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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/269,516	07/01/2014	8768865	103287 (822791)	4858

15093   7590   06/11/2014

Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 250 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Vidya NARAYANAN, San Diego, CA;
Sanjiv NANDA, Ramona, CA;
Fuming SHIH, Cambridge, MA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

IR103 (Rev. 10/09)

APPLE 1002

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: <u>Mail</u>   Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or <u>Fax</u>   (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

| 15093 | 7590 | 02/21/2014 |

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San Francisco, CA 94111-3834

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission filed via EFS-Web
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Dane Stephenson	(Depositor's name)
/Dane Stephenson/	(Signature)
May 20, 2014	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/269,516	10/07/2011	Vidya NARAYANAN	103287 (822791)	4858

TITLE OF INVENTION: LEARNING SITUATIONS VIA PATTERN MATCHING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	05/21/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
CHEN, ALAN S	2129	706-012000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Kilpatrick Townsend & Stockton LLP

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

QUALCOMM INCORPORATED

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

SAN DIEGO, CALIFORNIA

Please check the appropriate assignee category or categories (will not be printed on the patent) :   ☐ Individual   ☒ Corporation or other private group entity   ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)
☐ A check is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number ___201430___ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature ___/Scott L. McMillan/___   Date ___May 20, 2014___

Typed or printed name ___Scott L. McMillan___   Registration No. ___62,079___

Page 2 of 3

PTOL-85 Part B (10-13) Approved for use through 10/31/2013.   OMB 0651-0033   U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

2

Electronic Patent Application Fee Transmittal

Application Number:	13269516
Filing Date:	07-Oct-2011
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya NARAYANAN
Filer:	Scott Lee McMillan/Dane Stephenson
Attorney Docket Number:	103287 (822791)

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**960**

Electronic Acknowledgement Receipt

EFS ID:	19076755
Application Number:	13269516
International Application Number:	
Confirmation Number:	4858
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya NARAYANAN
Customer Number:	15093
Filer:	Scott Lee McMillan/Dane Stephenson
Filer Authorized By:	Scott Lee McMillan
Attorney Docket Number:	103287 (822791)
Receipt Date:	20-MAY-2014
Filing Date:	07-OCT-2011
Time Stamp:	13:18:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$ 960
RAM confirmation Number	10722
Deposit Account	201430
Authorized User	MCMILLAN, SCOTT
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	
Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)	
Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	93495-822791_Issue_Fee.pdf	1516308 aeff6fd66630d904326e6b0b252b15c10213f608	no	1

Warnings:

Information:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
2	Fee Worksheet (SB06)	fee-info.pdf	32100 e4a299c578d2d9e3e6c32ca3564a26439604c208	no	2

Warnings:

Information:

Total Files Size (in bytes):	1548408

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/269,516	10/07/2011	Vidya NARAYANAN	103287 (822791)	4858

7590   05/13/2014
Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

EXAMINER
CHEN, ALAN S

ART UNIT	PAPER NUMBER
2129	

NOTIFICATION DATE	DELIVERY MODE
05/13/2014	ELECTRONIC

NOTICE OF NON-COMPLIANT INFORMATION DISCLOSURE STATEMENT

An Information Disclosure Statement (IDS) filed _05-06-14_ in the above-identified application fails to meet the requirements of 37 CFR 1.97(d) for the reason(s) specified below. Accordingly, the IDS will be placed in the file, but the information referred to therein has not been considered.

The IDS is not compliant with 37 CFR 1.97(d) because:

☒ The IDS lacks a statement as specified in 37 CFR 1.97(e).

☐ The IDS lacks the fee set forth in 37 CFR 1.17(p).

☐ The IDS was filed after the issue fee was paid. Applicant may wish to consider filing a petition to withdraw the application from issue under 37 CFR 1.313(c) to have the IDS considered. See MPEP 1308.

571-272-4200 or 1-888-786-0101
Application Assistance Unit
Office of Data Management

FORM PTOM327-B (Rev. 02/08)

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** (Use as many sheets as necessary)	Complete if Known	
	Application Number	13/269,516
	Filing Date	2011-10-07
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	2617
	Examiner Name	CHEN, Alan S

Sheet		1	of	3	Attorney Docket Number	103287 (822791)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US-20120265716	10-18-2012	HUNZINGER, Jason Frank et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No1	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

Examiner Signature		Date Considered	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2]See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.
This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for form 1449/PTO	Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	Application Number	13/269,516
	Filing Date	2011-10-07
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	2617
	Examiner Name	CHEN, Alan S

Sheet	2	of	3	Attorney Docket Number	103287 (822791)

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE
A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Scott L. McMillan/	Date (YYYY-MM-DD)	2014-05-06
Name/Print	Scott L. McMillan	Registration Number	62,079

Electronic Acknowledgement Receipt

EFS ID:	18960684
Application Number:	13269516
International Application Number:	
Confirmation Number:	4858
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya NARAYANAN
Customer Number:	15093
Filer:	Scott Lee McMillan/Victoria MacMillan
Filer Authorized By:	Scott Lee McMillan
Attorney Docket Number:	103287 (822791)
Receipt Date:	06-MAY-2014
Filing Date:	07-OCT-2011
Time Stamp:	18:48:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	103287_Information_Disclosure_Statement_As_Filed_May_6_2014.pdf	103481 7bfa8eb3611b09e85e2f5c67af1fa2cdd558de95	no	3

Warnings:

Information:

This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	103481

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/269,516	10/07/2011	Vidya NARAYANAN	103287 (822791)	4858

15093   7590   03/25/2014
Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

EXAMINER
CHEN, ALAN S

ART UNIT	PAPER NUMBER
2129	

NOTIFICATION DATE	DELIVERY MODE
03/25/2014	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ipefiling@kilpatricktownsend.com
ocpat_uspto@qualcomm.com
qcominst@kilpatricktownsend.com

PTOL-90A (Rev. 04/07)

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
13/269,516	07 October, 2011	NARAYANAN ET AL.	103287 (822791)

	EXAMINER	
	ALAN CHEN	
	ART UNIT	PAPER
	2129	20140319

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

IDSs filed on 10/10/2013 are considered.

/Alan Chen/
Primary Examiner

PTO-90C (Rev.04-03)

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	Unknown 13/269516
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown 2129
	Examiner Name	Unknown Alan Chen

Sheet	1	of	3	Attorney Docket No: 103287

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US7570943	08-04-2009	SORVARI; Antti et al.	
	002	US20090305661	12-10-2009	ITO; Koichi	
	003	US20100001949	01-07-2010	SHKOLNIKOV; Mark et al.	
	004	US20100075639	03-25-2010	HORVITZ; Eric J. et al.	
	005	US20100217533	08-26-2010	NADKARNI; Vijay et al.	
	006	US20100299757	11-25-2010	LEE; Ho Sub	
	007	US20100317371	12-16-2010	WESTERINEN; William J. et al.	
	008	US20110039522	02-17-2011	PARTRIDGE; Kurt E. et al.	
	009	US20110070863	03-24-2011	MA; Yiming et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T6

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T2
	010	CALDERON, et al., "Recognition and Generation of Motion Primitives with Humanoid Robots", 2009 IEEE/ASME International Conference on Advanced Intelligent Mechatronics Suntec Convention and Exhibition Center, Singapore, July 14-17, 2009, pp. 917-922.	☐

EXAMINER SIGNATURE	/Alan Chen/	DATE CONSIDERED	10/06/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.C./

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	Unknown
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown
	Examiner Name	Unknown

Sheet	2	of	3	**Attorney Docket No:** 103287

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No.**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T2**
	011	GHASEMZADEH, et al., "Collaborative Signal Processing for Action Recognition in Body Sensor Networks: A Distributed Classification Algorithm Using Motion Transcripts," IPSN'10, April 12-16, 2010, Stockholm, Sweden, pp. 244-255.	☐
	012	HUYNH, et al., "Analyzing Features for Activity Recognition," Joint sOc-EUSAI conference, Grenoble, October 2005, 6 pages.	☐
	013	VALTONEN M. et al., "Proactive and Adaptive Fuzzy Profile Control for Mobile Phones", percom, pp.1-3, 2009 IEEE International Conference on Pervasive Computing and Communications, 2009.	☐
	014	YANG, et al., "Distributed Recognition of Human Actions Using Wearable Motion Sensor Networks," Journal of Ambient Intelligence and Smart Environments (2009), pp. 1-13.	☐
	015	YANG, et al., "Distributed Segmentation and Classification of Human Actions Using a Wearable Motion Sensor Network," Computer Society Conference on Computer Vision and Pattern Recognition Workshops, 2008. CVPRW '08, pp. 1-8.	☐

EXAMINER SIGNATURE	/Alan Chen/	**DATE CONSIDERED**	10/06/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.C./

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	13/269,516
	Filing Date	10-07-2011
	First Named Inventor	VIDYA NARAYANAN
	Art Unit	~~2617~~ 2129
	Examiner Name	~~Unassigned~~ Alan Chen

Sheet	1	**of**	2	**Attorney Docket No:** 103287 (822791)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number — Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
/AC/	001	US20070036347	02-15-2007	TEICHER; Mordechai	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document — Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
/AC/	002	GB2434504A	07-25-2007	KATSIRI ELEFTHERIA [GB]		☐
/AC/	003	WO2008054135A1	05-08-2008	SK TELECOM CO LTD [KR], et al.		☐

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T2
/AC/	004	INTERNATIONAL SEARCH REPORT AND WRITTEN OPINION - PCT/US2012/021743 - ISA/EPO - 2012-05-14 (103287WO) .	☐

EXAMINER SIGNATURE	/Alan Chen/	**DATE CONSIDERED**	10/06/2013

UNITED STATES PATENT AND TRADEMARK OFFICE

NOTICE OF ALLOWANCE AND FEE(S) DUE

				EXAMINER	

15093   7590   02/21/2014

Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

EXAMINER
CHEN, ALAN S

ART UNIT	PAPER NUMBER
2129	

DATE MAILED: 02/21/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/269,516	10/07/2011	Vidya NARAYANAN	103287 (822791)	4858

TITLE OF INVENTION: LEARNING SITUATIONS VIA PATTERN MATCHING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	05/21/2014

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN <u>THREE MONTHS</u> FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. <u>THIS STATUTORY PERIOD CANNOT BE EXTENDED.</u> SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

Page 1 of 3

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: <u>Mail</u> Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or <u>Fax</u> (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15093   7590   02/21/2014
Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/269,516	10/07/2011	Vidya NARAYANAN	103287 (822791)	4858

TITLE OF INVENTION: LEARNING SITUATIONS VIA PATTERN MATCHING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	05/21/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
CHEN, ALAN S	2129	706-012000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE   (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
❑ Issue Fee
❑ Publication Fee (No small entity discount permitted)
❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)
❑ A check is enclosed.
❑ Payment by credit card. Form PTO-2038 is attached.
❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
❑ Applicant certifying micro entity status. See 37 CFR 1.29
❑ Applicant asserting small entity status. See 37 CFR 1.27
❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____   Date _____

Typed or printed name _____   Registration No. _____

Page 2 of 3

PTOL-85 Part B (10-13) Approved for use through 10/31/2013.   OMB 0651-0033   U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

19

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/269,516	10/07/2011	Vidya NARAYANAN	103287 (822791)	4858

15093 7590 02/21/2014	EXAMINER	
Kilpatrick Townsend & Stockton/Qualcomm	CHEN, ALAN S	
Two Embarcadero Center		
8th Floor	ART UNIT	PAPER NUMBER
San Francisco, CA 94111-3834	2129	

DATE MAILED: 02/21/2014

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 307 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 307 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:
1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

	Application No. 13/269,516	Applicant(s) NARAYANAN ET AL.
Notice of Allowability	Examiner ALAN CHEN	Art Unit 2129	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *amendment and arguments submitted on 1/9/2014*.

    ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are *1,3-32 and 34-55*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    Certified copies:

      a) ☐ All   b) ☐ Some   *c) ☐ None of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

      * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date *10/18/2013*

3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

5. ☐ Examiner's Amendment/Comment

6. ☐ Examiner's Statement of Reasons for Allowance

7. ☐ Other _____.

/ALAN CHEN/
Primary Examiner, Art Unit 2129

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13269516	NARAYANAN ET AL.
	Examiner	Art Unit
	ALAN CHEN	2129

CPC

Symbol				Type	Version
G06N		99	005	F	20130101

CPC Combination Sets

Symbol				Type	Set	Ranking	Version

NONE		Total Claims Allowed:
		53
(Assistant Examiner)	(Date)	
/ALAN CHEN/ Primary Examiner.Art Unit 2129	2/13/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

U.S. Patent and Trademark Office

Part of Paper No. 20140213

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
(barcode)	13269516	NARAYANAN ET AL.
	Examiner	**Art Unit**
	ALAN CHEN	2129

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION	
CLASS	**SUBCLASS**	**CLAIMED**	**NON-CLAIMED**
706	12	G 0 6 F 17 / 20 (2006.01.01)	
CROSS REFERENCE(S)		G 0 1 D 15 / 00 (2006.01.01)	
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**		
702	127		

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	53	
/ALAN CHEN/ Primary Examiner.Art Unit 2129	2/13/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

U.S. Patent and Trademark Office

Part of Paper No. 20140213

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13269516	NARAYANAN ET AL.
	Examiner	**Art Unit**
	ALAN CHEN	2129

☐	Claims renumbered in the same order as presented by applicant	☐ CPA	☐ T.D.	☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	17	18	33	35	49	51								
2	3	18	19	34	36	50	52								
3	4	19	20	35	37	51	53								
4	5	20	21	36	38	52	54								
5	6	21	22	37	39	53	55								
6	7	22	23	38	40										
7	8	23	24	39	41										
8	9	24	25	40	42										
9	10	25	26	41	43										
10	11	26	27	42	44										
11	12	27	28	43	45										
12	13	28	29	44	46										
13	14	29	30	45	47										
14	15	30	31	46	48										
15	16	31	32	47	49										
16	17	32	34	48	50										

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	53	
/ALAN CHEN/ Primary Examiner.Art Unit 2129	2/13/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

U.S. Patent and Trademark Office

Part of Paper No. 20140213

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 4858

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/269,516	10/07/2011 **RULE**	706	2129	103287 (822791)

APPLICANTS

INVENTORS
Vidya NARAYANAN, San Diego, CA;
Sanjiv NANDA, Ramona, CA;
Fuming SHIH, Cambridge, MA;

** **CONTINUING DATA** **************************
This appln claims benefit of 61/434,400 01/19/2011

** **FOREIGN APPLICATIONS** **************************

** **IF REQUIRED, FOREIGN FILING LICENSE GRANTED** **
10/21/2011

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /ALAN S CHEN/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY CA	SHEETS DRAWINGS 5	TOTAL CLAIMS 55	INDEPENDENT CLAIMS 4

ADDRESS

Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834
UNITED STATES

TITLE

LEARNING SITUATIONS VIA PATTERN MATCHING

FILING FEE RECEIVED 3730	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees
		☐ 1.16 Fees (Filing)
		☐ 1.17 Fees (Processing Ext. of time)
		☐ 1.18 Fees (Issue)
		☐ Other _____
		☐ Credit

BIB (Rev. 05/07).

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*				*Complete if Known*	
				Application Number	13/269,516
				Filing Date	2011-10-07
				First Named Inventor	NARAYANAN, Vidya
				Art Unit	2617
				Examiner Name	CHEN, Alan S
Sheet	1	**of**	3	**Attorney Docket No:** 103287 (822791)	

U.S. PATENTS						
Examiner Initial*	Cite No[1]	Patent Number	Kind Code[2]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No[1]	Publication Number	Kind Code[2]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
/A.C./	001	20090303204	A1	2009-12-10	NASIRI, Steven S. et al.	
/A.C./	002	20110066383	A1	2011-03-17	JANGLE, Jeetendra et al.	

FOREIGN PATENT DOCUMENTS							
Examiner Initial*	Cite No[1]	Foreign Document Number[4]	Country Code[3]	Kind Code[5]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T[6]

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]

EXAMINER SIGNATURE	/Alan Chen/	**DATE CONSIDERED**	02/13/2014

Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination
	13/269,516	NARAYANAN ET AL.
	Examiner	Art Unit
	ALAN CHEN	2129

SEARCHED

Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner
see search history printouts		2/13/2014	AC

SEARCH NOTES (INCLUDING SEARCH STRATEGY)

	DATE	EXMR
updated EAST	2/13/2014	AC

I hereby certify that this correspondence is being filed via
EFS-Web with the United States Patent and Trademark Office
on _____January 9, 2014_____ .

KILPATRICK TOWNSEND & STOCKTON LLP

By: /Dane Stephenson/
  Dane Stephenson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Vidya NARAYANAN et al.	Confirmation No. 4858
Application No.: 13/269,516	Examiner: CHEN, ALAN S.
Filed: October 7, 2011	Technology Center/Art Unit: 2129
For: LEARNING SITUATIONS VIA PATTERN MATCHING	AMENDMENT
Customer No.: 15093	

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

   In response to the Office Action mailed October 10, 2013, please enter the following amendments and remarks:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 3 of this paper.

Remarks/Arguments begin on page 12 of this paper.

Amendments to the Specification:

Beginning on page 1, please replace the first paragraph with the following:

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority to U.S. Provisional Patent Application Ser. No.

61/434,400, entitled "Learning Situations via Pattern Matching," filed on January 19, 2011,

which is assigned to the assignee hereof and which is expressly incorporated herein by reference.

Additionally, U.S. Patent Application ~~No.~~ ~~——————~~ **No. 13/269,513**, filed October 7, 2011,

entitled "MACHINE LEARNING OF KNOWN OR UNKNOWN MOTION STATES WITH

SENSOR FUSION" ~~(Attorney Docket No. 93495-822645 (102259))~~ is being filed concurrently,

the entire disclosure of which is hereby incorporated by reference.

Amendments to the Claims:

1.   (Currently Amended) A method comprising:

monitoring, at a mobile device, input signals from a plurality of information sources associated with said mobile device;

detecting at least one condition based, at least in part, on at least one of said monitored input signals;

identifying a first pattern based, at least in part, on said at least one detected condition; and

fixing a subset of varying parameters associated with said first pattern **by associating at least one parameter of said subset of varying parameters with said first pattern to represent said at least one detected condition**, said varying parameters derived, at least in part, from said monitored input signals.

2.   (Canceled)

3.   (Currently Amended) The method of claim 2 1, wherein said fixing said subset of varying parameters comprises associating said varying parameters to represent a condition derived from said monitored input signals from at least one of the following disposed in said mobile device: an accelerometer, a Global Positioning System (GPS)-enabled device, a Wireless Fidelity (WiFi)-enabled device, or any combination thereof.

4.   (Original) The method of claim 1, and further comprising initiating a process to attempt a recognition of a second pattern in connection with said monitoring said input signals based, at least in part, on said first identified pattern.

5.   (Original) The method of claim 4, wherein said second pattern is recognized in a reduced set of varying parameters derived from said monitored input signals in response, at least in part, to said fixing of said subset of varying parameters.

6.   (Original) The method of claim 4, wherein said process further comprises:

capturing a snapshot of said monitored input signals in response to said detection of said at least one condition, said monitored input signals defining at least one context-related information stream; and

correlating said snapshot with said second pattern in a database.

7.   (Original) The method of claim 6, wherein said second pattern is attempted to be recognized in connection with correlating said snapshot with at least one of the following: a temporal pattern, an action-correlated pattern, a transition-correlated pattern, a relational pattern, or any combination thereof.

8.   (Original) The method of claim 6, wherein said snapshot comprises at least one of the following: a snapshot of said first identified pattern, a snapshot of said second pattern, a snapshot of said at least one context-related information stream, or any combination thereof.

9.   (Original) The method of claim 6, wherein said snapshot is correlated in connection with a captured history of said at least one context-related information stream.

10.   (Original) The method of claim 9, wherein said history comprises a time period captured prior to said detecting said at least one condition.

11.   (Original) The method of claim 10, wherein said time period comprises a time period existing for a threshold duration.

12.   (Original) The method of claim 11, wherein said threshold duration comprises a duration relevant to said at least one detected condition.

13.   (Original) The method of claim 6, wherein said database comprises at least one of the following: a condition database, a correlation database, or any combination thereof.

14.   (Original) The method of claim 13, wherein said condition database comprises said at least one context-related information stream.

15.   (Original) The method of claim 13, wherein said correlation database comprises at least one of the following: a condition correlation database, a transition correlation database, or any combination thereof.

16.   (Original) The method of claim 1, wherein at least one of said plurality of information sources comprises signals generated in response to at least one of the following: a user executing an instruction on said mobile device, a host application executing an instruction on said mobile device, or any combination thereof.

17.   (Original) The method of claim 16, wherein said host application executes said instruction in response to at least one signal received from at least one sensor associated with said mobile device.

18.   (Original) The method of claim 1, wherein said fixed subset of said varying parameters comprises said first pattern.

19.   (Original) The method of claim 1, and further comprising identifying at least one pattern irrelevant to said at least one condition in connection with said monitoring input signals.

20.   (Original) The method of claim 19, wherein said irrelevant pattern is identified via an application of at least one of the following: a context labeling-type process, a situation labeling-type process, or any combination thereof.

21.   (Original) The method of claim 19, wherein said irrelevant pattern is identified in connection with a user identifying at least one of the following: a relevant information source among said plurality of information sources, a relevant information stream among a plurality of context-related information streams, or any combination thereof.

22.   (Currently Amended) An apparatus comprising:

a mobile device comprising at least one processor configured to:

monitor input signals from a plurality of information sources associated with said

mobile device;

detect at least one condition based, at least in part, on at least one of said

monitored input signals;

identify a first pattern based, at least in part, on said at least one detected

condition; and

fix a subset of varying parameters associated with said first pattern **by associating**

at least one parameter of said subset of varying parameters with said first pattern to

represent said at least one detected condition, said varying parameters derived, at least in part,

from said monitored input signals.

23.   (Original) The apparatus of claim 22, wherein said at least one processor

is further configured to initiate a process to attempt a recognition of a second pattern in

connection with said processor to monitor said input signals based, at least in part, on said first

identified pattern.

24.   (Original) The apparatus of claim 23, wherein said second pattern is

associated with a reduced set of varying parameters derived from said monitored input signals

due, at least in part, to fixing said subset of varying parameters.

25.   (Original) The apparatus of claim 23, wherein said processor is further

configured to:

capture a snapshot of said monitored input signals in response to said detection of

said at least one condition, said monitored input signals defining at least one context-related

information stream; and

correlate said snapshot with said second pattern in a database.

26.   (Original) The apparatus of claim 25, wherein said snapshot comprises at least one of the following: a snapshot of said first identified pattern, a snapshot of said second pattern, a snapshot of said at least one context-related information stream, or any combination thereof.

27.   (Original) The apparatus of claim 25, wherein said second pattern is attempted to be recognized in connection with said correlation of said snapshot with at least one of the following: a temporal pattern, an action-correlated pattern, a transition-correlated pattern, a relational pattern, or any combination thereof.

28.   (Original) The apparatus of claim 25, wherein said snapshot is correlated in connection with a captured history of said at least one context-related information stream.

29.   (Original) The apparatus of claim 22, wherein at least one of said plurality of information sources comprises signals generated in response to at least one of the following: a user executing an instruction on said mobile device, a host application executing an instruction on said mobile device, or any combination thereof.

30.   (Original) The apparatus of claim 22, wherein said fixed subset of said varying parameters comprises said first pattern.

31.   (Original) The apparatus of claim 22, wherein said at least one processor is further configured to identify at least one pattern irrelevant to said at least one condition in connection with said processor to monitor said input signals.

32.   (Currently Amended) An apparatus comprising:
        means for monitoring, at a mobile device, input signals from a plurality of information sources associated with said mobile device;
        means for detecting at least one condition based, at least in part, on at least one of said monitored input signals;

means for identifying a first pattern based, at least in part, on said at least one detected condition; and

means for fixing a subset of varying parameters associated with said first pattern **by associating at least one parameter of said subset of varying parameters with said first pattern to represent said at least one detected condition**, said varying parameters derived, at least in part, from said monitored input signals.

33.   (Canceled)

34.   (Original) The apparatus of claim 32, and further comprising means for initiating a process to attempt a recognition of a second pattern in connection with said monitoring said input signals based, at least in part, on said first identified pattern.

35.   (Original) The apparatus of claim 34, wherein said second pattern is associated with a reduced set of varying parameters derived from said monitored input signals due, at least in part, to said fixing of said subset of varying parameters.

36.   (Original) The apparatus of claim 34, wherein said means for initiating said process further comprises:

means for capturing a snapshot of said monitored input signals in response to said detection of said at least one condition, said monitored input signals defining at least one context-related information stream; and

means for correlating said snapshot with said second pattern in a database.

37.   (Original) The apparatus of claim 36, wherein said second pattern is attempted to be recognized in connection with correlating said snapshot with at least one of the following: a temporal patter, an action-correlated pattern, a transition-correlated pattern; a relational pattern, or any combination thereof.

38.   (Original) The apparatus of claim 36, wherein said snapshot comprises at least one of the following: a snapshot of said first identified pattern, a snapshot of said second

pattern, a snapshot of said at least one context-related information stream, or any combination thereof.

39.   (Original) The apparatus of claim 36, wherein said snapshot is correlated in connection with a captured history of said at least one context-related information stream.

40.   (Original) The apparatus of claim 39, wherein said history comprises a time period captured prior to said detecting said at least one condition.

41.   (Original) The apparatus of claim 40, wherein said time period comprises a time period existing for a threshold duration.

42.   (Original) The apparatus of claim 41, wherein said threshold duration comprises a duration relevant to said at least one detected condition.

43.   (Original) The apparatus of claim 36, wherein said database comprises at least one of the following: a condition database, a correlation database, or any combination thereof.

44.   (Original) The apparatus of claim 32, wherein at least one of said plurality of information sources comprises signals generated in response to at least one of the following: a user executing an instruction on said mobile device, a host application executing an instruction on said mobile device, or any combination thereof.

45.   (Original) The apparatus of claim 32, wherein said fixed subset of said varying parameters comprises said first pattern.

46.   (Original) The apparatus of claim 32, and further comprising means for identifying at least one pattern irrelevant to said at least one condition in connection with said monitoring said input signals.

47.   (Original) The apparatus of claim 46, wherein said irrelevant pattern is identified via an application of at least one of the following: a context labeling-type process, a situation labeling-type process, or any combination thereof.

48.   (Currently Amended) An article comprising:

a non-transitory storage medium having instructions stored thereon executable by a special purpose computing platform at a mobile device to:

monitor input signals from a plurality of information sources associated with said mobile device;

detect at least one condition based, at least in part, on at least one of said monitored input signals;

identify a first pattern based, at least in part, on said at least one detected condition; and

fix a subset of varying parameters associated with said first pattern **by associating at least one parameter of said subset of varying parameters with said first pattern to represent said at least one detected condition**, said varying parameters derived, at least in part, from said monitored input signals.

49.   (Original) The article of claim 48, wherein said storage medium further includes instructions to initiate a process to attempt a recognition of a second pattern in connection with said monitoring said input signals based, at least in part, on said first identified pattern.

50.   (Original) The article of claim 49, wherein said instructions to initiate said process further comprise instructions to:

capture a snapshot of said monitored input signals in response to said detection of said at least one condition, said monitored input signals defining at least one context-related information stream; and

correlate said snapshot with said second pattern in a database.

51.   (Original) The article of claim 49, wherein said second pattern is attempted to be recognized in connection with at least one of the following: a temporal pattern, an action-correlated pattern, a transition-correlated pattern, a relational pattern, or any combination thereof.

52.   (Original) The article of claim 50, wherein said snapshot comprises at least one of the following: a snapshot of said first identified pattern, a snapshot of said second pattern, a snapshot of said at least one context-related information stream, or any combination thereof.

53.   (Original) The article of claim 50, wherein said snapshot is correlated in connection with a captured history of said at least one context-related information stream.

54.   (Original) The article of claim 48, wherein said storage medium further includes instructions to identify at least one pattern irrelevant to said at least one condition in connection with said monitoring said input signals.

55.   (Original) The article of claim 54, wherein said irrelevant pattern is identified via an application of at least one of the following: a context labeling-type process, a situation labeling-type process, or any combination thereof. .

Appl. No. 13/269,516
Amdt. dated January 9, 2014
Reply to Office Action mailed October 10, 2013

PATENT

REMARKS/ARGUMENTS

Prior to entry of this Amendment, claims 1-55 were pending for examination. Claims 1, 3, 22, 32, and 48 have been amended. No claims have been added. Claims 2 and 33 have been canceled. Hence, after entry of this amendment, claims 1, 3-32, and 34-55 will be pending for examination. Claims 1, 22, 32 and 48 are independent claims.

Claim Rejections Under 35 U.S.C. §102

The Office Action has rejected claims 1, 3-5, 16-21, 24, 29-32, 34-35, 44-49, 51, 54 and 55 under pre-AIA 35 U.S.C. 102(e) as allegedly being anticipated by U.S. Patent Publication No. 2011/0066383 to Jangle et al. (hereinafter Jangle). In light of the following arguments, Applicants respectfully request reconsideration and withdrawal of these rejections.

Claims 1, 22, 32 and 48

Claims 1, 22, 32, and 48 have been amended to incorporate aspects of former claims 2 and 33, to clarify that "fixing a subset of carrying parameters" is done "by associating at least one parameter of said subset of varying parameters with said first pattern to represent said at least one detected condition." In addition to the support found in former claims 2 and 33, support for these amendments can also be found throughout the specification and figures, such as in paragraphs [0034] and [0055], for example. Jangle clearly fails to teach or suggest at least this feature.

Jangle discloses techniques for identifying an activity of an object by matching sequences of elemental motions with stored activities.[1] In its rejection of former claim 2, the Office Action cites FIG. 6 as allegedly disclosing "associating at least one parameter…with said first pattern to represent said at least one detected condition."[2] The Office Action's reasoning, however, is problematic.

In its rejection of claim 1, for example, the Office Action alleges that certain features recited in claim 1 are disclosed in Jangle as follows:

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[1] *See Jangle*, Abstract.
[2] *Office Action*, p. 3.

Appl. No. 13/269,516
Amdt. dated January 9, 2014
Reply to Office Action mailed October 10, 2013

PATENT

Recited Feature	Alleged Corresponding Feature[3]
"varying parameters"	input signals
"condition"	sensed acceleration
"first pattern"	acceleration signature

Following this logic, to anticipate the language "associating at least one parameter…with said first pattern to represent said at least one detected condition," Jangle would necessarily have to disclose associating at least one *input signal* with an *acceleration signature* to represent a *sensed acceleration*. But Jangle does not disclose anything remotely similar.

As Jangle teaches in FIG. 6, an acceleration signature is generated based on sensed acceleration and is later matched against stored signatures. Nothing is mentioned that could be interpreted as "associating" an input signal with an acceleration signature, much less doing so to "represent" a sensed acceleration. In fact, it is unclear how any aspect of FIG. 6 could be interpreted, even broadly, as "associating" or "representing" anything.

The Office Action's reasoning provides no clarity on the matter, and is clearly insufficient to support a rejection under § 102. In its rejection of claim 2, the Office Action claims FIG. 6 discloses "associating at least one parameter…with said first pattern to represent said at least one detected condition" because "matching signatures involves fixing input signals to a relative statistical range to see if there is an approximate match with known/stored signatures that represent known conditions."[4] But even if it were true that Jangle indeed discloses "fixing input signals to a relative statistical range," this is entirely unrelated to the language of claim 2. The Office Action therefore fails to provide any reasoning or other support for how Jangle is alleged to disclose "associating at least one parameter…with said first pattern to represent said at least one detected condition."

In light of these arguments, Jangle fails to teach or suggest at least this feature of claim 1. As such, Applicants respectfully request withdrawal of the rejection of claims 1, 22, 32, and 48 under § 102.

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[3] *See id.* at 2-3.
[4] *Office Action*, p. 3.

Claims 3-5, 16-21, 24, 29-31, 34-35, 44-47, 49, 51, 54 and 55

Claims 3-5, 16-21, 24, 29-31, 34-35, 44-47, 49, 51, 54 and 55 are dependent on claims 1,

22, 32 and 48, which are allowable for the reasons discussed above. Therefore, Applicants assert

that claims 3-5, 16-21, 24, 29-31, 34-35, 44-47, 49, 51, 54 and 55 are allowable for at least the

reason that they are dependent on an allowable claim.

__Allowable Claims__

Claims 6-15, 25-28, 36-43, 50, 52 and 53 are objected to as being dependent upon a

rejected base claim (claims 1, 22, 32, and 48), but would be allowable if rewritten in independent

form including all of the limitations of the base claim and any intervening claims. As indicated

above, however, independent claims 1, 22, 32, and 48 are indeed allowable. Therefore, claims 6-

15, 25-28, 36-43, 50, 52 and 53 are allowable for at least the reason that they are dependent on

an allowable claim.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this

Application are in condition for allowance. The issuance of a formal Notice of Allowance at an

early date is respectfully requested.

It is believed that all of the pending claims have been addressed in this paper.

However, failure to address a specific rejection, issue, or comment, does not signify agreement

with or concession of that rejection, issue or comment. In addition, because the arguments made

above are not intended to be exhaustive, there may be reasons for patentability of any or all

pending claims (or other claims) that have not been expressed. Finally, nothing in this paper

should be construed as an intent to concede any issue with regard to any claim, except as

specifically stated in this paper, and the amendment of any claim does not necessarily signify

concession of unpatentability of the claim prior to its amendment.

If the Examiner believes a telephone conference would expedite

prosecution of this application, please telephone the undersigned at 303.571.4000.

Respectfully submitted,

/Scott L. McMillan/

_____

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Reg. No. 62,079

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65946086V.1

Electronic Acknowledgement Receipt

EFS ID:	17862696
Application Number:	13269516
International Application Number:	
Confirmation Number:	4858
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya NARAYANAN
Customer Number:	15093
Filer:	Scott Lee McMillan/Dane Stephenson
Filer Authorized By:	Scott Lee McMillan
Attorney Docket Number:	103287 (822791)
Receipt Date:	09-JAN-2014
Filing Date:	07-OCT-2011
Time Stamp:	11:18:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		93495-822791_Amendment. pdf	142690 e9e3b992991e2cbce32a18c5d129e8804a7facc5	yes	15

Multipart Description/PDF files in .zip description		
Document Description	Start	End
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Specification	2	2
Claims	3	11
Applicant Arguments/Remarks Made in an Amendment	12	15

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/269,516	Filing Date 10/07/2011	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	**01/09/2014**	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 53	Minus	** 55	= 0		x $80 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0		x $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	**0**

		(Column 1)		(Column 2)	(Column 3)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/DORIS BURNS/

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	13/269,516
	Filing Date	2011-10-07
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	2617
	Examiner Name	CHEN, Alan S
Sheet 1 of 3	**Attorney Docket No:** 103287 (822791)	

U.S. PATENTS

Examiner Initial*	Cite No[1]	Patent Number	Kind Code[2]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No[1]	Publication Number	Kind Code[2]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	20090303204	A1	2009-12-10	NASIRI, Steven S. et al.	
	002	20110066383	A1	2011-03-17	JANGLE, Jeetendra et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No[1]	Foreign Document Number[4]	Country Code[3]	Kind Code[5]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T[6]

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]

EXAMINER SIGNATURE   **DATE CONSIDERED**

Substitute for form 1449/PTO				*Complete if Known*	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	13/269,516
				Filing Date	2011-10-07
				First Named Inventor	NARAYANAN, Vidya
(Use as many sheets as necessary)				Art Unit	2617
				Examiner Name	CHEN, Alan S
Sheet	2	**of**	3	**Attorney Docket No:** 103287 (822791)	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Scott L. McMillan/	Date (YYYY-MM-DD)	2013-10-18
Name/Print	Scott L. McMillan	Registration Number	62,079

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt

EFS ID:	17172901
Application Number:	13269516
International Application Number:	
Confirmation Number:	4858
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya NARAYANAN
Customer Number:	15093
Filer:	Scott Lee McMillan/Victoria MacMillan
Filer Authorized By:	Scott Lee McMillan
Attorney Docket Number:	103287 (822791)
Receipt Date:	18-OCT-2013
Filing Date:	07-OCT-2011
Time Stamp:	18:17:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	103287_Information_Disclosure_Statement_As_Filed_Oct_18_2013.pdf	123818 364ecf987b9092af2cec1c33bbc22e000ea67503	no	3

Warnings:

Information:

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/269,516	10/07/2011	Vidya NARAYANAN	103287 (822791)	4858

15093   7590   10/10/2013
Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

EXAMINER
CHEN, ALAN S

ART UNIT	PAPER NUMBER
2129	

NOTIFICATION DATE	DELIVERY MODE
10/10/2013	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ipefiling@kilpatricktownsend.com
ocpat_uspto@qualcomm.com
qcominst@kilpatricktownsend.com

PTOL-90A (Rev. 04/07)

Office Action Summary	Application No. 13/269,516	Applicant(s) NARAYANAN ET AL.
	Examiner ALAN CHEN	Art Unit 2129	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/7/2011*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____ .
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____ ; the restriction requirement and election have been incorporated into this action.
4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-55* is/are pending in the application.
     5a) Of the above claim(s) _____ is/are withdrawn from consideration.
6)☐ Claim(s) _____ is/are allowed.
7)☒ Claim(s) *1-5,16-24,29-35,44-49,51,54 and 55* is/are rejected.
8)☒ Claim(s) *6-15,25-28,36-43,50,52 and 53* is/are objected to.
9)☐ Claim(s) _____ are subject to restriction and/or election requirement.
* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.
11)☒ The drawing(s) filed on *10/7/2011* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   Certified copies:
      a)☐ All   b)☐ Some * c)☐ None of the:
         1.☐ Certified copies of the priority documents have been received.
         2.☐ Certified copies of the priority documents have been received in Application No. _____ .
         3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
      * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1) ☒ Notice of References Cited (PTO-892)
2) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *6/18 and 10/7*.
3) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
4) ☐ Other: _____ .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1.   The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C.

102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section
> 122(b), by another filed in the United States before the invention by the applicant for patent or
> (2) a patent granted on an application for patent by another filed in the United States before
> the invention by the applicant for patent, except that an international application filed under
> the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an
> application filed in the United States only if the international application designated the United
> States and was published under Article 21(2) of such treaty in the English language.

2.   Claims 1-5,16-21-24,29-35,44-49,51,54 and 55 are rejected under pre-AIA 35

U.S.C. 102(e) as being anticipated by US Pat. Pub. No. 2011/0066383 to Jangle et al.

(hereinafter Jangle).

3.   Per claim 1, Jangle discloses method comprising: monitoring, at a mobile device

(fig. 1, item 100; paragraph 28), input signals from a plurality of information sources

associated with said mobile device *(fig. 1, various sensors to external environment*

generate signals as input; paragraph 30); detecting at least one condition based, at

least in part, on at least one of said monitored input signals *(figs. 5 and 6, sensed*

acceleration is a detected condition, e.g., if there is a detected acceleration, than look

for acceleration signature); identifying a first pattern based, at least in part, on said at

least one detected condition *(figs. 5 and 6, acceleration signature is a pattern detected*

and to be matched with known signatures); and fixing a subset of varying parameters

associated with said first pattern *(fig. 5, input signals varies and acceleration signature*

may or may not exactly match known accelerations signatures; fig. 6, items 620 and

630, matching signatures involves fixing input signals to a relative statistical range to

see if there an approximate match with known/stored signatures), said varying

parameters derived, at least in part, from said monitored input signals *(input signals*

from sensor generates the acceleration signature).

4.   Per claim 2, Jangle discloses claim 1, further disclosing fixing said subset of

varying parameters comprises associating at least one parameter of said subset of

varying parameters with said first pattern to represent said at least one detected

condition *fig. 6, items 620 and 630, matching signatures involves fixing input signals to*

a relative statistical range to see if there an approximate match with known/stored

signatures that represent known conditions such as falling and lying down, slipping and

falling on back on a bouncy surface, etc.).

5.   Per claim 3, Jangle discloses claim 2, further disclosing said fixing said subset of

varying parameters comprises associating said varying parameters to represent a

condition derived from said monitored input signals from at least one of the following

disposed in said mobile device: an accelerometer, a Global Positioning System (GPS)-

enabled device, a Wireless Fidelity (WiFi)-enabled device, or any combination thereof

(fig. 1, items 112-116, 190, accelerometer, GPS, etc.).

6.   Per claim 4, Jangle discloses claim 1, further disclosing initiating a process to

attempt a recognition of a second pattern in connection with said monitoring said input

signals based, at least in part, on said first identified pattern *(fig. 3, different levels of*

patterns shown, first pattern is elemental motion, item 310; second pattern is identified activities, item 320; third pattern is identified behaviors, item 330).

7.   Per claim 5, Jangle discloses claim 4, further disclosing said second pattern is recognized in a reduced set of varying parameters derived from said monitored input signals in response, at least in part, to said fixing of said subset of varying parameters (paragraph 43, sequences of elemental motions form second pattern).

8.   Per claim 16, Jangle discloses claim 1, further disclosing at least one of said plurality of information sources comprises signals generated in response to at least one of the following: a user executing an instruction on said mobile device, a host application executing an instruction on said mobile device, or any combination thereof (fig. 1, host application executes instructions to collect sensor data, match for patterns, etc.).

9.   Per claim 17, Jangle discloses claim 16, further disclosing said host application executes said instruction in response to at least one signal received from at least one sensor associated with said mobile device (fig. 1, item 1 and 5, input sensor data required for host to further execute matching/analysis functions).

10.   Per claim 18, Jangle discloses claim 1, further disclosing said fixed subset of said varying parameters comprises said first pattern (fig. 3, various levels of patterns identified from matching).

11.   Per claim 19, Jangle discloses claim 1, and further comprising identifying at least one pattern irrelevant to said at least one condition in connection with said monitoring input signals (paragraph 67, filter out signals).

12.   Per claim 20, Jangle discloses claim 19, further disclosing said irrelevant pattern

is identified via an application of at least one of the following: a context labeling-type

process, a situation labeling-type process, or any combination thereof *(fig. 3, filtering out*

signals is part of attempting to identify some activity/situation that user is encountering,

e.g., such as slipping/falling).

13.   Per claim 21, Jangle discloses claim 19, further disclosing said irrelevant pattern

is identified in connection with a user identifying at least one of the following: a relevant

information source among said plurality of information sources, a relevant

information stream among a plurality of context-related information streams, or

any combination thereof *(paragraph 67, filtering out signals identifies relevant/pertinent*

signals while removing irrelevant ones from analysis).

14.   Claims 22-24,29-31 and 32-35 and 44-47 and 48,49,54,55 are substantially

similar to claims 1-5,16-21. Therefore the rejection of claims 1-5 and 16-21 are applied

accordingly.

15.   Per claim 51, Jangle discloses claim 49, further disclosing said second pattern is

attempted to be recognized in connection with at least one of the following: a temporal

pattern, an action-correlated pattern, a transition-correlated pattern, a relational pattern,

or any combination thereof *(fig. 5, input signals can be construed to be a temporal and*

action-correlated pattern).

Allowable Subject Matter

16.   Claims 6-15,25-28,36-43,50,52 and 53 are objected to as being dependent upon

a rejected base claim, but would be allowable if rewritten in independent form including

all of the limitations of the base claim and any intervening claims.

Contact Information

17.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to ALAN CHEN whose telephone number is (571)272-

4143. The examiner can normally be reached on M-F 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Jeffrey A. Gaffin can be reached on (571) 272-4146. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Alan Chen/
Primary Examiner, Art Unit 2129
10/6/2013

		Application/Control No.	Applicant(s)/Patent Under Reexamination
Notice of References Cited		13/269,516	NARAYANAN ET AL.
		Examiner	Art Unit	
		ALAN CHEN	2129	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2011/0066383	03-2011	Jangle et al.	702/19
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited   Part of Paper No. 20131006

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	Unknown
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown
	Examiner Name	Unknown
Sheet 1 of 3	**Attorney Docket No:** 103287	

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US7570943	08-04-2009	SORVARI; Antti et al.	
	002	US20090305661	12-10-2009	ITO; Koichi	
	003	US20100001949	01-07-2010	SHKOLNIKOV; Mark et al.	
	004	US20100075639	03-25-2010	HORVITZ; Eric J. et al.	
	005	US20100217533	08-26-2010	NADKARNI; Vijay et al.	
	006	US20100299757	11-25-2010	LEE; Ho Sub	
	007	US20100317371	12-16-2010	WESTERINEN; William J. et al.	
	008	US20110039522	02-17-2011	PARTRIDGE; Kurt E. et al.	
	009	US20110070863	03-24-2011	MA; Yiming et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T6

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T2
	010	CALDERON, et al., "Recognition and Generation of Motion Primitives with Humanoid Robots", 2009 IEEE/ASME International Conference on Advanced Intelligent Mechatronics Suntec Convention and Exhibition Center, Singapore, July 14-17, 2009, pp. 917-922.	☐

EXAMINER SIGNATURE	/Alan Chen/	DATE CONSIDERED	10/06/2013

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.C./

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	Unknown
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown
	Examiner Name	Unknown

Sheet	2	of	3	Attorney Docket No: 103287

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No.**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T2**
	011	GHASEMZADEH, et al., "Collaborative Signal Processing for Action Recognition in Body Sensor Networks: A Distributed Classification Algorithm Using Motion Transcripts," IPSN'10, April 12-16, 2010, Stockholm, Sweden, pp. 244-255.	☐
	012	HUYNH, et al., "Analyzing Features for Activity Recognition," Joint sOc-EUSAI conference, Grenoble, October 2005, 6 pages.	☐
	013	VALTONEN M. et al., "Proactive and Adaptive Fuzzy Profile Control for Mobile Phones", percom, pp.1-3, 2009 IEEE International Conference on Pervasive Computing and Communications, 2009.	☐
	014	YANG, et al., "Distributed Recognition of Human Actions Using Wearable Motion Sensor Networks," Journal of Ambient Intelligence and Smart Environments (2009), pp. 1-13.	☐
	015	YANG, et al., "Distributed Segmentation and Classification of Human Actions Using a Wearable Motion Sensor Network," Computer Society Conference on Computer Vision and Pattern Recognition Workshops, 2008. CVPRW '08, pp. 1-8.	☐

EXAMINER SIGNATURE	/Alan Chen/	DATE CONSIDERED	10/06/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.C./

	Application/Control No.	Applicant(s)/Patent under Reexamination
Search Notes	13/269,516	NARAYANAN ET AL.
	Examiner	Art Unit
	ALAN CHEN	2129

SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
USPAT, USPGPUB, EPO, JPO, DERWENT, IBM_TDB	10/6/2013	ASC
limited class search; classes 701, 702, 706	10/6/2013	ASC

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

U.S. Patent and Trademark Office

Part of Paper No. 20131006

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	13/269,516
	Filing Date	10-07-2011
	First Named Inventor	VIDYA NARAYANAN
	Art Unit	2617
	Examiner Name	Unassigned

Sheet	1	of	2	Attorney Docket No: 103287 (822791)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US20070036347	02-15-2007	TEICHER; Mordechai	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	002	GB2434504A	07-25-2007	KATSIRI ELEFTHERIA [GB]		☐
	003	WO2008054135A1	05-08-2008	SK TELECOM CO LTD [KR], et al.		☐

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T2
	004	INTERNATIONAL SEARCH REPORT AND WRITTEN OPINION - PCT/US2012/021743 - ISA/EPO - 2012-05-14 (103287WO) .	☐

EXAMINER SIGNATURE	/Alan Chen/	**DATE CONSIDERED**	10/06/2013

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. 3 Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). 4 For Japanese **patent** documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. 5 Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. 6 Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	LEARNING SITUATIONS VIA PATTERN MATCHING

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☒ Application No. 13/269,516   filed on October 07, 2011

   ☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: Vidya NARAYANAN	Date: 6/26/13
Signature:	Citizen of: US
Inventor two: Sanjiv NANDA	Date:
Signature:	Citizen of: US

☒ Additional inventors or a legal representative are being named on ___1 of 2___ additional form(s) attached hereto.

2

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	LEARNING SITUATIONS VIA PATTERN MATCHING

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☒ Application No. 13/269,516 _____ filed on October 07, 2011 _____

☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: Vidya NARAYANAN _____ Date: _____

Signature: _____ Citizen of: US

Inventor two: Sanjiv NANDA _____ Date: 6/24/13

Signature: _____ Citizen of: US

☒ Additional inventors or a legal representative are being named on ___ 1 of 2 ___ additional form(s) attached hereto.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	LEARNING SITUATIONS VIA PATTERN MATCHING

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☒ Application No. 13/269,516   filed on October 07, 2011

     ☐ As amended on _____ (if applicable);

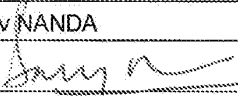I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: Fuming SHIH   Date: June 25, 2013

Signature: _Fuming Shih_   Citizen of: TW

Inventor two: _____   Date: _____

Signature: _____   Citizen of: _____

☒ Additional inventors or a legal representative are being named on ____2 of 2____ additional form(s) attached hereto.

Electronic Acknowledgement Receipt

EFS ID:	16236630
Application Number:	13269516
International Application Number:	
Confirmation Number:	4858
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya NARAYANAN
Customer Number:	15093
Filer:	Scott Lee McMillan/Dane Stephenson
Filer Authorized By:	Scott Lee McMillan
Attorney Docket Number:	103287 (822791)
Receipt Date:	03-JUL-2013
Filing Date:	07-OCT-2011
Time Stamp:	18:50:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	93495-822791_Supplemental_Declaration.pdf	4137279 9a1edbea301649ea7c34914e6e8ae5b31d5a465e	no	3

Warnings:

Information:

Total Files Size (in bytes):	4137279

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/269,516	10/07/2011	Vidya NARAYANAN	103287 (822791)

CONFIRMATION NO. 4858

15093
Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

PUBLICATION NOTICE

OC000000057154448

Title:LEARNING SITUATIONS VIA PATTERN MATCHING

Publication No.US-2012-0265717-A1
Publication Date:10/18/2012

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/269,516	10/07/2011	2617	3730	103287 (822791)	55	4

CONFIRMATION NO. 4858

15093
Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

UPDATED FILING RECEIPT

OC000000055280665

Date Mailed: 07/12/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)
Vidya NARAYANAN, San Diego, CA;
Sanjiv NANDA, Ramona, CA;
Fuming SHIH, Cambridge, MA;
Assignment For Published Patent Application
QUALCOMM INCORPORATED, San Diego, CA
Power of Attorney: The patent practitioners associated with Customer Number 15093

Domestic Priority data as claimed by applicant
This appln claims benefit of 61/434,400 01/19/2011

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 10/21/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/269,516**

Projected Publication Date: 10/18/2012

Non-Publication Request: No

Early Publication Request: No

page 1 of 3

Title

LEARNING SITUATIONS VIA PATTERN MATCHING

Preliminary Class

455

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

<u>GRANTED</u>

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

<u>NOT GRANTED</u>

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit <u>SelectUSA.gov</u>.

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number
13/269,516

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	380
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(i))	55 minus 20 =	* 35			OR	x 60 =	2100
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1				x 250 =	250
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	3600

APPLICATION AS AMENDED - PART II

AMENDMENT A

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/269,516	10/07/2011	Vidya NARAYANAN	103287 (822791)

CONFIRMATION NO. 4858

15093
Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

POA ACCEPTANCE LETTER

OC000000055280684

Date Mailed: 07/12/2012

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/07/2011.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/nton/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Substitute for form 1449/PTO	*Complete if Known*	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*	**Application Number**	13/269,516
	Filing Date	10-07-2011
	First Named Inventor	VIDYA NARAYANAN
	Art Unit	2617
	Examiner Name	Unassigned
Sheet 1 of 2	**Attorney Docket No:** 103287 (822791)	

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number — Number-Kind Code[2](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US20070036347	02-15-2007	TEICHER; Mordechai	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document — Country Code[3]-Number[4]-Kind Code[5](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	002	GB2434504A	07-25-2007	KATSIRI ELEFTHERIA [GB]		☐
	003	WO2008054135A1	05-08-2008	SK TELECOM CO LTD [KR], et al.		☐

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T2
	004	INTERNATIONAL SEARCH REPORT AND WRITTEN OPINION - PCT/US2012/021743 - ISA/EPO - 2012-05-14 (103287WO) .	☐

EXAMINER SIGNATURE   **DATE CONSIDERED**

Based on Form PTO/SB/08a; SB/08b
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO	*Complete if Known*	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*	Application Number	13/269,516
	Filing Date	10-07-2011
	First Named Inventor	VIDYA NARAYANAN
	Art Unit	2617
	Examiner Name	Unassigned

Sheet	2	of	2	Attorney Docket No: 103287 (822791)

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

SIGNATURE
A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Scott L. McMillan/	Date (YYYY-MM-DD)	2012-06-18
Name/Print	Scott L. McMillan	Registration Number	62,079

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Kilpatrick Townsend 64361890 1

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	13/269,516
	Filing Date	10-07-2011
	First Named Inventor	VIDYA NARAYANAN
	Art Unit	2617
	Examiner Name	Unassigned

Sheet	1	of	2	Attorney Docket No: 103287 (822791)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US20070036347	02-15-2007	TEICHER; Mordechai	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T6
	002	GB2434504A	07-25-2007	KATSIRI ELEFTHERIA [GB]		☐
	003	WO2008054135A1	05-08-2008	SK TELECOM CO LTD [KR], et al.		☐

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T2
	004	INTERNATIONAL SEARCH REPORT AND WRITTEN OPINION - PCT/US2012/021743 - ISA/EPO - 2012-05-14 (103287WO) .	☐

EXAMINER SIGNATURE	DATE CONSIDERED

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	13/269,516
	Filing Date	10-07-2011
	First Named Inventor	VIDYA NARAYANAN
	Art Unit	2617
	Examiner Name	Unassigned

Sheet	2	of	2	**Attorney Docket No:** 103287 (822791)

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Scott L. McMillan/	Date (YYYY-MM-DD)	2012-06-18
Name/Print	Scott L. McMillan	Registration Number	62,079

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Kilpatrick Townsend 64361890 1

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(54) Abstract Title: **Pattern Recognition Systems**

(57)   This invention generally relates to methods, apparatus and computer program code for classifying data
representing patterns of activity, in particular activity in physical space as defined by spatial location data, in
particular in mobile communications networks, such as digital mobile phone networks.
A user activity monitoring system for a digital mobile communications network, the system comprising: an input
for receiving spatial position information from a plurality of mobile communications devices coupled to said
network; a module for constructing a trajectory for each of said devices, a trajectory of a device comprising a time
series of positions of the device; and a classification system configured to classify said trajectories into selected
classes of a predetermined set of classes using a plurality of hidden Markov models or Rete networks to provide
a classification data output responsive to said trajectory classification.

Figure 21

GB 2 434 504 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.
Original Printed on Recycled Paper

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PublishAbstractEvent()

Figure 1

Figure 2

Figure 3

PublishAbstractEvent()

KB

DeductiveKB

Rete Manager

ExecuteReteCommand()

Sampler

Adaptor

Trajectory()
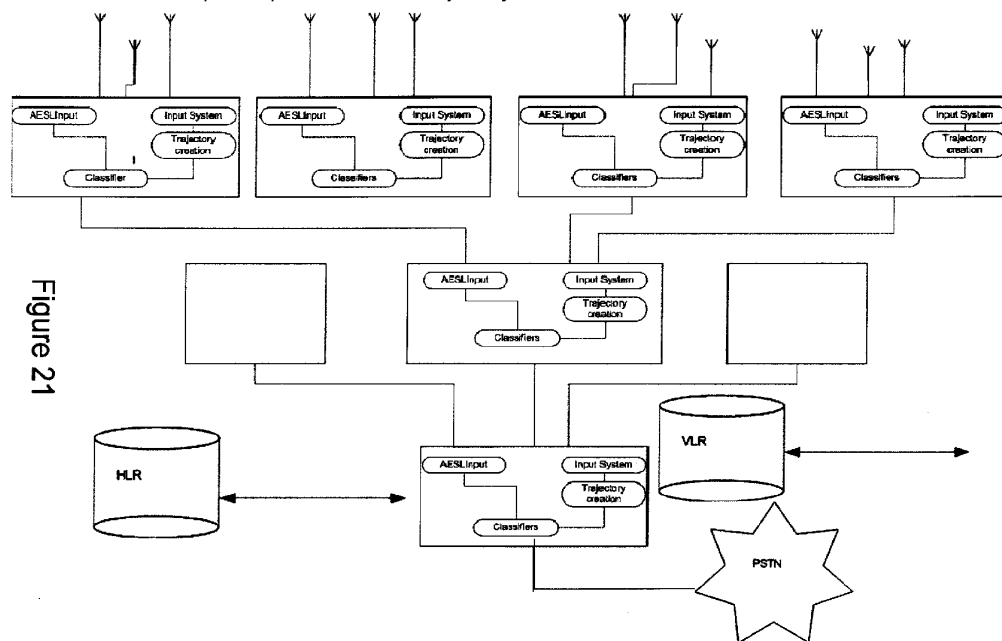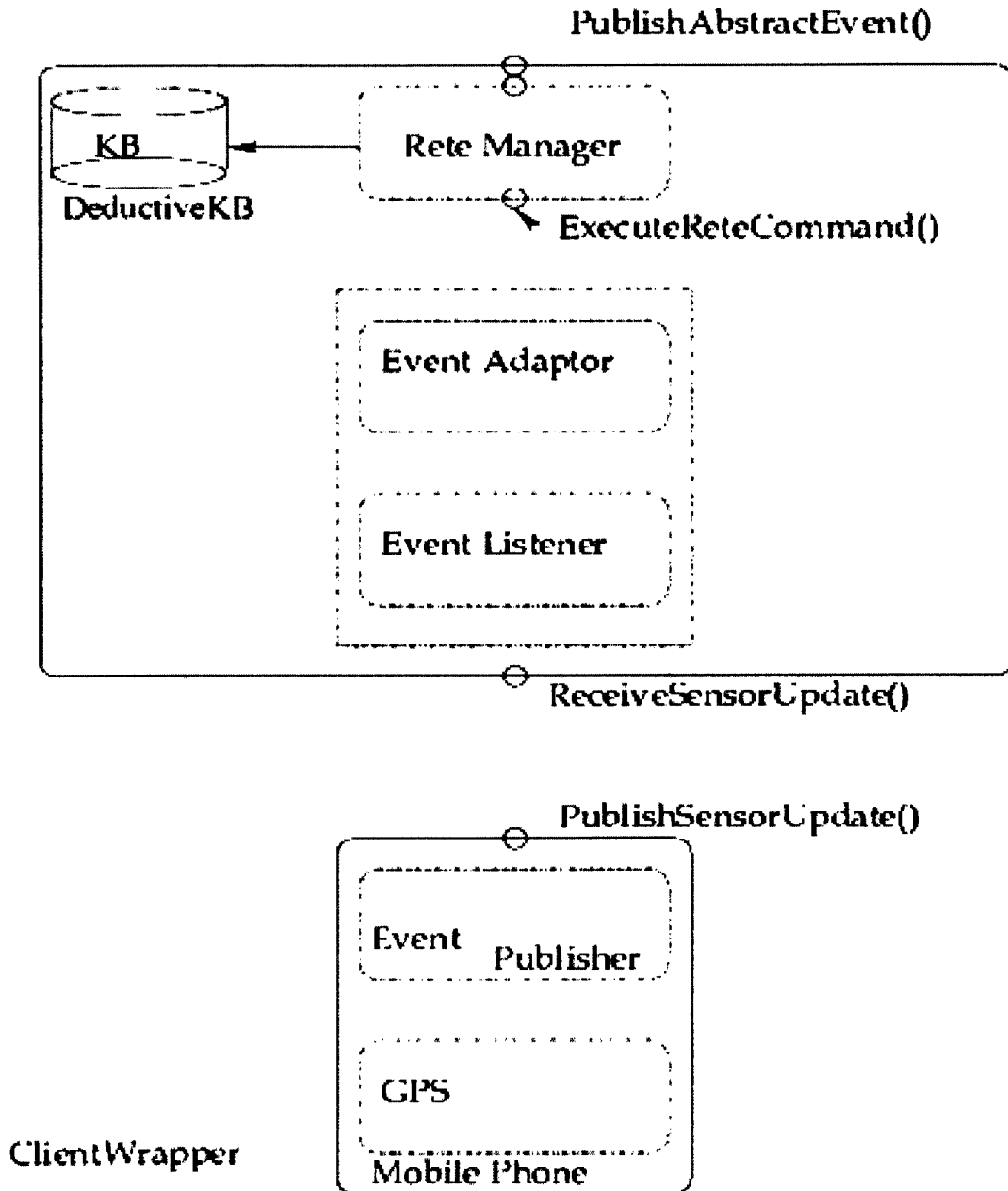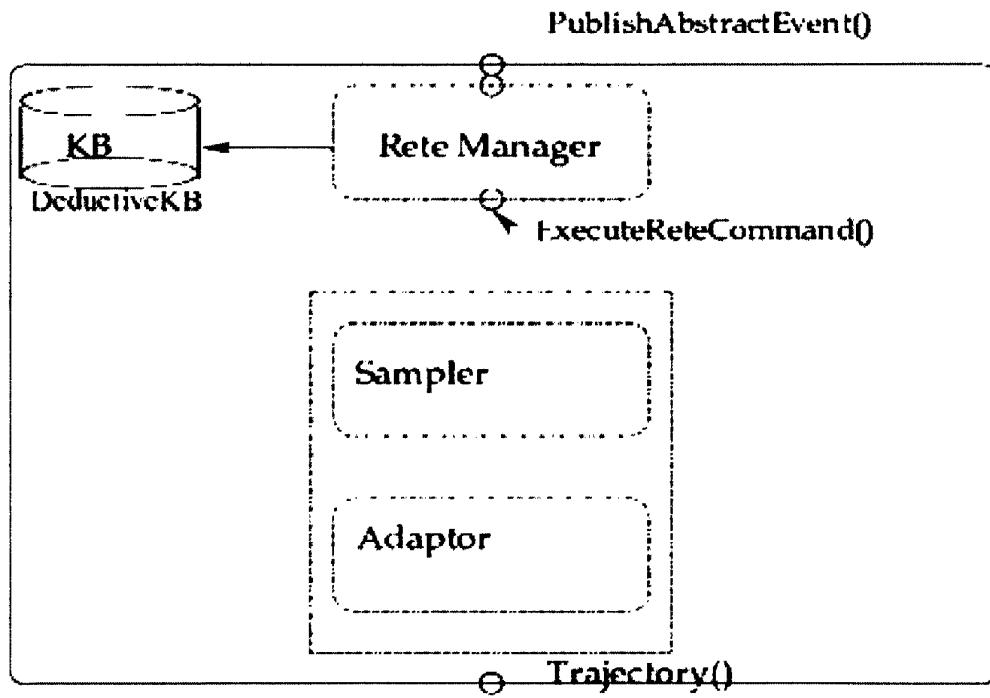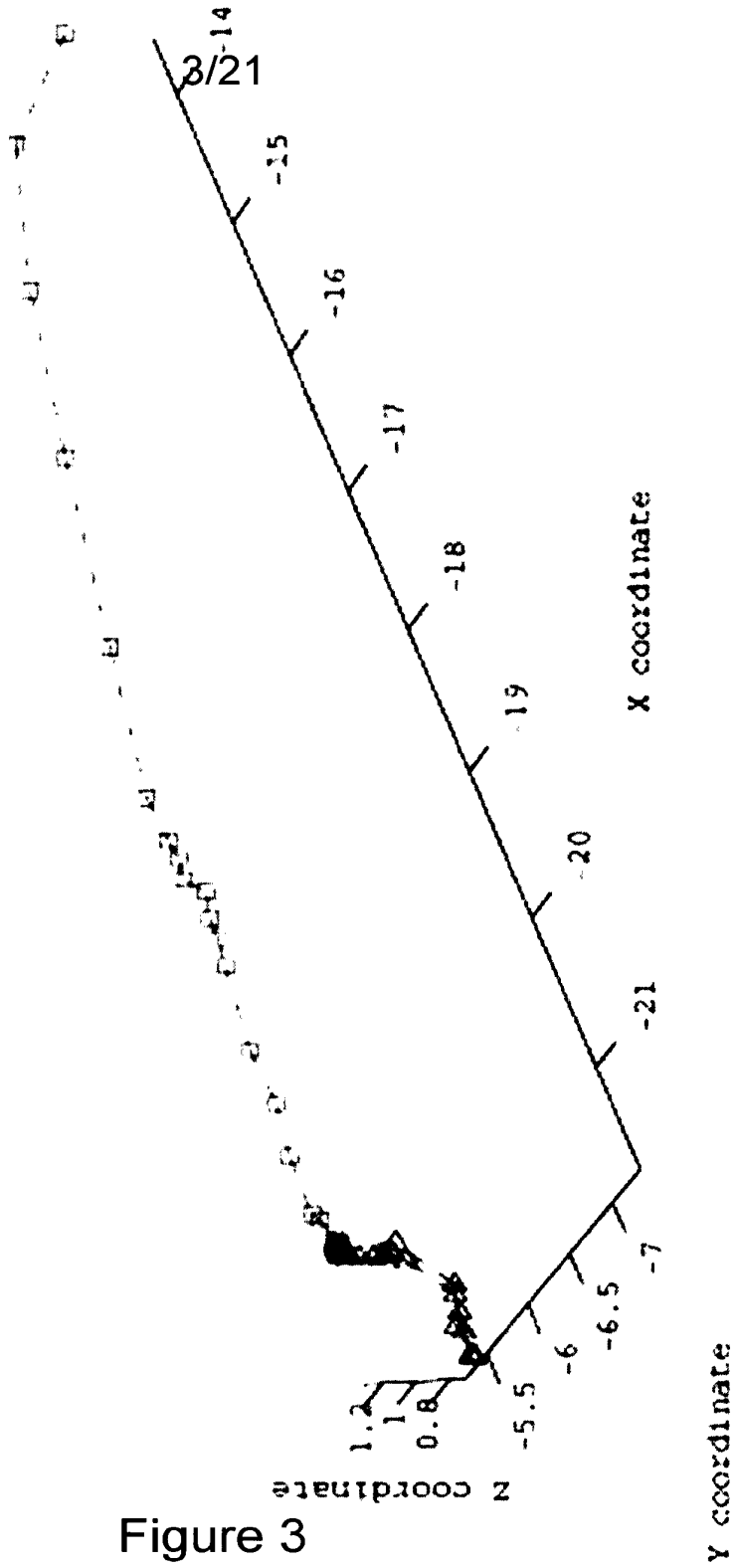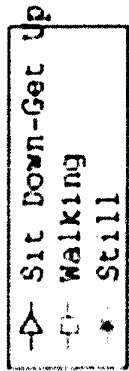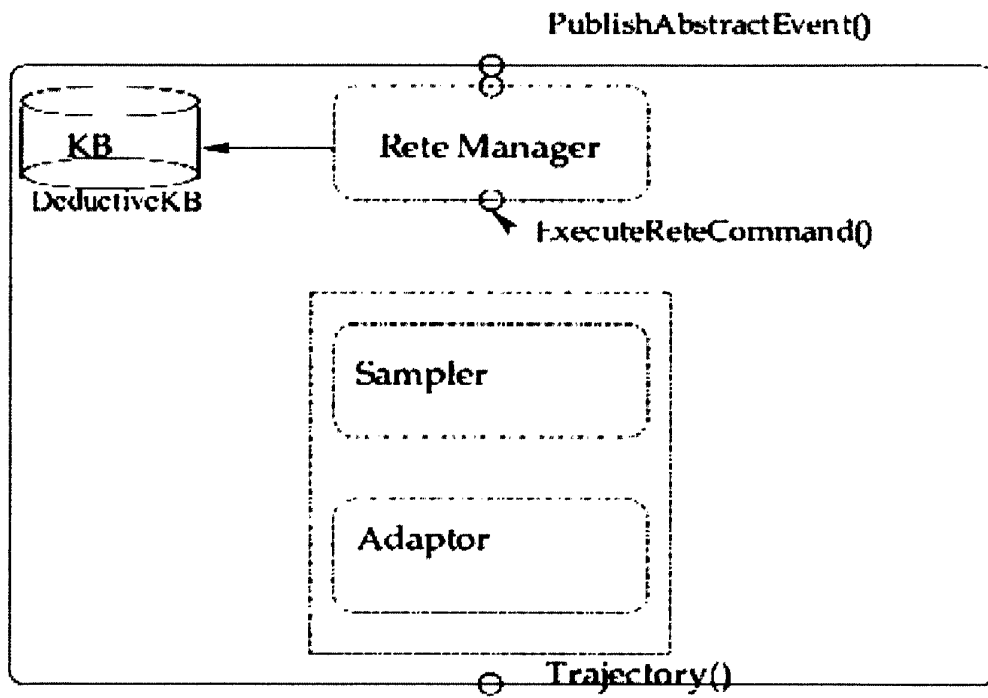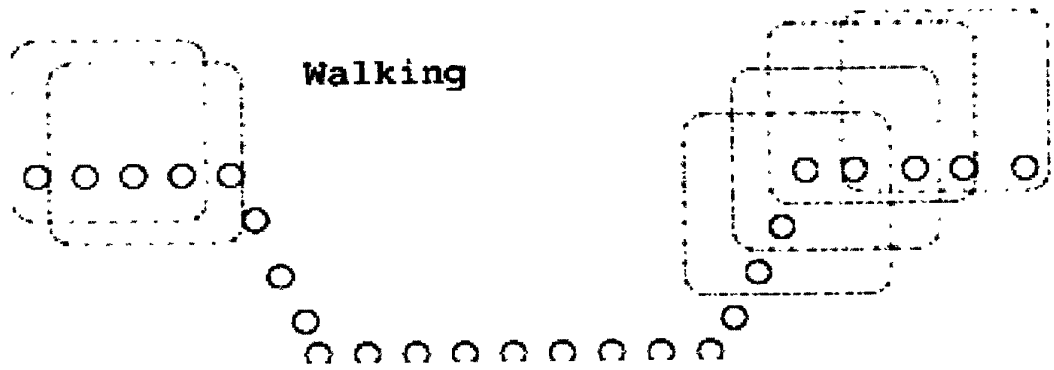
Figure 4

Walking

Walking

Sit Down   Stand Up
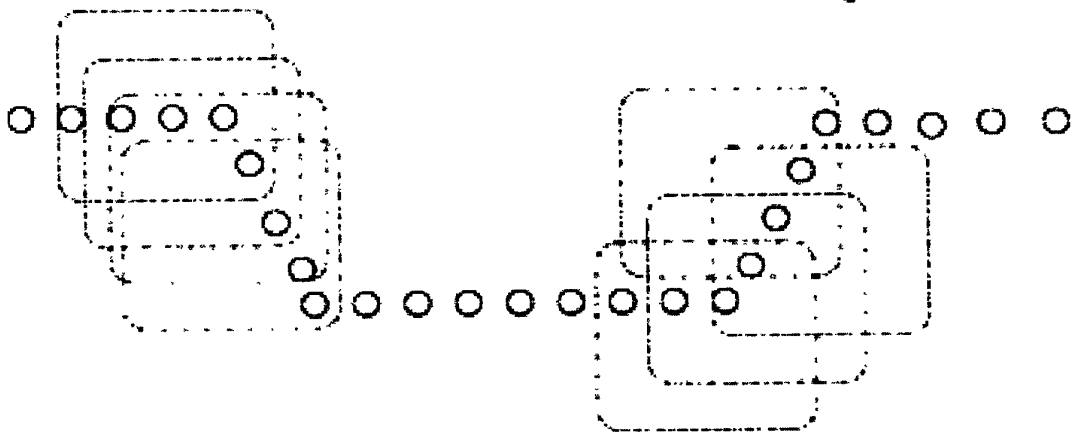
Sitting
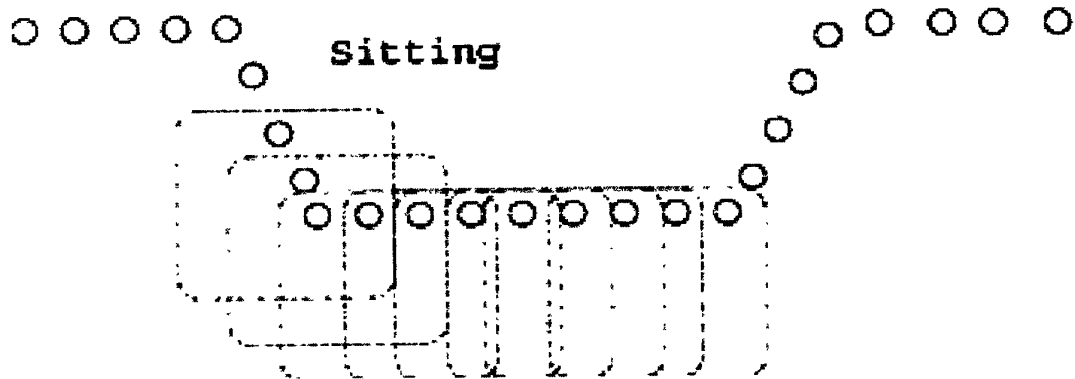
Figure 5
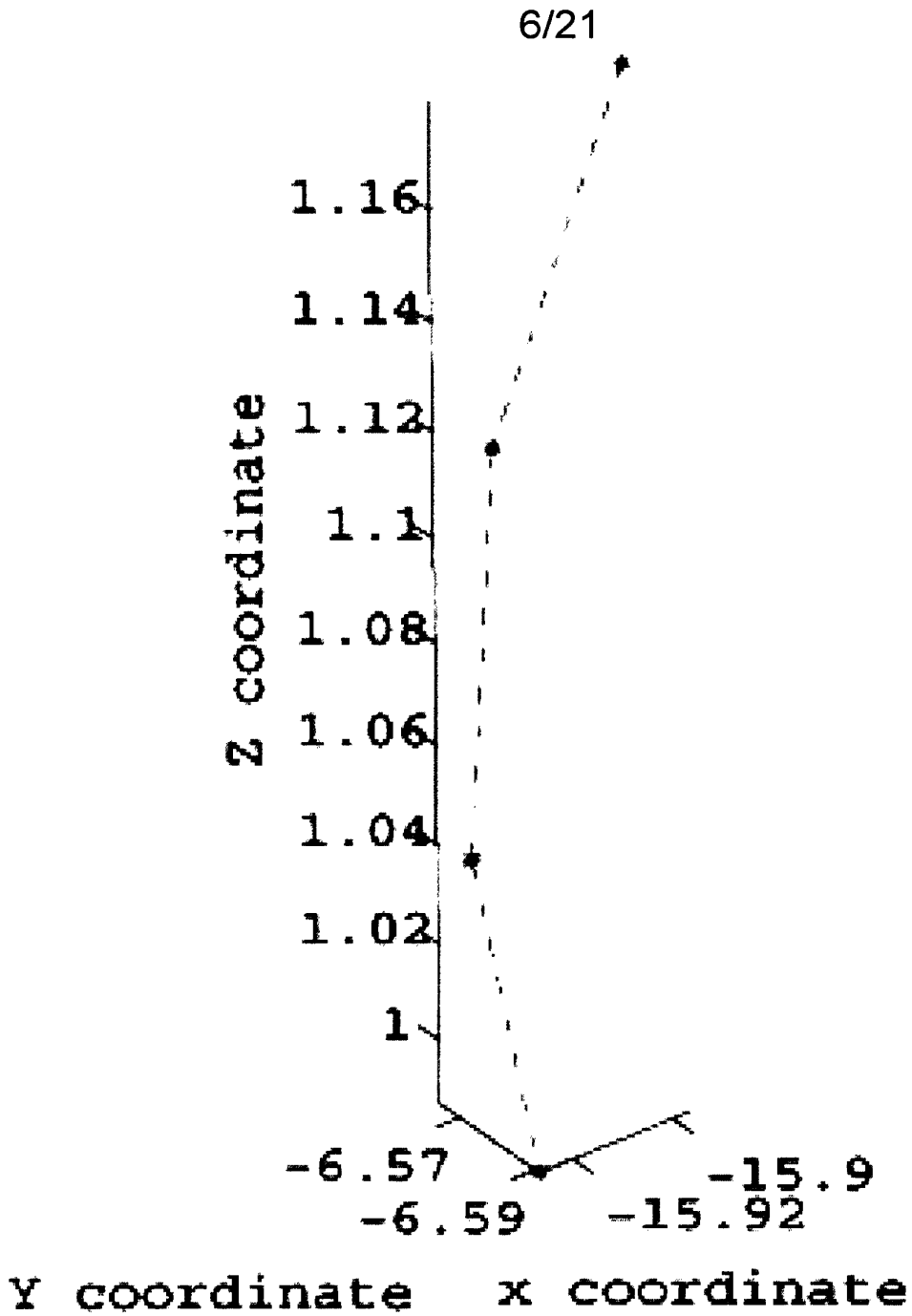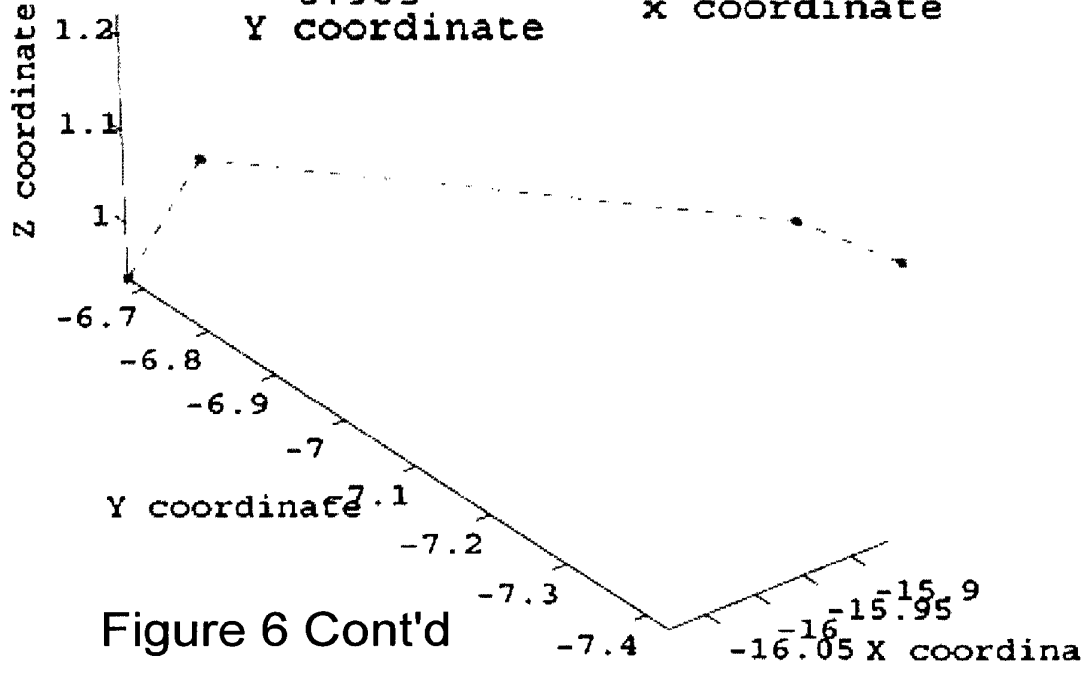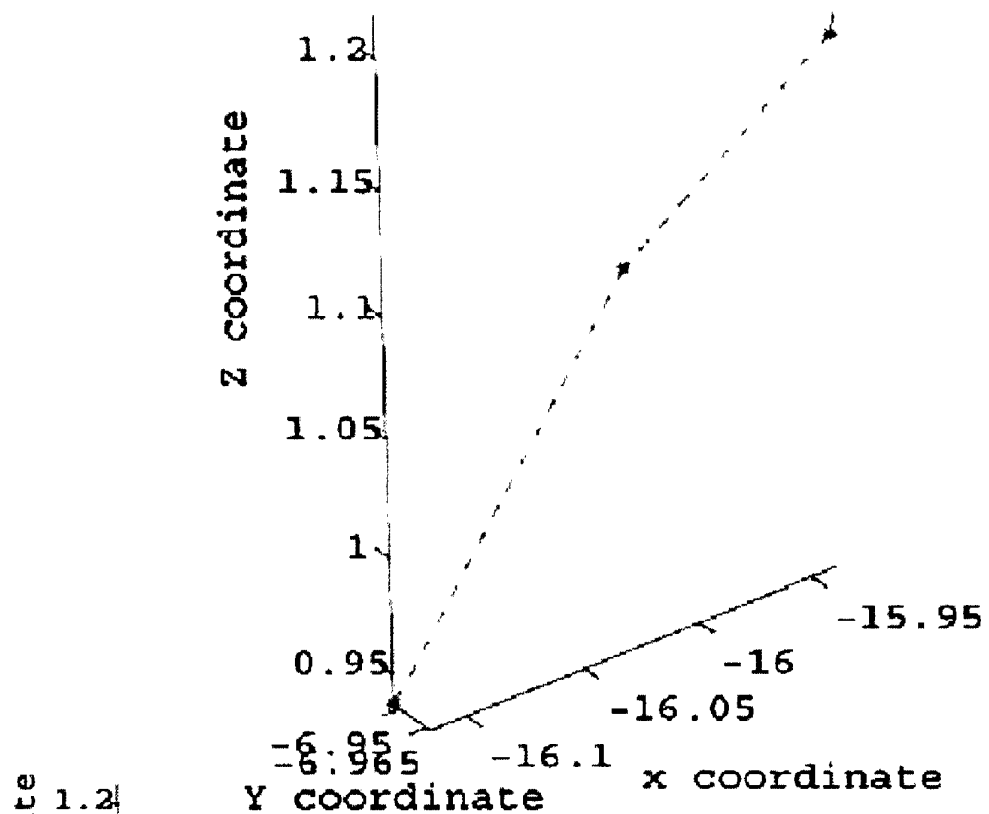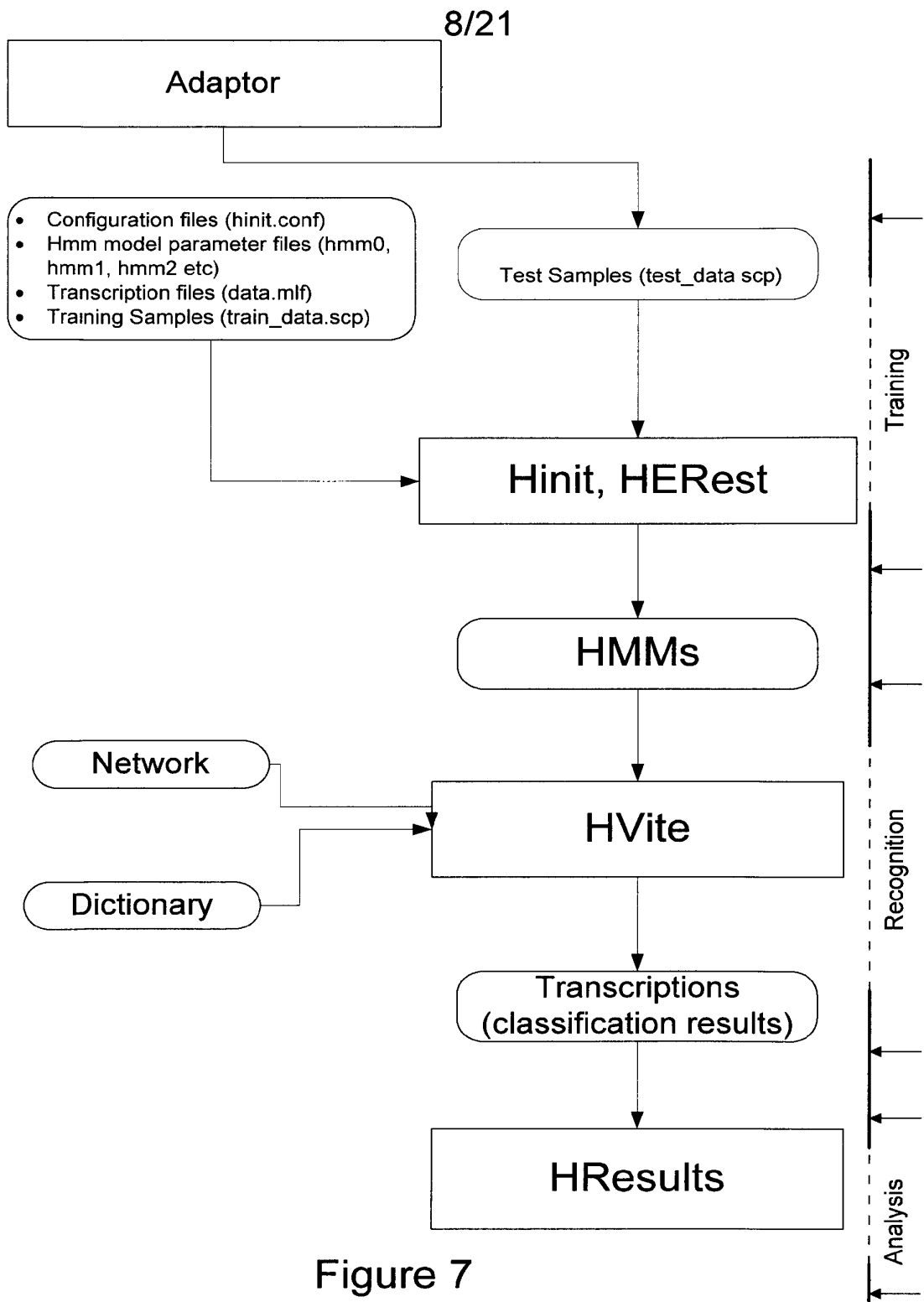
Figure 6

Figure 6 Cont'd

Adaptor

- Configuration files (hinit.conf)
- Hmm model parameter files (hmm0, hmm1, hmm2 etc)
- Transcription files (data.mlf)
- Training Samples (train_data.scp)

Test Samples (test_data scp)

Hinit, HERest

HMMs

Network

Dictionary

HVite

Transcriptions (classification results)

HResults

Training

Recognition

Analysis

Figure 7

System Input

Trajectory creator

HMM-based Classifier

Figure 8

CEL(u,rolc,rid,rattr)

AND

v1>v2   CL(u,rolc,rid,rattr)

EL(rid,rattr)

>

AND

AL(rid,rattr)

NOT

UL(u,rid,rolc,rattr)

nonc

IQD(v,u,rolc,rid,rattr))

root node

D(v,u,rolc,rid,rattr)

Figure 9

89

Figure 10

Figure 11

System Input

Trajectory creator

HMM-based Classifier
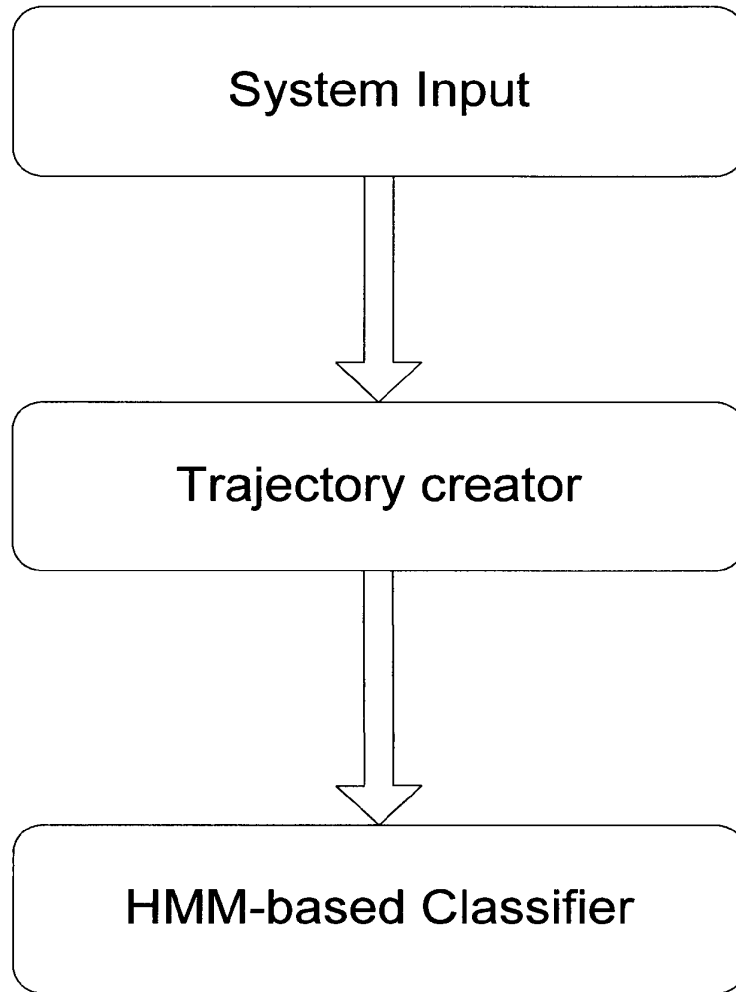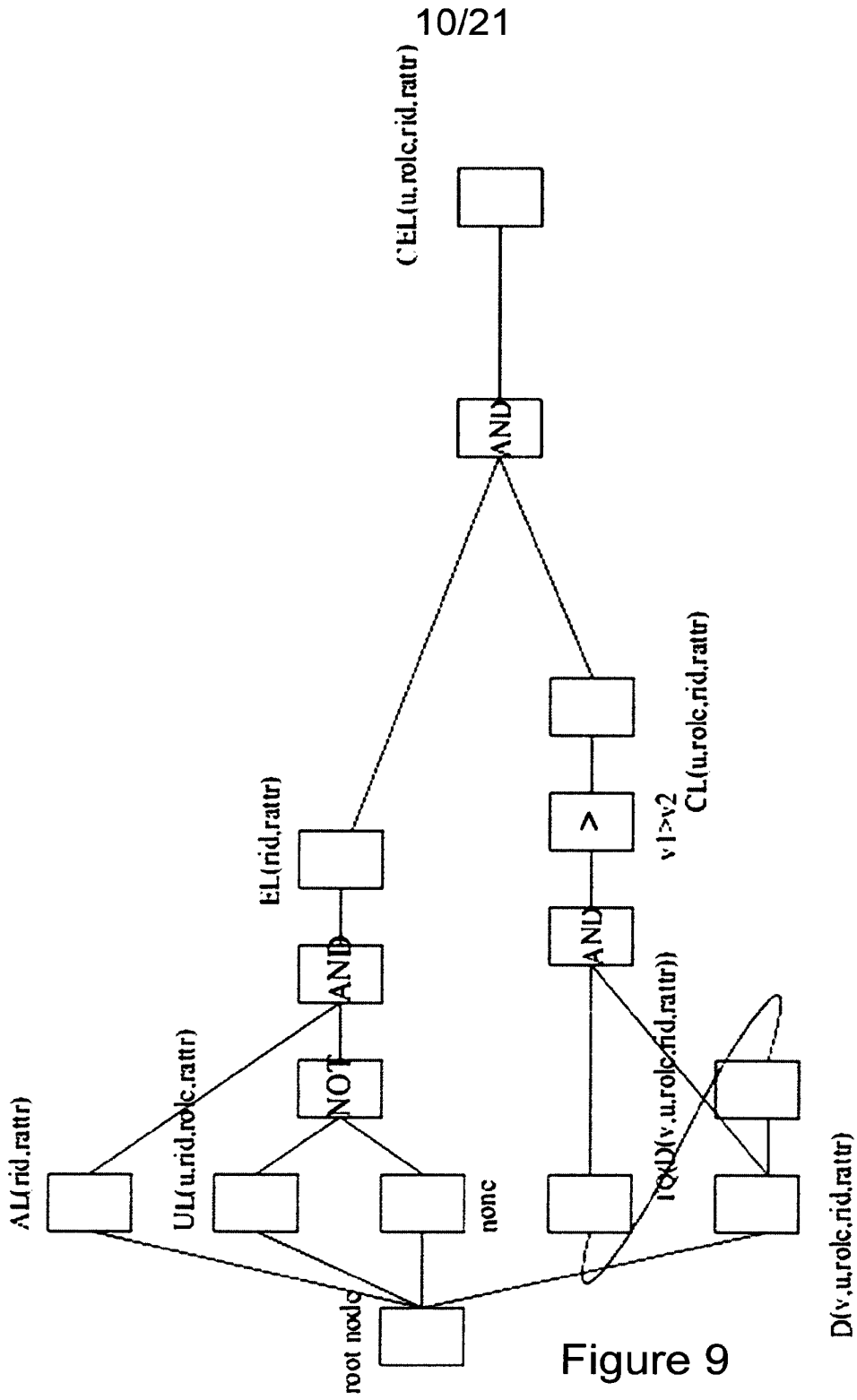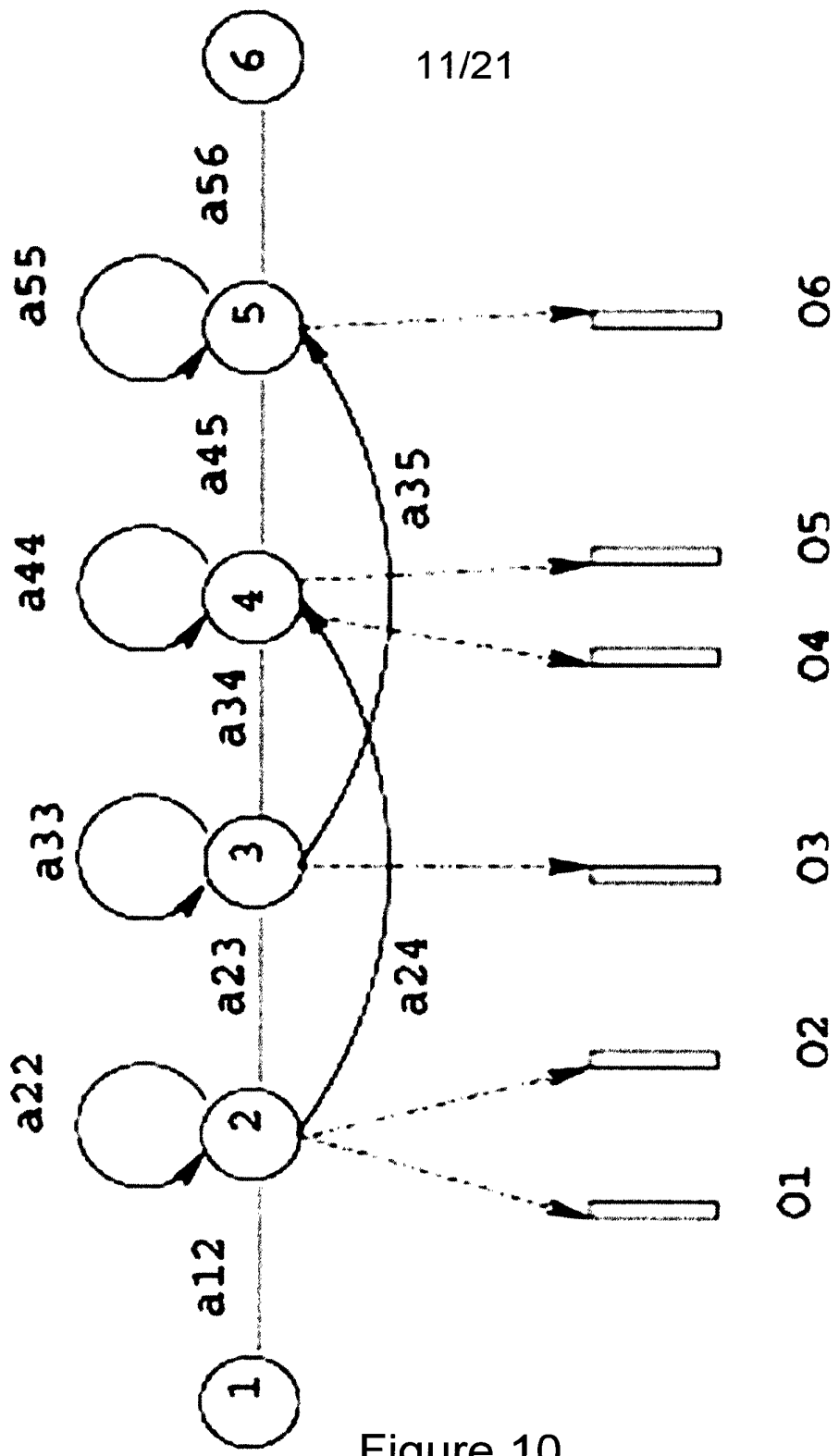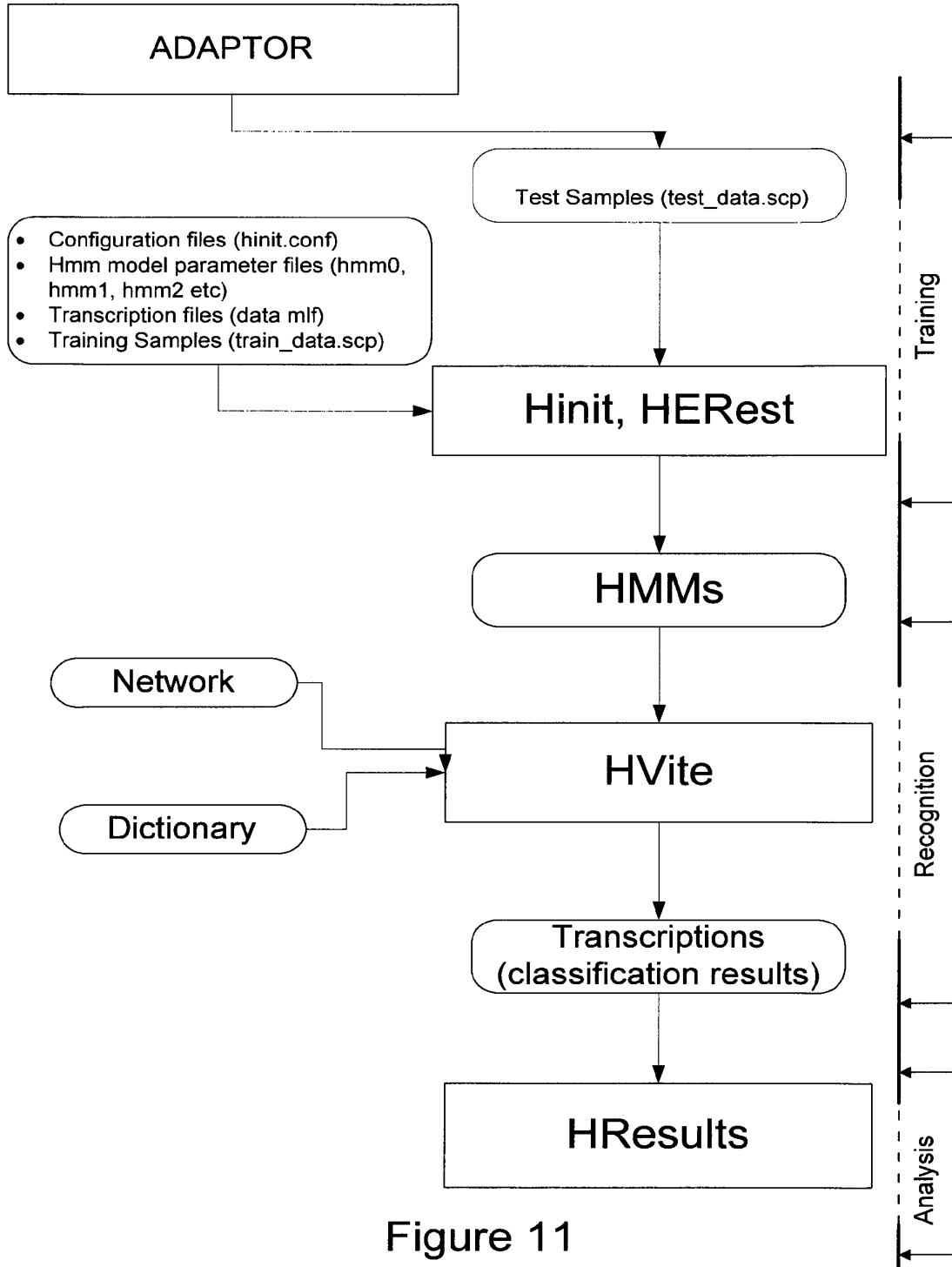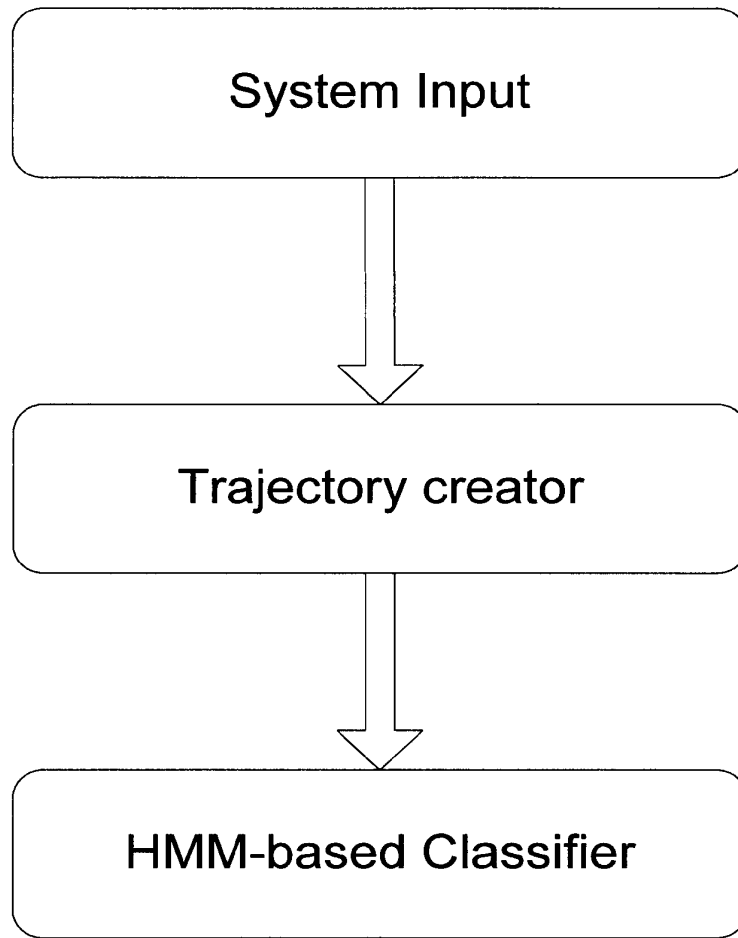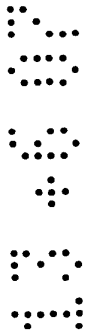
Figure 12

```
#!MLF!#
"*/sample1.rec"
0 6000 Sit Down -2.446976
.
"*/sample2.rec"
0 6000 Sit Down -2.932242
.
"*/sample3.rec"
0 6000 Sit Down -2.932242
.


....
```

Figure 13

```
/home/ek236/htk/sit_samples_6_time/testdata/htk/sample1.htk
/home/ek236/htk/sit_samples_6_time/testdata/htk/sample2.htk
/home/ek236/htk/sit_samples_6_time/testdata/htk/sample3.htk


....
```

Figure 14
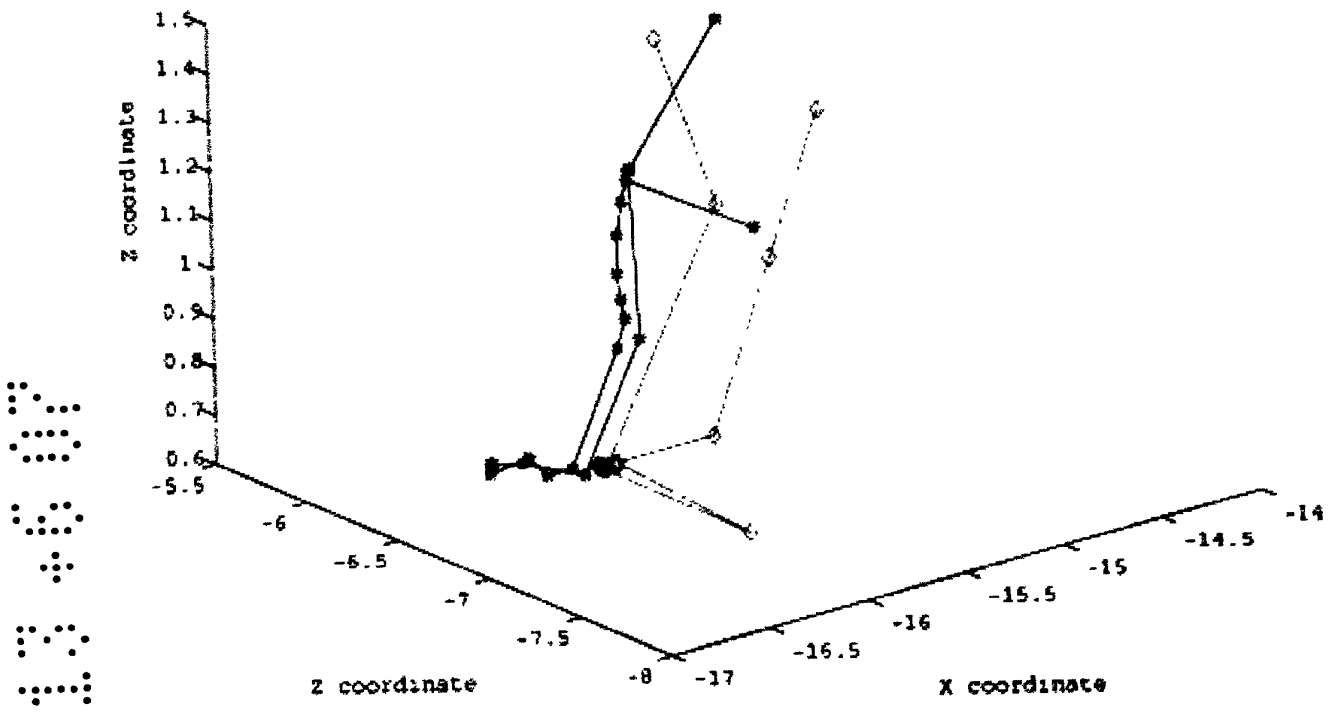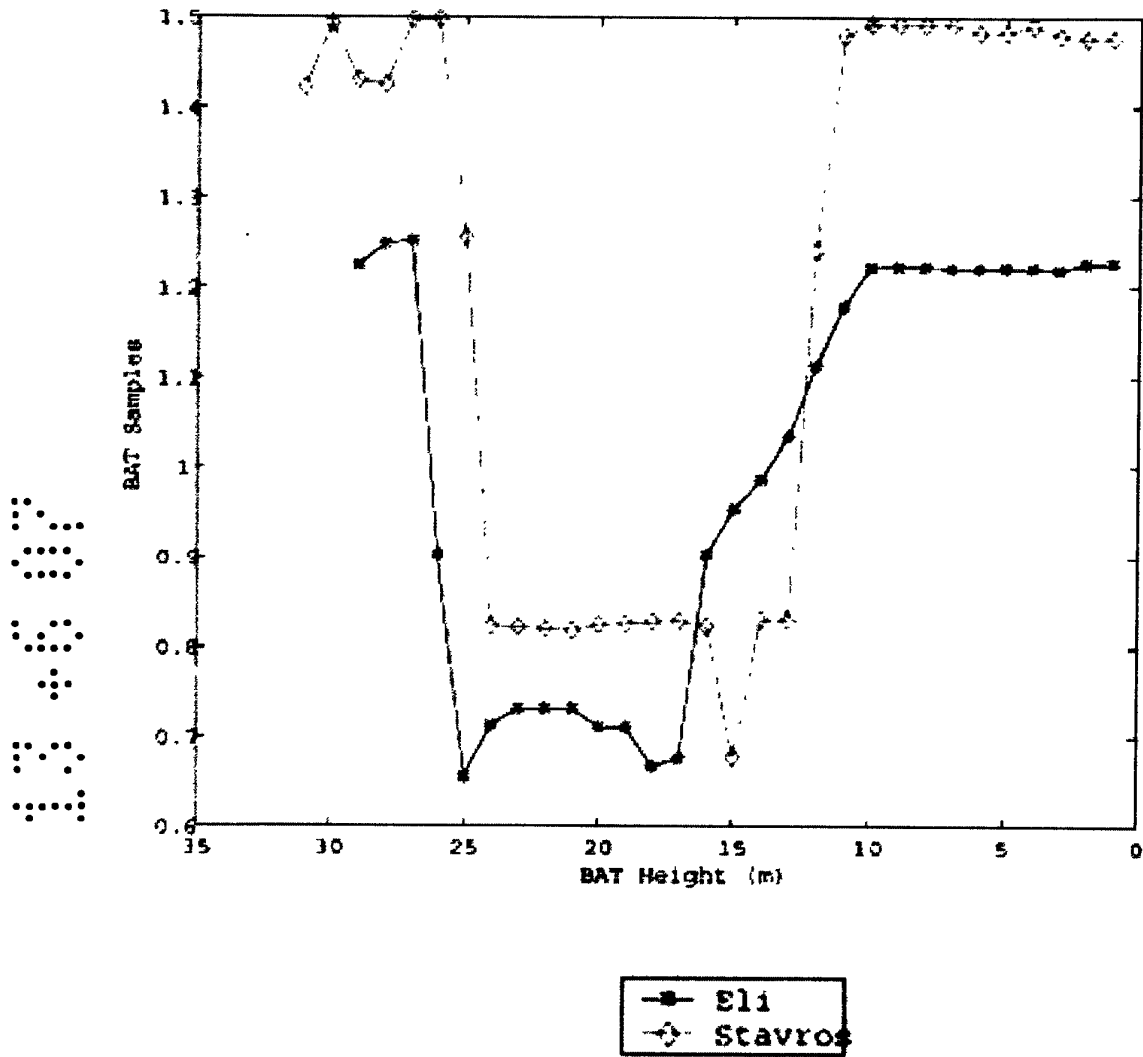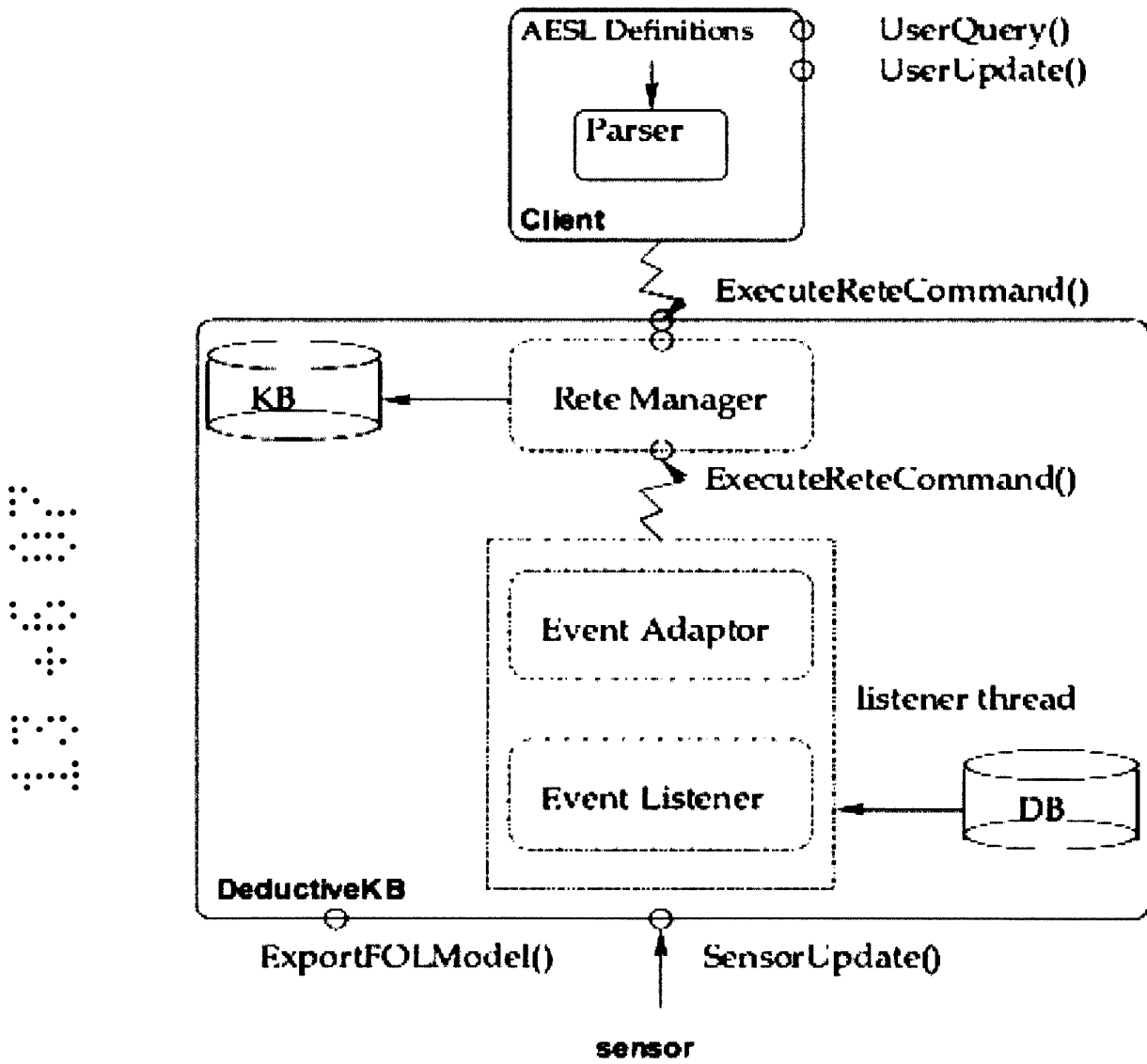
Figure 15

Figure 16

Figure 17

role—Ceo

role—Sysadm

CEL rattr—Meeting room

Figure 18

$$\uparrow\downarrow \quad \text{API}$$

P_1 P_2

Deductive Abstract Laye

$$\text{rate} \lambda^{H_1} \qquad \text{rate} \lambda^{H_2}$$

monitor$_1$ P   monitor$_2$ P
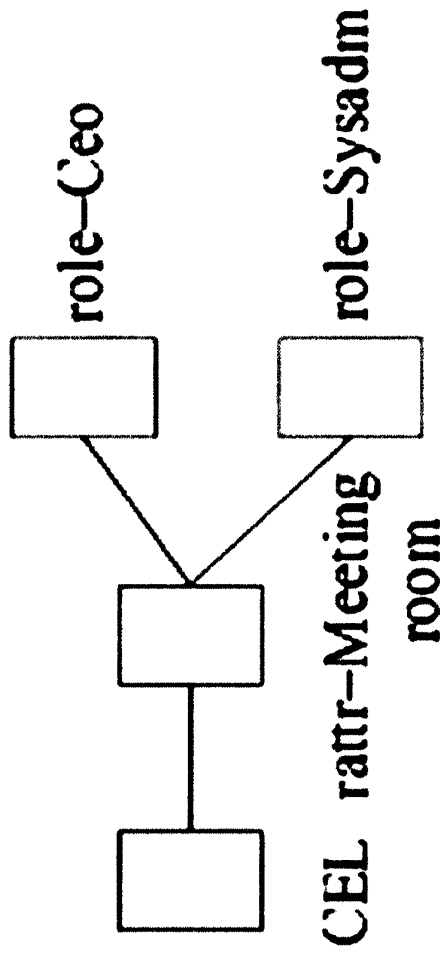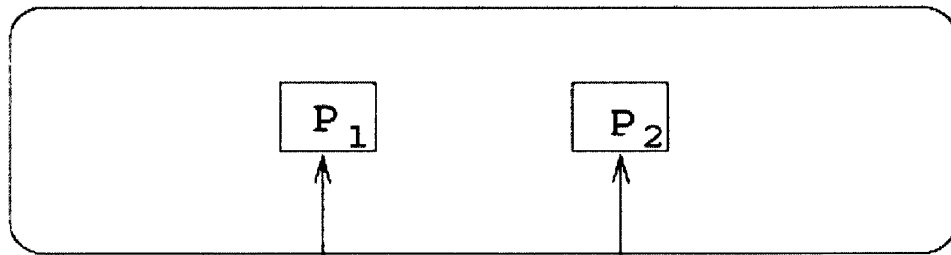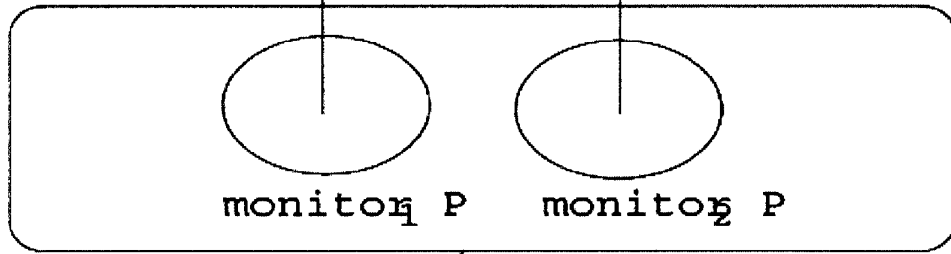
$$\text{event rate} \lambda^L \qquad \text{Sensor Abstract Lay}$$
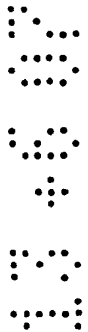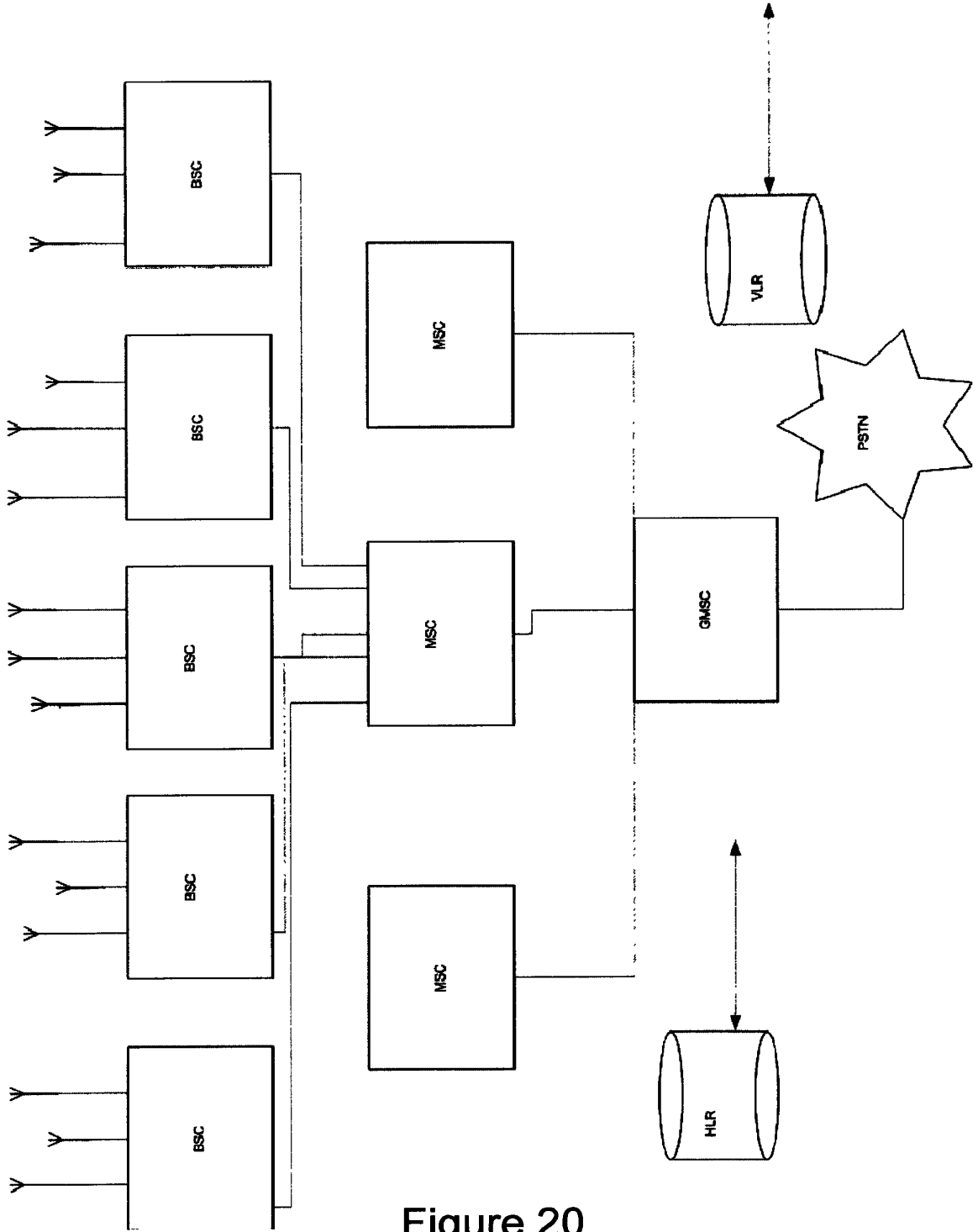
Figure 19

Figure 20
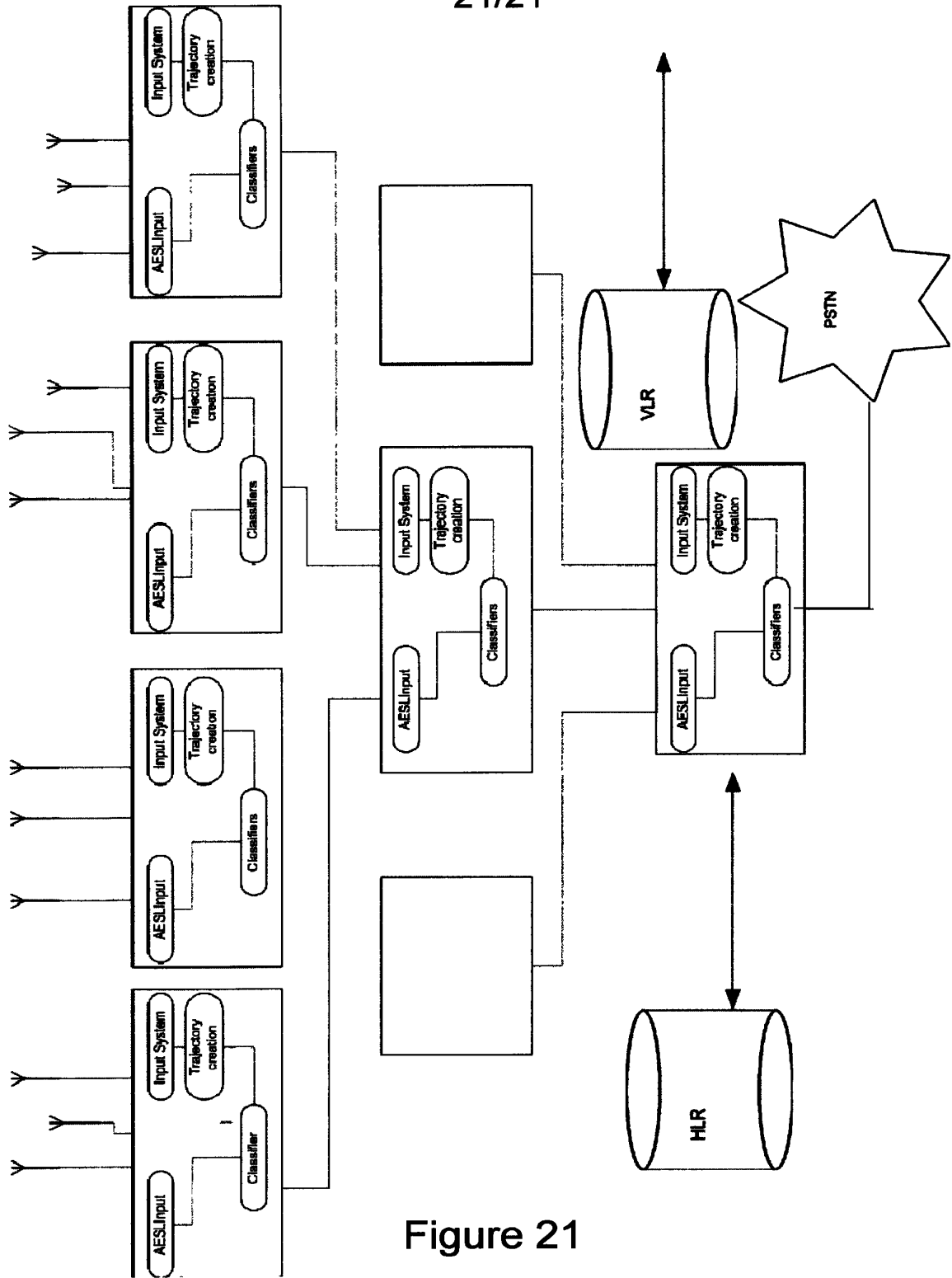
Figure 21

1

Pattern Recognition Systems.

FIELD OF THE INVENTION

This invention generally relates to methods, apparatus and computer program code for classifying data representing patterns of activity, in particular activity in physical space as defined by spatial location data, in particular in mobile communications networks, such as digital mobile phone networks.

BACKGROUND TO THE INVENTION

Many mobile communications networks provide a crude form of location technology by identifying a particular base station to which a mobile device is attached. However, location technology is developing rapidly and now includes triangulation techniques, as well as GPS (Global Positioning System) technology which is being built into an increasing number of mobile devices. Spatial position information accurate to of order 1 centimetre is also provided by ultrasonic BAT sensors (see, for example, [harter 99]) and UWB (Ultra Wide Band) [fleming95] devices, for example of the type available from Ubisense of Cambridge UK. (Details of the references are given at the end of the description).

There is a need for improved techniques for processing this type of spatial location data so as to be able to make good use of the information available. We will describe systems and methods which address these needs, and which, in aspects, also have applications outside the processing of spatial data.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is therefore provided a user activity monitoring system for a digital mobile communications network, the system comprising: an input for receiving spatial position information from a plurality of mobile communications devices coupled to said network; a module for constructing a trajectory for each of said devices, a trajectory of a device comprising a time series of positions of the device; and a classification system configured to classify said trajectories into selected classes of a predetermined set of classes using a plurality of hidden Markov models or Rete networks to provide a classification data output responsive to said trajectory classification.

The network may comprise any conventional mobile communications network including, but not limited to, a wireless local area network (WLAN) and a mobile phone network such as a GSM, GPRS or 3G network, for example of the type specified in the 3GPP (3rd Generation Partnership Project) and 3GPP2 specifications. Embodiments of the system may also be used across multiple networks for multiply enabled mobile communications devices.

Preferably the classification system is configured to select a class for a trajectory responsive to probability data from the plurality of hidden Markov models or Rete networks for the trajectory, typically selecting the most likely model or network. Preferably the classification comprises Bayesian classification, as described further below.

In some preferred embodiments of the system, the collective behaviour of a plurality of devices is classified, based on a plurality of the trajectories. This may be used, for example, to identify a collective physical motion state of the plurality of devices (which, in general, will be attached to human users). Thus, for example, a group of devices/users moving on a train may be identified. More generally embodiments of the system may be used to identify one or more locations of traffic congestion and/or relatively free traffic flow. A collective behaviour classification may also be employed to reconfigure the network in order to better cope with predicted or actual load, for

example to increase the coverage in a region where many users are present or where, for example based upon predicted motion, many users or an increased number of users is predicted to be present. Methods for reconfiguring a network may include reallocation of base stations and/or other techniques, such as network bandwidth control and/or cell size adjustment.

In some preferred embodiments of the system, the trajectory constructing module includes a system to link spatial position information received from a single device at a plurality of different elements of the network. This may comprise, for example, a system to retain data from two or more cells or base stations to which a device is attached at any one time. Additionally or alternatively this may be accomplished by monitoring hand-overs (hand-offs) in the mobile communications network to track a device as it moves within a region of network coverage.

In some preferred embodiments the classification system is distributed across a plurality of servers in a tree structure. Preferably a hierarchy of servers is present, so that, for example, a server at a lower layer need only pass information relating to a change in the data used for classifying further up the hierarchy to a higher level. Preferably means is provided for coordinating the classification system across these servers, for example using a distributed object structure such as a web service implementation. This provides a scaleable architecture which is useful in the context of managing the large volumes of data which may be encountered, for example, in a mobile phone network.

Preferably the system also includes a training module for training the classification system hidden Markov models or Rete networks using historical data from the user activity monitoring.

The invention also provides a method of monitoring user activity in a digital mobile communications network, the method comprising: receiving spatial position information from a plurality of mobile communications devices coupled to said network; constructing a trajectory for each of said devices, a trajectory of a device comprising a time series of positions of the device; and classifying said trajectories into selected classes of a predetermined set of classes using a plurality of hidden Markov models or

Rete networks to provide a classification data output responsive to said trajectory classification.

In a further aspect the invention provides a method of user activity monitoring, the method comprising: inputting spatial position data for a least one user representing activity of said user; constructing a space-time trajectory for said user; and classifying said space-time trajectory into one of a plurality of predetermined classes using a plurality of hidden Markov models or Rete networks.

In embodiments the classification is sufficiently fine to identify particular users. Preferably each trajectory includes a sufficient number of points for reliable classification with at least 50 percent (on average) reliability discrimination of an unknown sample belonging to one of the predetermined classes.

Another application of the above described techniques involves identifying potential security violations in a packet data communications network. Known techniques typically rely upon determining a data rate (packets/second) but embodiments of the method we describe do not need this information. Instead in some preferred embodiments, putative invariant features are sought.

According to a further aspect of the invention there is therefore provided a method of detecting a potential security violation in a packet data communications network, the method comprising: capturing data from said network relating to data packets carried by the network; representing said captured data as tuples, each said tuple comprising a set of data items relating to a captured packet, said data items being selected from the group consisting of packet identification data, packet size, packet source address, packet source port, and packet time; grouping said tuples into sets of tuples each set representing a trajectory of said grouped tuples; and classifying said tuple trajectories using a plurality of hidden Markov models or Rete networks to identify a trajectory defining a potential security violation of said network.

In embodiments the tuples may be grouped, for example, by a source identifier such as a source IP address and/or port. Trajectories may, for example be in n-dimensional

packet parameter space (where n is an integer equal to or greater than 1), and may optionally include one or more physical space dimensions.

Another application of the techniques we describe involves the detection of changes in financial instruments. These may be assumed to represent stochastic networks of random variables.

Thus in a further aspect the invention provides a method of identifying a potentially valuable stock share or other financial instrument, the method comprising: capturing data relating to stocks, shares or other financial instruments; representing said captured data as tuples, each said tuple comprising a set of parameters relating to said stocks, shares or other financial instruments; grouping said tuples into sets of tuples each set representing a trajectory of said grouped tuples; and classifying said tuple trajectories using a plurality of hidden Markov models or Rete networks to identify a potentially valuable stock, share or other financial instrument.

The data relating to the stocks, shares or other financial instruments may comprise value data and/or data derived from this, for example by differentiation in time, and/or other data such as that derived from company research.

The invention further provides computer program code to implement the above described systems and methods, in particular on a data carrier such as a disc, CD or CD-rom, non-volatile or programmed memory or on a data carrier such as an optical or electrical signal carrier. Code (and/or data) to implement embodiments of the invention may comprise source, object or executable code in a conventional programming language (interpreted or compiled) such as C, or assembly code, or other computer program code. Such code and/or data may be distributed between a plurality of coupled components in communication with one another.

The invention also provides a computer system comprising means for implementing the steps of each of the above described methods.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects of the invention will now be further described by way of
example only, with reference to the accompanying figures which are as follows:

Figure 1: Input System (input_final.jpg).

Figure 2: The UserAtPosition event type (UserAtPosition.jpg).

Figure 3: User Trajectory (allphonemes.jpg).

Figure 4: Trajectory creation (Trajectory.jpg).

Figure 5: Sampling process (walking.jpg,sit-down.jg, sitting.jpg).

Figure 6: Samples of the Sit Down movement (sit_3_square.jpg, sit10.jpg, sit15.jpg).

Figure 7: Classification System (recognition.jpg).

Figure 8: Classification System architecture 1 (classification.jpg).

Figure 9: A Rete Network that detects the closest empty location to user (cem_rete_sal3

copy.jpg).

Figure 10: The Markov Generation model (hmm.jpg)

Figure 11: Rete-based Classifier Architecture (recogn1.vsd).

Figure 12: Classification Architecture 2 (classif2.vsd).

Figure 13: Data.mlf (data.mlf.vsd).

Figure 14: Data.scp (data.scp.vsd).

Figure 15: Trajectories of two users sitting down and getting up(3d) (stavros-eli-
full.jpg).

Figure 16:Trajectories of two users sitting down and getting up (2d).(eli-stavros-z.jpg).

Figure 17: AESLdefinitions (implementation_aesl.jpg).

Figure 18: Filter combination.(filter_context2.jpg).

Figure 19: Dual-layer knowledge base. (levels2.jpg).

Figure 20: An example GSM network architecture (gsm.vsd).

Figure 21: Distributed classification architectures for the GSM network with server tree (gsm2.jpg).

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

According to a first embodiment of the present invention there is provided a user activity monitoring system for a digital mobile communications network.

.The system comprises: an input for receiving spatial position information from a plurality of mobile communications devices coupled to said network; a module for constructing a trajectory for each of said devices, a trajectory of a device comprising a time series of positions of the device; and a classification system configured to classify said trajectories into selected classes of a predetermined set of classes using a plurality of hidden Markov models or Rete networks to provide a classification data output responsive to said trajectory classification.

It is assumed that communication devices are equipped with appropriate location technologies such as the GPS technology, in order to know their position in 3D space. Communication systems that are enhanced with allocation technologies belong to the general category of sensor-driven systems. Several location technologies exist at the moment that are appropriate for communication devices. We summarise the main ones below:

Location Technologies

The Active BAT is an indoors positioning system that uses an ultrasound time-of-flight trilateration (trilateration is a method of surveying analogous to triangulation, in which each triangle is determined by the measurement of all three sides) technique to provide positioning accuracy of one cm indoors. Users and objects carry Active BAT tags. In response to a request that the controller sends via short-range radio, a BAT emits an

ultrasonic pulse to a grid of ceiling-mounted receivers. At the same time the controller sends the radio frequency request packet, it also sends a synchronised reset signal to the ceiling sensors using a wired serial network. Each ceiling sensor measures the time interval from reset to ultrasonic pulse arrival and computes its distance from the BAT. The local controller then forwards the distance measurements to a central controller which performs the trilateration computation. Statistical pruning eliminates erroneous sensor measurements caused by a ceiling sensor hearing a reflected ultrasound pulse instead of one that travelled along the direct path from the BAT to the sensor. The system can locate BATs to within 1 cm of their true position for 95 percent of the measurements. It can also compute orientation information.

The Cricket System [priyantha00] is another location system that is also based on ultrasound technology. In contrast to the BAT, it uses ultrasound emitters to create the infrastructure and embeds receivers in the object being located. This approach forces the mobile objects to perform all their own triangulation (Triangulation is defined as the measurement of a series or network of triangles in order to survey and map out a territory or region, by measuring the angles and one side of each triangle) computations. Cricket uses the radio frequency signal not only for synchronisation of the time measurement but also to delineate the time region during which the receiver should consider the sounds it receives. Like the Active BAT, Cricket uses ultrasonic time-of-flight data and a radio frequency control signal but this system does not require a grid of ceiling sensors. Cricket in its currently implemented form is less precise than the Active BAT, however, the fundamental limit of range estimation accuracy used in Cricket should be the same as the Active BAT. Its advantages include privacy and decentralised scalability while its disadvantages include a lack of centralised management or monitoring and the computational burden that processing both the ultrasound pulses and RF data places on the mobile receivers.

The Global Positioning System (GPS) [dana98] is a satellite-based navigation system developed and operated by the US Department of Defence. GPS permits land, sea and airborne users to determine their three-dimensional position, velocity and time. GPS uses a constellation of 21 operational NAVSTAR satellites and 3 active spares. The GPS satellite signal contains information used to identify the satellite and provide

position, timing, ranging data, satellite status and the updated ephemeris (orbital parameters). A minimum of 4 satellites allows the GPS client to compute latitude, longitude, altitude (with reference to mean sea level) and GPS system time, through a process of triangulation. The satellites receive periodic updates with accurate information on their exact orbits. Differential GPS (DGPS) is regular GPS with an additional correction signal added. DGPS uses a reference station at a known point (also called a 'base station') to calculate and correct bias errors. The reference station computes corrections for each satellite signal and broadcasts these corrections to the remote, or field, GPS receiver. The remote receiver then applies the corrections to each satellite used to compute its fix.

Ultra Wideband (UWB) [fleming95] is a radio technology that opens up new capabilities in radio communications. A wireless technology transmits digital data at very high rates over a wide spectrum of frequency. Within the power limits allowed under current FCC regulations, not only can UWB carry huge amounts of data over a short distance at very low power, but it also has the ability to carry signals through doors and other obstacles that reflect signals at more limited bandwidths and higher power. In addition to its uses in wireless communications products and applications, UWB can also be used for very high-resolution radars and precision (sub-centimeter) location and tracking systems.

UWB radiation has unique advantages: transceivers and antennas can be made very small (i.e., coin size), low power and low cost because the electronics can be completely integrated in CMOS without any inductive components. Ultra Wideband signals form a shadow spectrum that can coexist and does not interfere with the sine wave spectrum. The transmitted power is spread over such a large bandwidth that the amount of power in any narrow frequency band is very small. The advantages of spread spectrum are shared, including multipath immunity, tolerance of interference from other radio sources and inherent privacy from eavesdropping (low probability of intercept). Ultra Wideband non-sinusoidal signals have very good penetrating capabilities, and they support centimetre-level location accuracy without needing extremely accurate clocks to synchronise multiple receivers.

Currently, the rapid advances in mobile communications and the activities of development forums such as Source O2 [sourceo2] include efforts towards the integration of mobile communication systems such as GSM, UMTS, iMode, with state of the art location technologies, such as GPS.

The next section describes the input system, i.e. the part of the system that is responsible for communicating the spatial positions of a device that is both coupled to the system and equipped with a positioning technology such as the ones above.

System Input

The input of the system depicted in Figure 1. It consists of two main components: The *client wrapper component* and the *input component*. The client wrapper component operates on the coupled device and the input component on the said system. The client wrapper component accesses the GPS data and *publishes* it through the Application Programmable Interface (API) *PublishSensorUpdate()* in the form of a stream of *UserAtPosition events* to the input component in regular intervals, typically 1 *UserAtPosition* event per second. This is a typical value for the rate of calculated positions per device, for both the GPS and Active BAT location technology.

The structure of the *UserAtPosition* event is depicted in Figure 2. The name UserAtPosition is the type we have defined for this event. DeviceID, <x,y,z,> are the attributes of the event. DeviceId is the unique identifier of the coupled device, e.g., in the case of a mobile phone it could be its SIM card number. The attribute tuple <x,y,z> represent the unique coordinates of the device's position in 3-D space, according to a predefined coordinate system. Several coordinate systems exist currently, such as the World Geodetic System 1984 (WGS84) and the Terrestrial Reference Frame (TRF) for the GPS technology. The said system is independent of coordinate system used. Geodetic transformations make it possible to transform the positions from one systems to another and for this reason, we have modelled the UserAtPosition event position tuple with <x,y,z>, which is correct in all cases.

As shown in Figure 1, the input component consists of four subcomponents: An Event Listener, an Event Adaptor, a Rete Manager and a Deductive Knowledge Base. The Event Listener, through the *ReceiveSensorUpdate()* API, listens for events that represent spatial positions produced by the coupled devices. It has filtering capabilities on event type and event attributes. Once an event is received it then passes it on to the Event Adaptor. The Event Adaptor performs the translation between the received event and a string and performs a remote invocation on the Rete Manager that causes a fact of type UserAtPosition to be asserted in the knowledge base, in a similar manner as it would be inserted into a database table. It reports any exceptions raised. Several such Event Adaptors may operate concurrently.

A *knowledge base* represents predicates that are true by storing an instance of each of these predicates. We refer to this instance as a fact. The assertion of a fact in the knowledge base is equivalent to it being stored in the knowledge base as a true statement. A fact being retracted from the knowledge base results in the removal of the fact from the knowledge base. In fact, the assert command is similar to a database ADD, whereas the retract command is equivalent to a database DELETE. When a fact is asserted in the knowledge base, this signifies that the predicate that the fact's predicate has the value TRUE. When the fact is retracted from the knowledge base, this signifies that the corresponding predicate has the value FALSE. This nomenclature is taken from logic programming.

The structure of the UserAtPosition fact and the UserAtPosition predicate is identical to the one of the UserAtPosition event and therefore is depicted in Figure 2.

The Rete Manager is a distributed object that allows the deductive Knowledge base to be accessed through a unique address, called IOR (Identifying object reference) without its location being known. Although there is only one Rete Manager per deductive knowledge base, the Event Adaptor can connect to more than one Rete Manager and consequently Deductive Knowledge Base, e.g. in order to replicate the data, load balance the Deductive Knowledge Base component, or in case of failure, to fall back to a replicated server.

This concludes the description of the system input. In the manner described above, the knowledge base stores the input that is received from the coupled devices. The interface Publish Abstract Event is discussed in Section "Rete-based Classifier".

Constructing a Trajectory

The second part of the system is the one where a trajectory is constructed from the events that have been received by the system and correspond to the device positions. A trajectory is a time-series of positions of one or more device. An example of a trajectory that corresponds to a user that sits down momentarily on a sofa, gets up again, remains standing still for a few seconds and then walks away, is portrayed in Figure 3. The coordinate system is user defined. The points in the figure represent the device positions, as those have been communicated to the said system in the form of events, as explained in Section "System Input". The dotted line connects the points.

The architecture of this part of the system is portrayed in Figure 4. In order for the system to classify a trajectory correctly, the trajectory is cut into samples. This part of the system is called a sampler. The sampler uses a window over the stream of positions that are exported by the knowledge base and creates samples of a fixed size. The size is determined by the smaller number of points that describe a trajectory that belongs to a predefined class, under the worst circumstances. This very important as often events get lost or are filtered by the location technology and sometimes the rate by which the location technology generates location events varies (as is the case with the Active BAT system) so often samples contain a different number of data points. This is not a problem with our system. The Adaptor part of the trajectory creation translates the data points from their current format (knowledge bases fact format) to the format needed by the classifier which is the HTK User format [htkbook].

The functionality of the sampler is portrayed in Figure 5. In this figure, the window acts as a buffer of three data points (events). Each new event produced by the location system is tested against the three previous ones, which are buffered. Figure 5 illustrates

how the movements Walking, Sit Down, Sitting and Stand Up are delimited with the help of the window.

An example of the samples that are produced by the sampler is portrayed in Figure 6. After the samples have been processed by the Adaptor, they are sent to the classification system.

Classification System

The architecture of the classification system is portrayed in Figures 8 and 12, in respect to the components of the Input System and Trajectory creation module respectively.

The classification system automatically infers high-level knowledge from trajectories such as the ones discussed in Section "Constructing a trajectory" when it has been appropriately trained. Such a system behaves similarly to a speech recogniser that recognises words from processing speech signals. More specifically the classifier comprises of one or more HMM-based classifier or and one or more Rete-based classifier.

HMM-based classifier

A more detailed view of the classification system can be seen in Figures 7 and 11. The HMM-based classifier is built using the HTK toolkit [htk]. comprises of a set of training tools (HInit, HERest), a collection of Hidden Markov models (HMMs), a recognition module (HVite), an analysis module (HResults), a dictionary file and a network file.

Each HMM model represents a predefined classification class. Each model is represented by means of its parameter files. Initially the models are represented by the file hmm0. Each model is trained by means of a set of (predefined) configuration files, a set of transcription files (data.mlf) and a set of data files (data.scp). The data.mlf file contains labels that link the samples that have been generated by the Trajectory Creation modules with the correct classification class, as discussed in Section "Creating a

Trajectory". Figure 6 portrays three training samples of the class "Sit Down". After the models have been trained, their parameters have been re-estimated (See Section "Hidden Markov Models") and they are represented by a new parameter file hmm2.

The file data.mlf (Figure 13) contains an entry for each sample. This entry contains the path where the sample can be found and the label that corresponds to the classification class e.g., Sit Down. The file train_data.scp contains the path and the file names of the training files. The file test_data.scp (Figure.14) contains the path and file names of the test samples (that will be recognised by the classifier).

The dictionary and network file are part of the system configuration files. After the classification has been performed by the recogniser, the results are generated in the results.mlf file (depicted in Figure 11 as "Transcriptions".)

The analysis module (HResult) analyses the classification results file from the recogniser by comparing it to a reference file where the same samples were correctly labeled and a recognition score is assigned to the recognition as a percentage of correct labels over the overall number of labels.

Table 1 contains the recognition score for the movement phonemes tested for the same user that produced the training samples as well as an additional user. The recognition score is 93% of the phonemes identified correctly. If recognition is performed for a different set of phonemes, namely, only patterns of doors opening outwards as opposed to walking straight, the recognition score is 77.78%.

Classes	Training Samples	Test Samples	Correct	Recognition score
Walking-Still-Sitting-Sit Down-Stand Up (same user)	123	46	43	93.18%
Walking-Still-Sitting-Sit Down-Stand Up (two users)	123	45	41	91.11%
User Recognition (two users)	31	8	8	100%

Table 1: Classification Score examples.

User Recognition

By means of the classification system it is also possible to recognise the user that has performed the said trajectory. The drive behind this goal has been the observation that a user sitting down on seats with different heights causes the production of different tracks by the monitoring system;

A user recognition problem, which consists of distinguishing a user by the trajectories produced while sitting down and standing up again, was implemented using the said classification system. Figures 15 and 16 portray the trajectories of two users sitting down on a sofa and getting up again that are used as training samples to a user recogniser. The recognition score for this experiment was 100% (Table 1).

Hidden Markov Models

A Hidden Markov Model (HMM) is a stochastic model where an underlying process that is not observable can be observed through another set of stochastic processes that produce the sequence of observations.

An HMM can be seen as a finite state machine that consists of N states denoted as

$$X = x_1, x_2, ..., x_N$$

and the state at time t as q_t. An HMM is characterised by the following:

- S, the number of distinct observation symbols per state, i.e., the discrete alphabet size. The observation symbols correspond to the physical output of the system being modelled. We denote the individual symbols as $V = v_1, v_2, ... v_S$.

- The state transition probability distribution $A = a_{ij}$ where

  o $a_{ij} = P[q_{t+1} = x_j \mid q_t = x_i]$, $1 \le i, j \le N$

- The observation symbol probability distribution in state j, $B = b_j(k)$, for a fixed time t, where

  o $b_j(k) = P[v_k$ at $t \mid q_t = x_j]$, $1 \le j \le N, 1 \le k \le S$

- The initial state distribution $\pi = \{\pi_i\}$, i.e., the probability that each state x_i is the first state,

  o $\pi_i = P[q_1 = x_i]$, $1 \le i \le N$

Each time that a state j is entered at time t, an observation Vector O_t is generated from the probability density $b_j(O_t)$. After the HMM has moved from the initial state x_0 to a final state x_{T+1} for this sequence, a sequence of observations has been generated: $O = O_1 O_2 ... O_T$ where each observation O_t is one of the symbols from V and T is the number of observations in the sequence (it is assumed that states x_0 and x_{T+1} do not produce any observations).

Figure shows an example of this process where a six state model moves through the state sequence X=1, 2,2,3,4,4,5,6 in order to generate the sequence O_1 to O_6 (States 1 and 6 are the initial and final states and they do not generate any observations).

The general recognition problem can be seen as classifying an observation sequence O_T to the HMM that represents the hidden underlying process that generated the observation sequence. This problem entails three more specific problems: the first is that when trying to create HMM models for each movement phoneme, the values of the state transition probabilities $a_{i,j}$ and output probabilities b_j of each model are not known and need to be estimated by training data. The better the estimation, the more accurate the model. The second problem arises when trying to uncover the hidden part of the model. As the process to be modelled (movement phoneme) is unknown, the state sequence that generated an observation is not known either. The third problem is a problem of evaluation: how is the most appropriate model that generated the observation sequence defined, out of a set of possible models.

Bayesian Reasoning

Assuming a vocabulary that consists of words w_i that represent the classification classes of interest, i.e., imagine we want to classify a single user's trajectory to a set of redefined classes Sit Down, Stand Up, Walking, Still, Sitting, each representing the possible movements that can be performed by the user, let each movement be represented by a sequence of position vectors of three dimensions (x, y, z) or observations O, defined as

$$O = \langle O_1, O_2, ..., O_T \rangle$$

where O_t is the position (O_t is a vector of three variables x, y, z that represent the coordinates) observed at time t. The phoneme recognition problem can then be regarded as that of computing the model with the maximum probability of having generated the observation sequence O.

$$\arg\max_i P(w_i \mid O) \qquad (1)$$

where w_i is the ith phoneme in the vocabulary.

This probability is not computable directly, but using Bayes' rule gives

$$P(w_i \mid O) = \frac{P(O \mid w_i)P(w_i)}{P(O)} \quad (2)$$

Equation (1) is solved using (2) if $P(O \mid w_i)$ can be estimated. The general problem of the direct estimation of the joint conditional probability $P(O_1, O_2, ..., O_T \mid w_i)$ from examples of location samples, given the dimensionality of the observation sequence O, is not practicable. However, if a parametric model of word production such as a Markov model is used, then estimation from data is possible since the problem of estimating the class conditional observation densities $P(O \mid w_i)$ is replaced by the mathematically much simpler problem of estimating the Markov model parameters, which entails significantly smaller computational effort. Given an HMM model, the joint probability that O is generated by the model M moving through the state sequence X of Figure 10 is calculated simply as the product of the transition probabilities and the output probabilities:

$$P(O, X \mid M) = a_{12}b_2(O_1)a_{22}b_2(O_2)a_{23}b_3(O_3)... \quad (3)$$

Given that X is unknown, the required likelihood is computed by summing over all possible state sequences $X = x(1), x(2), x(3), ..., x(T)$, that is

$$P(O \mid M) = \sum_x a_{x(0)x(1)} \prod_{t=1}^{T} b_{x(t)}(O_t)a_{x(t)x(t+1)}$$

where $x(0)$ is the model's entry state and $x(T+1)$ is the model exit state.

As an alternative to Equation (3), the likelihood can be approximated by only considering the most likely state sequence that is

$$\hat{P}(O \mid M) = \max_x \{a_{x(0)x(1)} \prod_{t=1}^{T} b_{x(t)}(O_t)a_{x(t)x(t+1)}\} \quad (4)$$

This assumes that the parameters a_{ij} and b_j are known. Although this is not generally the case, HMMs allow for the above parameters to be estimated using training data. This process is called training (Figure 11).

Training.

Given a set of training examples corresponding to a particular model, the parameters of that model can be determined automatically by a statistically robust and efficient re-estimation procedure (Baum-Welch re-estimation). This procedure has the following steps:

A set of prototype models are created, in which the output distribution for each state j is Gaussian with mean vector μ_j and covariance matrix Σ_j, that is, $b_j(O_t)$ satisfies:

$$b_j(O_t) = N(O_t : \mu_j, \Sigma_j)$$

If $L_j(t)$ denotes the probability of being in state j at time t, then the maximum likelihood estimates of μ_j and Σ_j, can be calculated as shown below

$$\hat{\mu}_j = \frac{\sum_{t=1}^{T} L_j(t)O_t}{\sum_{t=1}^{T} L_j(t)}$$

$$\hat{\Sigma}_j = \frac{\sum_{t=1}^{T} L_j(t)(O_t - \mu_j)(O_t - \mu_j)'}{\sum_{t=1}^{T} L_j(t)}$$

where prime denotes vector transpose. To apply the above equations, the probability $L_j(t)$ must be calculated. This is done efficiently using the Forward-Backward algorithm. Executing the above produces a set of models, which are optimised according to the training data.

Recognition

Recognition of an unknown data sample of size s is based on building a Hidden Markov Model network and finding a path of size s that has the maximum likelihood (Viterbi algorithm). That path corresponds to the HMM model that corresponds to the correct phoneme. The model with the highest maximum likelihood is selected for each observation sequence under consideration (Token Passing Algorithm).

Rete-based classifier

AESL input

The AESL input may comprise a separate input to the classification system, based on Rete Networks. Preferably this input comprises a language based on first-order logic called AESL (Abstract Event Specification Language) that allows Rete Networks to be compiled from the specification. Although, generally in a hidden Markov Model based classifier we classify into predefined classes, for the Rete-based classifier, preferably we generate the classifiers in real time, through passing through the AESL input the AESL definition. It is also possible to use hidden Markov models in this way, i.e. not (only) to have predefined classes but also to provide a facility to be able to give a command to the system that "explains" (defines) how to create and train one (or more) of these models from scratch.

Most distributed systems research assumes that events are primitive, and various studies have, therefore, concentrated on composite events. However event-based systems, such as those using finite state machines, are insufficient for querying and subscribing transparently to distributed state [katsiri04]. This is due to the fact that the mapping between the subscription language and the implementation domain is incomplete, which makes computation by finite automata limited. This necessitates an alternative model for sensor-driven communication systems.

This section utilises the notion of an abstract event [katsiri04] as a notification of transparent changes in distributed state. This is implemented as an extension to the publish/subscribe protocol in which a higher-order service (Abstract Event Detection Service) publishes its interface; this service takes an abstract event specification as an argument and in return publishes an interface to a further service (an abstract event detector or Rete-based classifier), which notifies transitions between the values true and false of the formula, thus providing a natural interface to applications.

The AESL input allows Rete-based classifiers to be generated in run-time from a specification. This means that although in hidden Markov Model based classification we classify into predefined classes, for the Rete-based classifier, we generate the classifiers in real time, through passing through the AESL input the AESL definition. The AESL input can be linked to the HMM-based classifiers with minor alterations to the system.

Rete-based classifiers comprise one or more Rete Networks. A Rete Network that classifies rooms to the class "Closest empty location to each user" is portrayed in Figure 9. A Rete-based classifier is connected to the said system input (Figure 1) and more specifically it is connected to the Rete Manager module. It has a second input (AESL input) where the classification class is provided by the user or another classification system (lower in the hierarchy) in the form of a first-order logic definition. The AESL parser (depicted in Figure 17 as "Parser") translates the AESL definition into a set of production system rules, using the production system languages Jess, Drools or CLIPS. The production system rules are fed via the Rete Manager to the knowledge base module where they are compiled by the knowledge base interpreter into one or more Rete Networks that perform the classification. Each Rete network generates a token for each successful classification and this is published as an event by the Rete Manager through the PublishAbstractEvent () interface. Because the abstract event represents the result of the classification it can be fed through the System Input to another classification system thus realising hierarchical classification.

An AESL definition for locating the closest location to each user follows:

UL for UserInLocation, AL for AtomicLocation, EL for EmptyLocation, CL for ClosestLocation, CEL for ClosestEmptyLocation and D for Distance:

(It is assumed that the UserInLocation predicates are inferred by the system automatically form the UserAtPosition predicates and the Distance predicates are constructed by the system from the UserAtPosition predicates (device positions).)

$$\neg \exists u UL(u,rid,role,rattr) \wedge AL(rid,rattr,polygon) \Rightarrow EL(rid,rattr)$$
$$D(v_1,u,role,rid_2,rattr_2) > D(v_2,u,role,rid_1,rattr_1) \Rightarrow CL(u,role,rid_1,rattr_1) \quad (6)$$
$$CL(u,role,rid,rattr) \wedge EL(rid,rattr) \Rightarrow CEL(u,role,rid,rattr)$$

Temporal Reasoning

It is also possible to reason with the temporal properties of the events. In this case, each device is forced to attach a timestamp to each position event. Rete-based classifiers work with time at a dual level. They know which predicates hold "now" and also they know of the timestamps and the local clock. This allows them to take decisions about temporal properties e.g., "Locate the closest, empty Meeting Room to each user which has been empty for at least 5 min."

Rete Networks

Each AESL definition is compiled into one or more Rete networks (forgy82) that are structured as a deductive knowledge base, and that can perform semantic operations on instances of first-order logic predicates that are defined in terms of FOL (first-order logic) formulae. Rete networks consist of nodes and arcs. Every time a sensor creates a new instance of a concrete state predicate, corresponding tokens are created and propagated through the arcs to the nodes, eventually modifying appropriately the value of the abstract predicate.

Node Types

This section outlines the type of nodes that are found in Rete Networks.

One-input nodes check whether the received tokens correspond to a particular condition, e.g., if they are of class UserAtPosition. These nodes are portrayed in red in Figure 9. One-input nodes also check whether a value is assigned correctly to an attribute thus restricting the selection of the one input nodes further, e.g., selecting from the UserAtPosition tokens only the ones that refer to user "ek236". Such nodes are portrayed in brown (although they are not depicted in Figure 9 as the AESL definition.(6) does not have any attributes bound to any specific values. Instead, they form part of the filters, see Figure 18) This is allows for filtering to take place after the Rete Network has been built. This avoids duplicating computation (see [katsiri05] Chapter 12) Each one-input node forwards the tokens that satisfy the check on to its child nodes.

Two-input nodes represent conjunctions. They concatenate the tokens that are stored in their right and left memory, and they perform a test to determine whether shared variables are bound correctly. Such nodes are portrayed in green and are labelled ``AND".

Store nodes act as buffers for the current and historical instances of a predicate type and forward all stored instances on to the child nodes. This allows for temporal reasoning as they store historic instances of the same predicate.

Trigger-Query (TQ) nodes are nodes that trigger a CLIPS query that selects all instances of a particular predicate from the knowledge base for each token that is received at that node. Each (TQ) node is portrayed as a pair of identical nodes connected with a curvy line. TQ nodes are integral in Rete Networks that implement functions such as those that calculate the maximum or minimum value of an attribute of all stored instances of a predicate. They are often used in this dissertation for calculating the location with the smallest distance to one of the users. Each of the two nodes that form a TQ node is labelled ``TQ (predicate)".

NOT nodes are satisfied when there is no token in their right memory. They are two-input nodes that use a special, auxiliary token ``none'' in their left memory. They are portrayed in yellow.

Test nodes perform a mathematical or logical operation such as equality or inequality on the values of the attributes of the tokens they receive. Test nodes that implement temporal reasoning are marked as TEMP.

Finally, &P nodes are final nodes. When a token is forwarded to the final node, an instance of the abstract predicate that is being defined is created or deleted accordingly and an ``activation'' or ``de-activation'' abstract event is triggered, respectively. Each match in the network of Figure 9 will cause the detection of the following abstract event:

ClosestEmptyLocation (uid, role, rid, rattr, activation, timestamp}

Each time an instance of the abstract predicate ClosestEmptyLocation (uid, role, rid, rattr) that was previously true is evaluated to false, the following event will be detected:

ClosestEmptyLocation (uid, role, rid, rattr, de-activation, timestamp}

Filters

A filter is implemented as an AE detector with linear complexity. Filters are combined whenever there is a shared condition. For example, the filter of (5) can be combined with the filter of (6) as shown in Figure 18.
rattr=Meeting Room ∧ role=Ceo.

```
rattr= Meeting Room ∧ role= Sysadm (5)
rattr= Meeting Room ∧ role= Ceo (6)
```

The Rete Algorithm

The Rete algorithm [forgy79, forgy82] is a powerful and efficient algorithm for pattern matching as it exploits properties such as temporal redundancy in the working memory and structural similarity in the production memory in order to avoid examining the whole of these memories in each cycle. Temporal redundancy expresses the fact that not all elements in working memory change in each cycle and that any production that becomes instantiated was close to being instantiated in the previous cycle. Structural similarity expresses the fact that many productions have many conditional elements in common in their LHS. Based on these two properties, the Rete algorithm, instead of examining the working memory directly, monitors the changes made to working memory and maintains internal information that is equivalent to the working memory. At the beginning of a cycle the match routine computes whether any changes need to be made to the conflict set. If there are changes to be made, it sends these changes to the interpreter where the conflict set is being maintained.

The interpreter consists of a fixed part that deals with the conflict set and a variable part that is generated by the compilation of the LHS of the productions into Rete networks. These networks perform the actual match. Structural similarity is achieved in them by combining nodes that test for the same LHS conditional elements.

For each working memory element, a token is created for the pair of the working memory element and a tag. The tag is used in order to determine whether the working memory element is added or removed from the working memory. Tokens are processed by the nodes in the network in order to determine whether the overall pattern is matched or not.

Distributed Classification

In some preferred embodiments the classification system is distributed across a plurality of servers in a tree structure. Preferably a hierarchy of servers is present, so that, for example, a server at a lower layer need only pass information relating to a change in the data used for classifying further up the hierarchy to a higher level. Preferably means is provided for coordinating the classification system across these servers, for example

using a distributed object structure such as a web service implementation. This provides a scaleable architecture which is useful in the context of managing the large volumes of data which may be encountered, for example, in a mobile phone network.

All components in the system are implemented as distributed objects using the CORBA or Web Services distributed object technologies. It is possible to use other technologies as well wherever needed. The system knows of a set of predefined low-level predicates that are derived from the coupled device without any logical inference (Rete-based classifier) or classification (HMM-based classifier). These predicates are processed by the Input System at the same rate as their input rate and are fed to the classifiers accordingly. The result of the classification can be fed to a higher-level classifier in the form of an event through the interface PublishAbstractEvent () in Figure 1. For HMM-based classifiers, the new event is fed to the part "Trajectory Creation" where it can be sampled and adapted to be fed to the classifier. For Rete-based classification it is fed to the Event Listener of the AESL Input System (Figure 17).

A tree-like distributed classification for communication systems such as the GSM network (Figure 20) is depicted in Figure 21. However the system is not restricted to GSM networks. A tree-like distributed classification for a communication system with a complex architecture, such as the internet architecture, including peer-to-peer communications between nodes, can be implemented using our system on top of a distributed hash table with an appropriate protocol for optimising the placement of the classifiers as close as possible to the devices.

Scalability

In addition to the above described hierarchical structure, Rete-based classification itself is structured in a relatively unusual way, namely, in order to allow applications to register inference rules that generate abstract knowledge from low-level, sensor-derived knowledge. Scalability is achieved by maintaining a dual-layer knowledge representation mechanism for each Rete-based classifier that functions in a similar way to a two-level cache. The lower layer maintains knowledge about the current state of the Communication System at device level by continually processing a high rate of events

produced by the coupled devices e.g., it knows of the position of a device in space in terms of his coordinates (x,y,z). The higher layer maintains easily retrievable, user-defined, abstract knowledge about current and historical states of the communications environment along with temporal properties such as the time of occurrence and their duration. Such abstract knowledge has the property that it is updated much less frequently than knowledge in the lower layer, namely, only when certain threshold events happen. Knowledge is retrieved mainly by accessing the higher layer, which entails a significantly lower computational cost than accessing the lower layer, thus maintaining the overall system scalability.

Figure 19 depicts the architecture of a dual-layer knowledge base. The lower layer is depicted as "Sensor Abstract Layer (SAL)" and the higher layer as "Deductive Abstract Layer (DAL)". The lower-level predicates p1 and p2 are monitored at the same rate as their arrival rate. The higher layer predicates P1 and P2 are abstract events specified by an AESL definition (see Section Rete-based classification) and only change according to the definition, at a lower rate than p1 and p2. See [katsiri03] for details.

Collective Behaviour modelling

Collective behaviour can be recognised and classified by means both of the HMM-based classifiers and the Rete-based classifiers. For example the said system can be used to classify samples consisting of positions derived from a plurality of devices, that characterise the collective physical motion of a plurality of devices (attached to humans). Collective behaviour recognition can be used to classify the features of a vehicle transportation model or a model for crowd management in public areas. In the former case, the model can be used to recognise the large-scale behaviour of people in cars, moving over a network of roads and railways. The system classifies samples taken from devices that are located within a single or adjacent cells (in a GSM network, see Figure 20) into the classification features/classes may be "traffic jam", "normal traffic", "train", "bus", "destination" etc. This way of collecting samples, ensures the locality of the devices that form a pattern but also ensures that patterns that exist at the boundaries of communication cells can also be captured, e.g., capturing a train that is crossing from one cell to another.

The crowd management model, can be used to describe the collective behaviour of a crowd of people moving inside a public area such as the Paddington station is London. Samples taken as described above, correspond to the classification classes "metro exit", "gate", "train platform", "congestion", "shop", "meeting point", "walking", "running" etc.

Effectors that are triggered as a result of successful classification, may be used for example to reconfigure the network in order to better cope with predicted or actual load, for example to increase the coverage in a region where many users are present or where, for example based upon predicted motion, many users or an increased number of users is predicted to be present. Methods for reconfiguring a network may include reallocation of base stations and/or other techniques, such as network bandwidth control and/or cell size adjustment.

Stock Management

In preferred embodiments of the said system, it is possible to compose, deploy and manage algorithmic trading strategies, such as VWAP, Spread Trading and Index Arbitrage, by means of the Rete-based and HMM-based Classifier. Using the AESL input it is possible to reason transparently with distributed state, leading to the composition of strategies that are portable and can be applied to multiple steams of real stock data in a "plug-and-play" manner. The AESL input allows the composition of strategies of an expressiveness that is not possible with existing technologies that are based on finite-state machines, including negation (see Section "AESL input"). It is also possible to calculate the risk associated with derivative modelling in real time, which is infeasible with current technologies.

Packet Data Communications

Another application of the above described techniques involves identifying potential security violations in a packet data communications network. Known techniques typically rely upon determining a data rate (packets/second) but embodiments of the method we describe do not need this information. Instead in some preferred

embodiments, putative invariant features are sought. For example, in order to detect an intrusion it is often necessary to detect data packet streams of the same length. This can be implemented efficiently using the classification system and the AESL input in order to provide a language for driving the classification.

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[priyantha00] N.B.Priyantha, A. Chakraboty and H. Balakrishnan. The Cricket Location-Support System. In MobiCom '00: Proceedings of the 6th Annual International Conference on Mobile Computing and Networking, pages 32-43, Boston, MA, Aug.2000.

[sourceo2]   Source O2:http://www.sourceo2.com

No doubt many other effective alternatives will occur to the skilled person. It will be understood that the invention is not limited to the described embodiments and encompasses modifications apparent to those skilled in the art lying within the spirit and scope of the claims appended hereto.

CLAIMS:

1.   A user activity monitoring system for a digital mobile communications network, the system comprising:

an input for receiving spatial position information from a plurality of mobile communications devices coupled to said network;

a module for constructing a trajectory for each of said devices, a trajectory of a device comprising a time series of positions of the device; and

a classification system configured to classify said trajectories into selected classes of a predetermined set of classes using a plurality of hidden Markov models or Rete networks to provide a classification data output responsive to said trajectory classification.

2.   A system as claimed in claim 1 wherein said classification system is configured to select a said class for a trajectory responsive to probability data from said plurality of hidden Markov models or Rete networks for the trajectory.

3.   A system as claimed in claim 2 wherein said classification comprises Bayesian classification.

4.   A system as claimed in claim 1, 2 or 3 wherein at least one said hidden Markov model or Rete network is responsive to a plurality of said trajectories from a plurality of said devices, whereby said at least one hidden Markov model or Rete network represents collective behaviour of a plurality of said devices, and wherein said classification data includes at least one said collective behaviour classification.

5.   A system as claimed in any one of claims 1 to 4 wherein said trajectory constructing module comprises a system to link spatial position information received from a single said device at a plurality of different elements of said network.

6.   A system as claimed in any one of claims 1 to 5 wherein said classification system is distributed across a plurality of servers in a tree structure, the system further comprising means to coordinate the classification system across said servers.

7. A system as claimed in any one of claims 1 to 6 further comprising means for re-configuring said network responsive to said classification data.

8. A system as claimed in any one of claims 1 to 7 further comprising a training module for training said classification system hidden Markov models or Rete networks response to historical data from said user activity monitoring.

9. A method of monitoring user activity in a digital mobile communications network, the method comprising:

    receiving spatial position information from a plurality of mobile communications devices coupled to said network;

    constructing a trajectory for each of said devices, a trajectory of a device comprising a time series of positions of the device; and

    classifying said trajectories into selected classes of a predetermined set of classes using a plurality of hidden Markov models or Rete networks to provide a classification data output responsive to said trajectory classification.

10. A method as claimed in claim 9 wherein at least one said hidden Markov model or Rete network is responsive to a plurality of said trajectories from a plurality of said devices, whereby said at least one hidden Markov model or Rete network represents collective behaviour of a plurality of said devices, and wherein said classification data includes at least one said collective behaviour classification.

11. A method as claimed in claim 10 wherein said collective behaviour classification comprises a classification defining a collective physical motion state of said plurality of devices.

12. A method of user activity monitoring, the method comprising:

    inputting spatial position data for a least one user representing activity of said user;

    constructing a space-time trajectory for said user; and

classifying said space-time trajectory into one of a plurality of predetermined classes using a plurality of hidden Markov models or Rete networks.

13.   A method of classifying user activity as claimed in claim 12, wherein said classifying further comprises identifying said user.

14.   A method of classifying user activity as claimed in claims 12 and 13 further comprising updating said models using a result of said user activity monitoring;

15.   A method of detecting a potential security violation in a packet data communications network, the method comprising:

capturing data from said network relating to data packets carried by the network;

representing said captured data as tuples, each said tuple comprising a set of data items relating to a captured packet, said data items being selected from the group consisting of packet identification data, packet size, packet source address, packet source port, and packet time;

grouping said tuples into sets of tuples each set representing a trajectory of said grouped tuples; and

classifying said tuple trajectories using a plurality of hidden Markov models or Rete networks to identify a trajectory defining a potential security violation of said network.

16.   A method of identifying a potentially valuable stock share or other financial instrument, the method comprising:

capturing data relating to stocks, shares or other financial instruments;

representing said captured data as tuples, each said tuple comprising a set of parameters relating to said stocks, shares or other financial instruments;

grouping said tuples into sets of tuples each set representing a trajectory of said grouped tuples; and

classifying said tuple trajectories using a plurality of hidden Markov models or Rete networks to identify a potentially valuable stock, share or other financial instrument.

17.   A carrier carrying computer program code to, when running, implement the method of any one of claims 9 to 16.

18.   A computer system comprising means for implementing the method of any one of claims 9 to 16.

_35_

Application No:	GB0600667.0	Examiner:	Mr Richard Howe
Claims searched:	1-15,17-18	Date of search:	19 April 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	1,9,12,15	WO2004/034312 A1 Intel - see whole document especially the abstract
A	1,9,12,15	US6754389 B1 Dimitrova - see whole document especially the abstract
A	1,9,12,15	US2003/0083875 A Brown et al - see whole document especially the abstract

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

The following online and other databases have been used in the preparation of this search report

Online : wpi ; epodoc ; paj

(54) Title: METHOD AND DEVICE FOR FLEXIBLY SETTING KEY BEHAVIOR IN USER INTERFACE LIBRARY
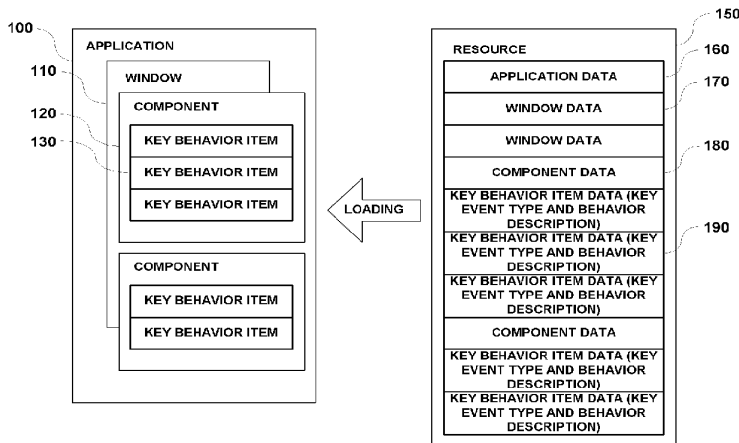
(57) Abstract: Disclosed herein is a method and device for flexibly setting key behavior in a user interface library. A key behavior setting unit reads corresponding key behavior item data recorded in a resource and sets at least one key behavior item for each component. A key event occurrence sensing unit senses the occurrence of a key event at a specific component of a user interface. A key behavior item possession checking unit determines whether the specific component includes at least one corresponding key behavior item. An application execution unit executes a corresponding application according to information written in the key behavior item if it is determined that the specific component includes at least one corresponding key behavior item. The application execution unit performs the general processing operation of the user interface if it is determined that the specific component does not include at least one corresponding key behavior item. A controller generally controls all of the respective blocks so that the blocks are operated to harmonize with other functional blocks.

Description

METHOD AND DEVICE FOR FLEXIBLY SETTING KEY BEHAVIOR IN USER INTERFACE LIBRARY

Technical Field

[1]   The present invention relates, generally, to a device and method for flexibly setting key behavior in a user interface (hereinafter referred to as "UI") library, and, more particularly, to a device and method for flexibly setting key behavior in the UI library of a mobile terminal without requiring that source code be modified.

Background Art

[2]   Generally, mobile terminals are devices that can be carried by users, and mobile phones can be considered to typically exemplify mobile terminals. Such mobile phones can provide various additional functions as well as the original functions of a telephone. Mobile phones having such additional functions include a camcorder phone, which is equipped with a camera, a TeleVision (TV) phone, which allows users to watch TV, a Moving Picture Experts Group audio layer-3 (MP3) phone, which allows users to listen to MP3 music files, and a digital broadcasting phone, which allows users to watch satellite broadcasts and/or Terrestrial broadcasts. That is, current mobile phones have evolved into forms having additional functions capable of processing multimedia data.

[3]   Further, according to trends, mobile terminals having the above-described functions generally include Liquid Crystal Display (LCD) units, and various methods of displaying the functions and the state of the mobile terminals have been developed. That is, mobile terminals have been developed to be able to display various types of user data. In order to use the various types of user data, data selection is generally performed by changing key behavior in a user interface.

[4]   With regard to key behavior technology, a method of changing key behavior without modifying source code may be seen using the "TrigML" of uiOne, which is a customized interface technology, owned by Qualcomm, and is described in the following Table 1:

[5]   Table 1

[Table 1]

[Table]

```
<trigml><layer id= "layer1"><group> <image res= "icon/bullet"> <load when=
"keypress [select]" Res= "news/headlines/$$/more" target= "layer2"/> </image> < /
group></layer><layer id= "layer2"/></trigml>
```

[6]   Here, Table 1 shows an example of reading a new page when a selection button is pressed on a purse icon (bullet). In TrigML, setting is made using the attribute 'when' such that operation is performed when an event occurs, that is, key events can be set using the attribute 'when'.

[7]   In the conventional user interface libraries, like the above-described example, key events, received from a platform, are transmitted to respective user interface components, the key events are received, and operations, such as the execution of applications and the switching of a screen, are performed based on the implementation of the components or the source code implementation of the applications. However, this method has a problem in that source code must be modified whenever an operation for a key event is changed.

Disclosure of Invention

Technical Solution

[8]   Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a method and device for flexibly setting key behavior, in which operations for key events are written in a resource in the user interface library of a mobile terminal, so that key behavior items are set for respective corresponding components and are operated when the resource is loaded.

Advantageous Effects

[9]   The advantage conferred by the preferred embodiments of the present invention, which operates as described above, is as follows.

[10]   That is, the present invention has an advantage of providing a method and device for flexibly setting a key behavior, in which operations for key events are written in a resource in the user interface library of a mobile terminal, so that key behavior items are set for respective corresponding components and are operated when the resource is loaded.

Brief Description of the Drawings

[11]   The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[12]   FIG. 1 is a diagram showing the construction of a method of flexibly setting key behavior in the user interface library of a mobile terminal according to an embodiment of the present invention;

[13]   FIG. 2 is a flowchart showing the operation of flexibly setting key behavior in the user interface library of a mobile terminal according to an embodiment of the present invention;

[14]   FIG. 3 is a view showing an example of changing the type of menu according to the embodiment of the present invention;

[15]   FIG. 4 is a view showing an example of adding menu items according to the embodiment of the present invention; and

[16]   FIG. 5 is a block diagram showing a device for flexibly setting key behavior in a user interface library of a mobile terminal according to an embodiment of the present invention.

Best Mode for Carrying Out the Invention

[17]   In order to accomplish the above object, the present invention provides a method of flexibly setting key behavior in a user interface library, including reading corresponding key behavior item data recorded in a resource and setting at least one key behavior item for each component; sensing the occurrence of a key event at a specific component of a user interface; determining whether the specific component includes at least one corresponding key behavior item; and executing a corresponding application according to information written in the key behavior item if it is determined that the specific component includes at least one corresponding key behavior item.

[18]   Here, the method further includes performing the general processing operation of the user interface if it is determined that the specific component does not include at least one corresponding key behavior item.

[19]   Further, in the setting, the key behavior item data includes information about key event type and behavior description, the resource includes application data, window data, component data, and key behavior item data, and the each component includes at least one key behavior item, and, in the sensing, the key event is transmitted to a component that currently has a focus.

[20]   In order to accomplish the above object, the present invention provides a device for flexibly setting key behavior in a user interface library, including a key behavior setting unit for reading corresponding key behavior item data recorded in a resource and setting at least one key behavior item for each component; a key event occurrence sensing unit for sensing the occurrence of a key event at a specific component of a user interface; a key behavior item possession checking unit for determining whether the specific component includes at least one corresponding key behavior item; an application execution unit for executing a corresponding application according to information written in the key behavior item if it is determined that the specific component includes at least one corresponding key behavior item, and for performing the general processing operation of the user interface if it is determined that the specific component does not include at least one corresponding key behavior item; and a controller for generally controlling all of the respective blocks so that the blocks are

operated to harmonize with other functional blocks.

[21]   Here, the device preferably performs the general processing operation of the user interface if it is determined that the specific component does not include at least one corresponding key behavior item.

[22]   Further, the key behavior item data includes information about key event type and behavior description, the resource includes application data, window data, component data, and key behavior item data, the each component includes at least one key behavior item, and the key event is transmitted to a component that currently has a focus.

[23]   In order to accomplish the above object, the present invention provides a recording medium storing a mobile terminal-readable program, the program having instructions executable in the mobile terminal and being implemented according to type so as to flexibly set key behavior in a user interface library, the program performing reading corresponding key behavior item data recorded in a resource and setting at least one key behavior item for each component; sensing the occurrence of a key event at a specific component of a user interface; determining whether the specific component includes at least one corresponding key behavior item; and executing a corresponding application according to information written in the key behavior item if it is determined that the specific component includes at least one corresponding key behavior item.

Mode for the Invention

[24]   The operational principle of embodiments of the present invention will be described in detail with reference to the attached drawings below. Reference now should be made to the drawings, in which the same reference numerals are used throughout the different drawings to designate the same or similar components. It should be noted that, in the following description, when it is determined that the detailed descriptions of well-known functions related to the present invention and the construction thereof would make the gist of the present invention obscure, they are omitted. The terms and words, which will be described later, and used in the present specification, are defined in consideration of functions related to the present invention, and may differ according to the intentions of users, operators, or customs. Therefore, the terms and words should be defined based on the description of this specification.

[25]   FIG. 1 is a diagram showing the construction of a method of flexibly setting key behavior in the user interface library of a mobile terminal according to an embodiment of the present invention.

[26]   Referring to FIG. 1, the user interface of the mobile terminal is connected to one or more windows 110 corresponding to respective applications 100. Each of the windows

110 includes one or more components 120 necessary for the construction thereof. Each of the components 120 includes one or more key behavior items 130.

[27]   Further, a resource 150 includes application data 160, window data 170, component data 180, and key behavior item data 190 including information about key event type and/or behavior description.

[28]   Here, an example of the actual operation of processing key events will be described below. Since the components 120 actually process respective key events, all of the provided components include key behavior through the key behavior items 130. Thereafter, corresponding key behavior item data 190, recorded in the resource 150, is read, and the key behavior of corresponding components is set.

[29]   Further, a key event is transferred to a component that currently has a focus. The component that received the key event determines whether the component includes at least one key behavior item for the corresponding key event. If the component does not include at least one key behavior item, the component executes a general process. If the component includes at least one key behavior item, the component performs an operation such as the execution of an application or the switching of a screen, according to information written in the key behavior item. The above-described operation is conceptualized and described in FIG. 2.

[30]   FIG. 2 is a flowchart showing the operation of flexibly setting key behavior in the user interface library of a mobile terminal according to an embodiment of the present invention.

[31]   Referring to FIG. 2, the mobile terminal reads corresponding key behavior item data recorded in the resource and sets at least one key behavior item for each component at step 200. The mobile terminal senses the occurrence of a key event at a specific component of a user interface at step 210. The mobile terminal determines whether the specific component includes at least one corresponding key behavior item at step 220. If it is determined that the component does not include at least one corresponding key behavior item, the mobile terminal performs the general processing operation of a user interface at step 230. If it is determined that the component includes at least one corresponding key behavior item, the mobile terminal executes a corresponding application according to information written in the key behavior item at step 240.

[32]   An embodiment of the operation of processing a key event proposed by the present invention will be described with reference to FIGS. 3 and 4.

[33]   FIG. 3 is a view showing an example of changing the type of menu according to the embodiment of the present invention.

[34]   The example of FIG. 3 shows the change of the way of moving the focus of a menu application using key behavior. A left user interface has menu icons arranged in a grid shape. A right user interface has menu icons arranged in a heart shape. That is, the case

in which the resource is modified such that the left user interface is changed to the right user interface is shown.

[35]   Since key behavior corresponding to components each having a menu icon is registered in the resource, focus is switched to a specific component through directional keys. Here, if the component to which focus is switched is changed by modifying the resource, the switching of focus can be appropriately performed in a user interface having a different type of menu.

[36]   FIG. 4 is a view showing an example of adding menu items according to the embodiment of the present invention.

[37]   The example of FIG. 4 shows the addition of menu items which are selected and execute applications, using key behavior. That is, when the left user interface is changed to the right user interface, menu items indicated by reference numeral 400 are added.

[38]   Here, if key behavior cannot be set, source code must be modified so that applications can be executed when a selection button is pressed on the menu items even though the menu items are added to the user interface. However, according to the present invention, the operation of menu items added using key behavior can be described, so that menu items can be modified, deleted, and added by performing the replacement of a resource.

[39]   In the existing user interface libraries, key events, received from a platform, are transmitted to respective user interface components, the key events are received, and operations, such as the execution of applications and the switching of a screen, are performed based on the implementation of the components or the source code implementation of the applications. Such a method causes inconvenience in that source code must be modified whenever an operation for a key event varies. That is, as in the above-described example, when a menu is selected in a menu application, source code must be modified if an execution application is changed or a menu item must be added or deleted.

[40]   However, since an operation for a key event is not implemented in source code but is written in a resource, it is possible to reduce the time required for compiling of source code and to flexibly set key behavior by performing the replacement of a resource.

[41]   FIG. 5 is a block diagram showing a device for flexibly setting key behavior in a user interface library of a mobile terminal according to an embodiment of the present invention.

[42]   Referring to FIG. 5, a mobile terminal, which enables key behavior to be flexibly set in a user interface library, includes a controller 500, a key behavior setting unit 510, a key event occurrence sensing unit 520, a key behavior item possession checking unit 530, and an application execution unit 540. It is apparent that the respective blocks

may be implemented using software, or using hardware in the form of a System on Chip (SOC).

[43]   In order to flexibly set key behavior in the user interface library of the mobile terminal, the controller 500 performs control such that the key behavior setting unit 510, the key event occurrence sensing unit 520, the key behavior item possession checking unit 530, and the application execution unit 540 are operated to harmonize with other functional blocks of the mobile terminal.

[44]   The key behavior setting unit 510 of the mobile terminal reads corresponding key behavior item data recorded in the resource and sets at least one key behavior item for each component. When a user generates a key event at a specific component of a user interface in order to execute a desired application, the key event occurrence sensing unit 520 of the mobile terminal senses the occurrence of the key event at the specific component of the user interface. The key behavior item possession checking unit 530 of the mobile terminal determines whether the specific component includes at least one corresponding key behavior item.

[45]   If, as a result of the determination, the specific component is found not to include at least one corresponding key behavior item, the application execution unit 540 of the mobile terminal performs the general processing operation of the user interface. In contrast, if, as the result of the determination, the specific component is found to include at least one corresponding key behavior item, the application execution unit 540 of the mobile terminal executes a corresponding application according to information written in the key behavior item.

[46]   Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

[1]   A method of flexibly setting key behavior in a user interface library, comprising:
        reading corresponding key behavior item data recorded in a resource and setting
        at least one key behavior item for each component;
        sensing an occurrence of a key event at a specific component of a user interface;
        determining whether the specific component includes at least one corresponding
        key behavior item; and
        executing a corresponding application according to information written in the
        key behavior item if it is determined that the specific component includes at least
        one corresponding key behavior item.

[2]   The method as set forth in claim 1, further comprising performing a general
        processing operation of the user interface if it is determined that the specific
        component does not include at least one corresponding key behavior item.

[3]   The method as set forth in claim 1, wherein, in the setting, the key behavior item
        data comprises information about key event type and behavior description, the
        resource comprises application data, window data, component data, and key
        behavior item data, and the each component comprises at least one key behavior
        item.

[4]   The method as set forth in claim 1, wherein, in the sensing, the key event is
        transmitted to a component that currently has a focus.

[5]   A device for flexibly setting key behavior in a user interface library, comprising:
        a key behavior setting unit for reading corresponding key behavior item data
        recorded in a resource and setting at least one key behavior item for each
        component;
        a key event occurrence sensing unit for sensing an occurrence of a key event at a
        specific component of a user interface;
        a key behavior item possession checking unit for determining whether the
        specific component includes at least one corresponding key behavior item;
        an application execution unit for executing a corresponding application
        according to information written in the key behavior item if it is determined that
        the specific component includes at least one corresponding key behavior item,
        and for performing a general processing operation of the user interface if it is
        determined that the specific component does not include at least one cor-
        responding key behavior item; and
        a controller for generally controlling all of the respective blocks so that the
        blocks are operated to harmonize with other functional blocks.

[6]   A recording medium storing a mobile terminal-readable program, the program

having instructions executable in the mobile terminal and being implemented according to type so as to flexibly set key behavior in a user interface library, the program performing:

reading corresponding key behavior item data recorded in a resource and setting at least one key behavior item for each component;

sensing an occurrence of a key event at a specific component of a user interface;

determining whether the specific component includes at least one corresponding key behavior item; and

executing a corresponding application according to information written in the key behavior item if it is determined that the specific component includes at least one corresponding key behavior item.

[Fig. 1]

```
  100 ─┐  ┌─────────────────────────────┐            ┌──────────────────────────────────┐ ┌─ 150
       │  │ APPLICATION                 │            │  RESOURCE                        │ ├─ 160
  110 ─┐ │  ┌──────────────────────────┐│            │ ┌───────────────────────────────┐│ │
       │ │  │ WINDOW                   ││            │ │  APPLICATION DATA             ││ ┌─ 170
       │ │  │ ┌───────────────────────┐││            │ ├───────────────────────────────┤│ │
  120 ─┐ │  │ │ COMPONENT             │││            │ │  WINDOW DATA                  ││ │
       │ │  │ │ ┌────────────────────┐│││            │ ├───────────────────────────────┤│ │
  130 ─┐ │  │ │ │ KEY BEHAVIOR ITEM  ││││            │ │  WINDOW DATA                  ││ ┌─ 180
       │ │  │ │ ├────────────────────┤│││            │ ├───────────────────────────────┤│ │
         │  │ │ │ KEY BEHAVIOR ITEM  ││││            │ │  COMPONENT DATA               ││ │
         │  │ │ ├────────────────────┤│││ ◄─┐        │ ├───────────────────────────────┤│ │
         │  │ │ │ KEY BEHAVIOR ITEM  ││││   LOADING  │ │ KEY BEHAVIOR ITEM DATA (KEY   ││ │
         │  │ │ └────────────────────┘│││            │ │ EVENT TYPE AND BEHAVIOR       ││ │
         │  │ └───────────────────────┘││            │ │ DESCRIPTION)                  ││ ┌─ 190
         │  │ ┌───────────────────────┐││            │ │ KEY BEHAVIOR ITEM DATA (KEY   ││
```

(Figure 1 shows the APPLICATION (100), WINDOW (110), COMPONENT (120), and KEY BEHAVIOR ITEM (130) blocks on the left, with a LOADING arrow pointing from the RESOURCE (150) block on the right. The RESOURCE block contains APPLICATION DATA (160), WINDOW DATA (170), COMPONENT DATA (180), and KEY BEHAVIOR ITEM DATA (KEY EVENT TYPE AND BEHAVIOR DESCRIPTION) (190).)

[Fig. 2]

```
                          ┌───────────┐
                          │   START   │
                          └─────┬─────┘
                                │
                                ▼
        ┌────────────────────────────────────────┐
  200 ─ │  CORRESPONDING KEY BEHAVIOR ITEM        │
        │  DATA RECORDED IN RESOURCE IS READ      │
        │  AND KEY BEHAVIOR OF EACH               │
        │  COMPONENT IS SET                       │
        └────────────────────┬───────────────────┘
                             │
                             ▼
        ┌────────────────────────────────────────┐
  210 ─ │        KEY EVENT OCCURS AT              │
        │        SPECIFIC COMPONENT               │
        └────────────────────┬───────────────────┘
                             │
          220                ▼                          230
          ┌──────────────────────────────┐   NO    ┌──────────────────────┐
          │   IS AT LEAST ONE             │────────▶│  GENERAL PROCESSING  │
          │   CORRESPONDING KEY BEHAVIOR  │         │  OPERATION IS        │
          │   ITEM INCLUDED?              │         │  PERFORMED           │
          └──────────────┬───────────────┘         └──────────┬───────────┘
                         │ YES                                 │
                         ▼                                     │
        ┌────────────────────────────────────────┐            │
  240 ─ │  APPLICATION IS EXECUTED ACCORDING      │            │
        │  TO INFORMATION WRITTEN IN KEY          │            │
        │  BEHAVIOR ITEM                          │            │
        └────────────────────┬───────────────────┘            │
                             │◄───────────────────────────────┘
                             ▼
                       ┌───────────┐
                       │    END    │
                       └───────────┘
```

[Fig. 3]

[Fig. 4]

[Fig. 5]

International application No.

PCT/KR2007/005426

A.	CLASSIFICATION OF SUBJECT MATTER

G06F 3/048(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B.	FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
  IPC8 G06F 3/048, H04B 1/38, 1/40, H04M 1/725

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
  Korean Utility models and applications for Utility Models since 1975
  Japanese Utility models and applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
  eKIPASS(KIPO internal) "portable, mobile, terminal, key, function, user interface, and similar terms"

C.	DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y1	US 5894276 A (WILKER ALTIDOR et al.) 13 Apr. 1999 See Summary of the invention, Figures 4, 5, Column 3 Line 6 - Column 3 Line 48	1 - 6
Y2	US 6381468 B1 (FLEMMING KLOVBORG LARSEN et al.) 30 Apr. 2002 See Summary of the invention, Column 3 Line 9 - Column 4 Line 64	1 - 6
Y2	KR 1020020011047 A (LG INFORMATION & COMMUNICATIONS LTD.) 07 Feb. 2002 See Summary of the invention, Figure 2, Claims 1-3	1 - 6
A	US 6799061 B2 (MI-RAN JEONG) 28 Sep. 2004 See Summary of the invention, Figure 2, Column 3 Line 1 - Column 3 Line 42	1 - 6

☐ Further documents are listed in the continuation of Box C.	☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 FEBRUARY 2008 (05.02.2008)	**05 FEBRUARY 2008 (05.02.2008)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer JEONG, Jae Woo Telephone No. 82-42-481-5718

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT
Information on patent family members

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5894276 A	13.04.1999	None	
US 6381468 B1	30.04.2002	EP 0844777 A3	12.06.2002
		JP 2005102320 A2	14.04.2005
		CN 1189075 A	29.07.1998
KR 1020020011047 A	07.02.2002	None	
US 6799061 B2	28.09.2004	KR 1020010054519 A	02.07.2001
		EP 1107544 A3	17.09.2003

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
McMillan, Scott L.
Kilpatrick Townsend & Stockton LLP
1400 Wewatta Street Suite 600
Denver CO 80202-5556
ETATS-UNIS D'AMERIQUE

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing (day/month/year)	14 May 2012 (14-05-2012)

Applicant's or agent's file reference 103287WO	FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No. PCT/US2012/021743	International filing date (day/month/year) 18 January 2012 (18-01-2012)

Applicant

QUALCOMM INCORPORATED

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1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

    Filing of amendments and statement under Article 19:
    The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

    When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

    Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
    1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70
    For more detailed instructions, see PCT Applicant's Guide, International Phase, paragraphs 9.004 - 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

    [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

    [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

    The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

    Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

    Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

    In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

    For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	CHIARIZIA, Brigitte Tel: +31 (0)70 340-3901

Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 103287WO	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US2012/021743	International filing date *(day/month/year)* 18/01/2012	(Earliest) Priority Date *(day/month/year)* 19/01/2011
Applicant QUALCOMM INCORPORATED		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of _____6_____ sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

 a. With regard to the **language,** the international search was carried out on the basis of:

 ☒ the international application in the language in which it was filed

 ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

 b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

 c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☒ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**

 ☒ the text is approved as submitted by the applicant

 ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

 ☒ the text is approved as submitted by the applicant

 ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**

 a. the figure of the **drawings** to be published with the abstract is Figure No. __4__

 ☒ as suggested by the applicant

 ☐ as selected by this Authority, because the applicant failed to suggest a figure

 ☐ as selected by this Authority, because this figure better characterizes the invention

 b. ☐ none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/021743

Box No. II   Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.:   1-55
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

    see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III   Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest   ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (April 2005)

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
INV.   G06K9/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 434 504 A (KATSIRI ELEFTHERIA [GB]) 25 July 2007 (2007-07-25) abstract	1,22,32, 48
A	US 2007/036347 A1 (TEICHER MORDECHAI [IL]) 15 February 2007 (2007-02-15) abstract	1,22,32, 48
A	WO 2008/054135 A1 (SK TELECOM CO LTD [KR]; KIM JONG BAE [KR]; KIM HOO JONG [KR]) 8 May 2008 (2008-05-08) abstract	1,22,32, 48

☐ Further documents are listed in the continuation of Box C.   ☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 May 2012	14/05/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Sonius, Michiel

Form PCT/ISA/210 (second sheet) (April 2005)

1

INTERNATIONAL SEARCH REPORT
Information on patent family members

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2434504	A	25-07-2007	NONE	
US 2007036347	A1	15-02-2007	NONE	
WO 2008054135	A1	08-05-2008	NONE	

FURTHER INFORMATION CONTINUED FROM   PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.:   1-55

1. The claims are so unclear that no meaningful search for prior art can
be performed. The main issues are: 1.1 It is not clear what is meant with
information sources or detecting a condition; what is meant with
condition or how it is detected. 1.1.1 The description gives some
examples of conditions: in paragraph 28 events or conditions could be
walking, driving, fidgeting. In paragraph 29, a conditionor an event may
include a time of day, day of week, state or action, wherein the actions
can be silencing a ringer, muting a call, sending a text message, etc.
Hence a very broad range of activities or occurrences are covered. 1.1.2
Claim 1 specifies that the conditions are detected based on at least one
of monitored input signals. Detecting activities such as walking from
signals would require some form of pattern recognition, unless the user
has a way of informing the (device performing the) method of his
activity. The latter interpretation would make more sense, as the
detection of the condition is followed by "identifying a pattern", which
suggests a form of supervised learning in order to be able to detect or
recognise the condition without the user informing the (device performing
the) method. If it is already known how to automatically infer the
conditions by pattern recognition, no training would be necessary. The
identifying of a pattern might however well to relate to other processes
than a pattern recognition activity. Hence any interpretation is
guesswork. 1.2 The fixing of the varying parameters also is not clear.
Again, it could be a pattern recognition related activity, but than it is
not clear how this process differs from the "identifying" of a pattern.
1.3 The very vague claim and similarly vague description do not clearly
indicate what contribution the invention is supposed to bring, especially
in that no technical problem and its solution can be identified (Rule 5
(a) (iii) PCT). Learning in pattern recognition, including feature
selection and distinguishing relevant from irrelevant information is well
known in the field of pattern recognition. With the various sensors
available in a mobile telephone and the unconstrained user behaviour it
presents a challenging task to detect significant conditions in a
reliable manner. It is not evident where the present application offers
any progress to achieving this challenge. 1.4 Further unclear terms are:
1.4.1 In claims 4, 5 it cannot be imagined what should be imagined as
second pattern, when the fixed variables correspond to parameters that
have been learned to recognise the first pattern. 1.4.2 It is not clear
what are transitions or context-related information streams. 1.5 It is
furthermore not clear on what basis patterns are determined to be
irrelevant.

The applicant's attention is drawn to the fact that claims relating to
inventions in respect of which no international search report has been
established need not be the subject of an international preliminary
examination (Rule 66.1(e) PCT). The applicant is advised that the EPO
policy when acting as an International Preliminary Examining Authority is
normally not to carry out a preliminary examination on matter which has
not been searched. This is the case irrespective of whether or not the
claims are amended following receipt of the search report or during any

FURTHER INFORMATION CONTINUED FROM   PCT/ISA/ 210

Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year)   see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference see form PCT/ISA/220	**FOR FURTHER ACTION** See paragraph 2 below

International application No. PCT/US2012/021743	International filing date (day/month/year) 18.01.2012	Priority date (day/month/year) 19.01.2011

International Patent Classification (IPC) or both national classification and IPC
INV. G06K9/00

Applicant
QUALCOMM INCORPORATED

1. This opinion contains indications relating to the following items:

   ☒ Box No. I   Basis of the opinion
   ☐ Box No. II   Priority
   ☒ Box No. III   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   ☐ Box No. IV   Lack of unity of invention
   ☐ Box No. V   Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
   ☐ Box No. VI   Certain documents cited
   ☐ Box No. VII   Certain defects in the international application
   ☐ Box No. VIII   Certain observations on the international application

2. **FURTHER ACTION**

   If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

   If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

   For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	Sonius, Michiel Telephone No. +31 70 340-0

Form PCT/ISA/237 (Cover Sheet) (July 2009)

Box No. I   Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

    ☒   the international application in the language in which it was filed

    ☐   a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐   This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

    a. (means)

        ☐   on paper

        ☐   in electronic form

    b. (time)

        ☐   in the international application as filed

        ☐   together with the international application in electronic form

        ☐   subsequently to this Authority for the purposes of search

4. ☐   In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. III   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

---

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

☒   the entire international application

☐   claims Nos. <u>1-55</u>

because:

☐   the said international application, or the said claims Nos.   relate to the following subject matter which does not require an international search *(specify)*:

☒   the description, claims or drawings *(indicate particular elements below)* or said claims Nos. <u>1-55</u> are so unclear that no meaningful opinion could be formed *(specify)*:

<u>see separate sheet</u>

☒   the claims, or said claims Nos. <u>1-55</u> are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

<u>see separate sheet</u>

☐   no international search report has been established for the whole application or for said claims Nos. ___

☐   a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

    ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

    ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

    ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b).

☐   See Supplemental Box for further details

Form PCT/ISA/ 237 (April 2007)

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The claims are so unclear that no meaningful opinion on presence of novelty or inventive step can be formulated. The main issues are:

1.1 It is not clear what is meant with information sources or detecting a condition; what is meant with condition or how it is detected.

1.1.1 The description gives some examples of conditions: in paragraph 28 events or conditions could be walking, driving, fidgeting. In paragraph 29, a condition or an event may include a time of day, day of week, state or action, wherein the actions can be silencing a ringer, muting a call, sending a text message, etc. Hence a very broad range of activities or occurrences are covered.

1.1.2 Claim 1 specifies that the conditions are detected based on at least one of monitored input signals. Detecting activities such as walking from signals would require some form of pattern recognition, unless the user has a way of informing the (device performing the) method of his activity. The latter interpretation would make more sense, as the detection of the condition is followed by "identifying a pattern", which suggests a form of supervised learning in order to be able to detect or recognise the condition without the user informing the (device performing the) method. If it is already known how to automatically infer the conditions by pattern recognition, no training would be necessary.

The identifying of a pattern might however well to relate to other processes than a pattern recognition activity. Hence any interpretation is guesswork.

1.2 The fixing of the varying parameters also is not clear. Again, it could be a pattern recognition related activity, but than it is not clear how this process differs from the "identifying" of a pattern.

1.3 The very vague claim and similarly vague description do not clearly indicate what contribution the invention is supposed to bring, especially in that no technical problem and its solution can be identified (Rule 5 (a) (iii) PCT). Learning in pattern recognition, including feature selection and distinguishing relevant from irrelevant information is well known in the field of pattern recognition. With the various sensors

Form PCT/ISA/237 (Separate Sheet) (Sheet 1) (EPO-April 2005)

available in a mobile telephone and the unconstrained user behaviour it presents a challenging task to detect significant conditions in a reliable manner. It is not evident where the present application offers any progress to achieving this challenge.

1.4   Further unclear terms are:

1.4.1   In claims 4, 5 it cannot be imagined what should be imagined as second pattern, when the fixed variables correspond to parameters that have been learned to recognise the first pattern.

1.4.2   It is not clear what are transitions or context-related information streams.

1.5   It is furthermore not clear on what basis patterns are determined to be irrelevant.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

Electronic Acknowledgement Receipt

EFS ID:	13044474
Application Number:	13269516
International Application Number:	
Confirmation Number:	4858
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya NARAYANAN
Customer Number:	15093
Filer:	Scott Lee McMillan/Victoria MacMillan
Filer Authorized By:	Scott Lee McMillan
Attorney Docket Number:	103287 (822791)
Receipt Date:	18-JUN-2012
Filing Date:	07-OCT-2011
Time Stamp:	19:19:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	93495_822791_IDS.pdf	134293 b1e8f52ad02724957d80fbc0540e5f1032997dce	no	2

Warnings:

Information:

This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	GB2434504.pdf	1722017 be64c8d389251aa9f960be267a73bfe64ab7410c	no	57

Warnings:

Information:

3	Foreign Reference	WO2008054135.pdf	686941 b526f6c65935eda8f54996a0a4b3ba501faac1b5	no	14

Warnings:

Information:

4	Non Patent Literature	103287WO_2012_05_14_WO_ISR.pdf	621977 1b572249724c2ba6a09108a9ce5afb6e178a249d	no	13

Warnings:

Information:

Total Files Size (in bytes):	3165228

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☒ Practitioners associated with the Customer Number:

15093

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b). I further authorize any of the above-identified practitioners to execute a Statement Under 37 CFR 3.73(b) on the undersigned's behalf to certify the chain of title and establish the undersigned's ownership in any and all patent applications in which rights have been assigned to the undersigned.

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☒ The address associated with Customer Number:

15093

OR

☐ Firm or Individual Name	
Address	

City		State		Zip	
Country					

Telephone		Email	

Assignee Name and Address:

QUALCOMM Incorporated
5775 Morehouse Drive
San Diego, California 92121

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date MAY 25, 2011
Name	Katherine Umpleby	Telephone 858 651 7170
Title	VP, Chief Patent Counsel	

63352755 v1

63559545

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: ___Vidya Narayanan et al._____

Application No./Patent No.: _____13/269,516_____ Filed/Issue Date: __October 7, 2011_____

Titled: ___LEARNING SITUATIONS VIA PATTERN MAKING___

___QUALCOMM INCORPORATED_____, a ___corporation_____
(Name of Assignee)   (Type of Assignee: corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;

2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____%); or

3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel __027328_____ , Frame __0617_____ , or for which a copy thereof is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____ , Frame _____ , or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____ , Frame _____ , or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____ , Frame _____ , or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet (s).

☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

___/Scott L. McMillan/_____	___December 7, 2011____
Signature	Date

___Scott L. McMillan, Reg. No. 62,079_____	___Attorney of Record____
Printed or Typed Name	Title

Electronic Patent Application Fee Transmittal

Application Number:	13269516
Filing Date:	07-Oct-2011
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya NARAYANAN
Filer:	Scott Lee McMillan/Joni Peterson
Attorney Docket Number:	103287 (822791)

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late filing fee for oath or declaration	1051	1	130	130
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**130**

Electronic Acknowledgement Receipt

EFS ID:	11563907
Application Number:	13269516
International Application Number:	
Confirmation Number:	4858
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya NARAYANAN
Customer Number:	15093
Filer:	Scott Lee McMillan/Joni Peterson
Filer Authorized By:	Scott Lee McMillan
Attorney Docket Number:	103287 (822791)
Receipt Date:	07-DEC-2011
Filing Date:	07-OCT-2011
Time Stamp:	15:39:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$130
RAM confirmation Number	2434
Deposit Account	201430
Authorized User	MCMILLAN,SCOTT
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	
Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)	
Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	DECLARATION_103287_AS_FILED.pdf	1521328 f368a764cf3fe35d49d7403793841da5143d5013	no	3
Warnings:					
Information:					
2	Power of Attorney	POWER_OF_ATTORNEY_103287_AS_FILED.pdf	574396 8e36f84876349b719e2af6e74611b09c55f33842	no	1
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73(b).	ASSIGNEE_STMT_103287_AS_FILED.pdf	56194 b682d30030d69bdf0c33b58be469c88f8b6fa10b	no	1
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	29907 95e34beac270b6fd98be85ce3ccbb6edbd30461f	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2181825		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	LEARNING SITUATIONS VIA PATTERN MAKING

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☒ Application No. 13/269,516 _____ filed on October 7, 2011 _____

☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: Vidya NARAYANAN _____ Date: 10/26/11 _____

Signature: _____ Citizen of: US _____

Inventor two: Sanjiv NANDA _____ Date: _____

Signature: _____ Citizen of: US _____

☒ Additional inventors or a legal representative are being named on _____ 1 of 2 _____ additional form(s) attached hereto.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	LEARNING SITUATIONS VIA PATTERN MAKING

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☒ Application No. 13/269,516 _____ filed on October 7, 2011 _____

☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.
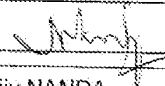
WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)	
Inventor one: Vidya NARAYANAN	Date:
Signature:	Citizen of: US
Inventor two: Sanjiv NANDA	Date: 10/19/11
Signature: _____	Citizen of: US

☒ Additional inventors or a legal representative are being named on _____ 1 of 2 _____ additional form(s) attached hereto.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	LEARNING SITUATIONS VIA PATTERN MAKING

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☒ Application No. 13/269,516   filed on October 7, 2011

    ☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)	
Inventor one: Fuming SHIH	Date: Nov. 30, 2011
Signature: *Fuming Shih*	Citizen of: TW
Inventor two:	Date:
Signature:	Citizen of:

☒ Additional inventors or a legal representative are being named on ____ 2 of 2 ____ additional form(s) attached hereto.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/269,516	10/07/2011	2617	3600	103287	55	4

CONFIRMATION NO. 4858

15093
Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

FILING RECEIPT

OC000000050526738

Date Mailed: 10/25/2011

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

        Vidya NARAYANAN, San Diego, CA;
        Sanjiv NANDA, Ramona, CA;
        Fuming SHIH, Cambridge, MA;

Assignment For Published Patent Application

        QUALCOMM INCORPORATED, San Diego, CA

Power of Attorney: None

Domestic Priority data as claimed by applicant

        This appln claims benefit of 61/434,400 01/19/2011

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 10/21/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/269,516**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

page 1 of 3

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Title

LEARNING SITUATIONS VIA PATTERN MATCHING

Preliminary Class

455

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number
13/269,516

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE($)	FEE($)		RATE($)	FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	380
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(i))	55 minus 20 =	* 35			OR	x 60 =	2100
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1				x 250 =	250
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	3600

APPLICATION AS AMENDED - PART II

AMENDMENT A

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
						RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
						RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

177

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/269,516	10/07/2011	Vidya NARAYANAN	103287

CONFIRMATION NO. 4858

15093
Kilpatrick Townsend & Stockton/Qualcomm
Two Embarcadero Center
8th Floor
San Francisco, CA 94111-3834

FORMALITIES LETTER

OC000000050526739

Date Mailed: 10/25/2011

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

• The oath or declaration is missing.
A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

• A surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of **$130** for a non-small entity, must be submitted.

SUMMARY OF FEES DUE:

Total fee(s) required within **TWO MONTHS** from the date of this Notice is **$130** for a non-small entity
• **$130** Surcharge.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

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/tly/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	Unknown
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown
	Examiner Name	Unknown

Sheet	1	of	3	Attorney Docket No: 103287

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number — Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US7570943	08-04-2009	SORVARI; Antti et al.	
	002	US20090305661	12-10-2009	ITO; Koichi	
	003	US20100001949	01-07-2010	SHKOLNIKOV; Mark et al.	
	004	US20100075639	03-25-2010	HORVITZ; Eric J. et al.	
	005	US20100217533	08-26-2010	NADKARNI; Vijay et al.	
	006	US20100299757	11-25-2010	LEE; Ho Sub	
	007	US20100317371	12-16-2010	WESTERINEN; William J. et al.	
	008	US20110039522	02-17-2011	PARTRIDGE; Kurt E. et al.	
	009	US20110070863	03-24-2011	MA; Yiming et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document — Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T6

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T2
	010	CALDERON, et al., "Recognition and Generation of Motion Primitives with Humanoid Robots", 2009 IEEE/ASME International Conference on Advanced Intelligent Mechatronics Suntec Convention and Exhibition Center, Singapore, July 14-17, 2009, pp. 917-922.	☐

EXAMINER SIGNATURE	DATE CONSIDERED

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 See Kinds Codes ofUSPTO Patent Documents at www.uspto.gov or MPEP 901.04. 3 Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). 4 For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. 5Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. 6Applicant is to place a check mark here if English language Translation is attached.This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by theUSPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	Unknown
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown
	Examiner Name	Unknown

Sheet	2	of	3	Attorney Docket No: 103287

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No.**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T2**
	011	GHASEMZADEH, et al., "Collaborative Signal Processing for Action Recognition in Body Sensor Networks: A Distributed Classification Algorithm Using Motion Transcripts," IPSN'10, April 12-16, 2010, Stockholm, Sweden, pp. 244-255.	☐
	012	HUYNH, et al., "Analyzing Features for Activity Recognition," Joint sOc-EUSAI conference, Grenoble, October 2005, 6 pages.	☐
	013	VALTONEN M. et al., "Proactive and Adaptive Fuzzy Profile Control for Mobile Phones", percom, pp.1-3, 2009 IEEE International Conference on Pervasive Computing and Communications, 2009.	☐
	014	YANG, et al., "Distributed Recognition of Human Actions Using Wearable Motion Sensor Networks," Journal of Ambient Intelligence and Smart Environments (2009), pp. 1-13.	☐
	015	YANG, et al., "Distributed Segmentation and Classification of Human Actions Using a Wearable Motion Sensor Network," Computer Society Conference on Computer Vision and Pattern Recognition Workshops, 2008. CVPRW '08, pp. 1-8.	☐

EXAMINER SIGNATURE	DATE CONSIDERED

Substitute for form 1449/PTO	**Complete if Known**	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*	**Application Number**	Unknown
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown
	Examiner Name	Unknown

Sheet	3	of	3	Attorney Docket No: 103287

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Scott L. McMillan/	Date (YYYY-MM-DD)	2011-10-07
Name/Print	Scott L. McMillan	Registration Number	62079

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	Unknown
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown
	Examiner Name	Unknown

Sheet	1	of	3	Attorney Docket No: 103287

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number — Number-Kind Code[2(if known)]	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US7570943	08-04-2009	SORVARI; Antti et al.	
	002	US20090305661	12-10-2009	ITO; Koichi	
	003	US20100001949	01-07-2010	SHKOLNIKOV; Mark et al.	
	004	US20100075639	03-25-2010	HORVITZ; Eric J. et al.	
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	007	US20100317371	12-16-2010	WESTERINEN; William J. et al.	
	008	US20110039522	02-17-2011	PARTRIDGE; Kurt E. et al.	
	009	US20110070863	03-24-2011	MA; Yiming et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document — Country Code[3]-Number[4]-Kind Code[5](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T6

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T2
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EXAMINER SIGNATURE		DATE CONSIDERED

Substitute for form 1449/PTO	*Complete if Known*	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*	**Application Number**	Unknown
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown
	Examiner Name	Unknown

Sheet	2	of	3	Attorney Docket No: 103287

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No.**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T2**
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	012	HUYNH, et al., "Analyzing Features for Activity Recognition," Joint sOc-EUSAI conference, Grenoble, October 2005, 6 pages.	☐
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	014	YANG, et al., "Distributed Recognition of Human Actions Using Wearable Motion Sensor Networks," Journal of Ambient Intelligence and Smart Environments (2009), pp. 1-13.	☐
	015	YANG, et al., "Distributed Segmentation and Classification of Human Actions Using a Wearable Motion Sensor Network," Computer Society Conference on Computer Vision and Pattern Recognition Workshops, 2008. CVPRW '08, pp. 1-8.	☐

EXAMINER SIGNATURE	DATE CONSIDERED

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*	*Complete if Known*	
	Application Number	Unknown
	Filing Date	Herewith
	First Named Inventor	NARAYANAN, Vidya
	Art Unit	Unknown
	Examiner Name	Unknown

Sheet	3	of	3	**Attorney Docket No:** 103287

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Scott L. McMillan/	Date (YYYY-MM-DD)	2011-10-07
Name/Print	Scott L. McMillan	Registration Number	62079

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya Narayanan
Filer:	Scott Lee McMillan/Jose Lopez
Attorney Docket Number:	103287

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Claims in excess of 20	1202	35	60	2100
Independent claims in excess of 3	1201	1	250	250
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	3600

Electronic Acknowledgement Receipt

EFS ID:	11147173
Application Number:	13269516
International Application Number:	
Confirmation Number:	4858
Title of Invention:	LEARNING SITUATIONS VIA PATTERN MATCHING
First Named Inventor/Applicant Name:	Vidya Narayanan
Customer Number:	15093
Filer:	Scott Lee McMillan/Jose Lopez
Filer Authorized By:	Scott Lee McMillan
Attorney Docket Number:	103287
Receipt Date:	07-OCT-2011
Filing Date:	
Time Stamp:	20:45:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$3600
RAM confirmation Number	5898
Deposit Account	201430
Authorized User	MCMILLAN,SCOTT
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	
Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)	
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Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	103287_ADS.pdf	1031804 243f8d5e54fc0faa81da4e745def3c2b210c7 caf	no	5

Warnings:

Information:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
2		APPLICATION_DWGS_IDS_REF ERENCES_103287.pdf	5126163 e02e0488fb30ee200272597e8bf8265aeea8 4603	yes	106

Multipart Description/PDF files in .zip description		
Document Description	Start	End
Specification	1	41
Claims	42	49
Abstract	50	50
Drawings-only black and white line drawings	51	55
Information Disclosure Statement (IDS) Form (SB08)	56	58
Non Patent Literature	59	106

Warnings:

Information:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
3	Fee Worksheet (SB06)	fee-info.pdf	37632 e0875f846101c18c970065abf95e7de49e71 ab8f	no	2

Warnings:

Information:

Total Files Size (in bytes):	6195599

189

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/14 (11-08)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	103287
	Application Number	

Title of Invention	LEARNING SITUATIONS VIA PATTERN MATCHING

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1 [Remove]

Applicant Authority ⦿Inventor	○Legal Representative under 35 U.S.C. 117	○Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Vidya		NARAYANAN	

Residence Information (Select One) ⦿ US Residency ○ Non US Residency ○ Active US Military Service

City	San Diego	State/Province	CA	Country of Residence i	US

Citizenship under 37 CFR 1.41(b) i	US

Mailing Address of Applicant:

Address 1	5775 Morehouse Drive
Address 2	

City	San Diego	State/Province	CA

Postal Code	92121	Country i	US

Applicant 2 [Remove]

Applicant Authority ⦿Inventor	○Legal Representative under 35 U.S.C. 117	○Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Sanjiv		NANDA	

Residence Information (Select One) ⦿ US Residency ○ Non US Residency ○ Active US Military Service

City	Ramona	State/Province	CA	Country of Residence i	US

Citizenship under 37 CFR 1.41(b) i	US

Mailing Address of Applicant:

Address 1	5775 Morehouse Drive
Address 2	

City	San Diego	State/Province	CA

Postal Code	92121	Country i	US

Applicant 3 [Remove]

Applicant Authority ⦿Inventor	○Legal Representative under 35 U.S.C. 117	○Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Fuming		SHIH	

Residence Information (Select One) ⦿ US Residency ○ Non US Residency ○ Active US Military Service

City	Cambridge	State/Province	MA	Country of Residence i	US

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	103287
	Application Number	

Title of Invention	LEARNING SITUATIONS VIA PATTERN MATCHING

Citizenship under 37 CFR 1.41(b) i		TW	
Mailing Address of Applicant:			
Address 1	280 Vassar Street, J-2		
Address 2			
City	Cambridge	**State/Province**	MA
Postal Code	02139	**Country i**	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.   [Add]

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).
☐   An Address is being provided for the correspondence Information of this application.

Customer Number	15093		
Email Address		[Add Email]	[Remove Email]

Application Information:

Title of the Invention	LEARNING SITUATIONS VIA PATTERN MATCHING	
Attorney Docket Number	103287	**Small Entity Status Claimed** ☐
Application Type	Nonprovisional	
Subject Matter	Utility	
Suggested Class (if any)		**Sub Class (if any)**
Suggested Technology Center (if any)		
Total Number of Drawing Sheets (if any)		**Suggested Figure for Publication (if any)**

Publication Information:

☐   Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐   **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S. C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)

PTO/SB/14 (11-08)
Approved for use through 09/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	103287
	Application Number	

Title of Invention	LEARNING SITUATIONS VIA PATTERN MATCHING

Customer Number	15093

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61434400	2011-01-19

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. | Add |

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

			Remove
Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			● Yes ○ No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. | Add |

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1	Remove

If the Assignee is an Organization check here.	☒

Organization Name	QUALCOMM Incorporated

Mailing Address Information:

Address 1	5775 Morehouse Drive		
Address 2			
City	San Diego	**State/Province**	CA
Country [i]	US	Postal Code	92121
Phone Number		Fax Number	
Email Address	patent.docketing.us@qualcomm.com		

Additional Assignee Data may be generated within this form by selecting the **Add** button. | Add |

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	103287
	Application Number	

Title of Invention	LEARNING SITUATIONS VIA PATTERN MATCHING

Signature	/Scott L. McMillan/			Date (YYYY-MM-DD)	2011-10-07
First Name	Scott	Last Name	McMillan	Registration Number	62079

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

LEARNING SITUATIONS VIA PATTERN MATCHING

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority to U.S. Provisional Patent Application

5   Ser. No. 61/434,400, entitled "Learning Situations via Pattern Matching," filed on

January 19, 2011, which is assigned to the assignee hereof and which is expressly

incorporated herein by reference. Additionally, U.S. Patent Application No.

_____, filed October 7, 2011, entitled "MACHINE LEARNING OF KNOWN OR

UNKNOWN MOTION STATES WITH SENSOR FUSION" (Attorney Docket No.

10   93495-822645 (102259)) is being filed concurrently, the entire disclosure of which is

hereby incorporated by reference.

BACKGROUND

1.   Field

15   **[0001]**   The present disclosure relates generally to machine learning and, more

particularly, to machine learning of situations via pattern matching or recognition for

use in or with mobile communication devices.

2.   Information

20   **[0002]**   Mobile communication devices, such as, for example, cellular telephones,

smart telephones, portable navigation units, laptop computers, personal digital

assistants, or the like are becoming more common every day. These devices may

include, for example, a variety of sensors to support a number of host applications.

Typically, although not necessarily, sensors are capable of converting physical

25   phenomena into analog or digital signals and may be integrated into (e.g., built-in, etc.)

or otherwise supported by (e.g., stand-alone, etc.) a mobile communication device. For

example, a mobile communication device may feature one or more accelerometers,

gyroscopes, magnetometers, gravitometers, ambient light detectors, proximity sensors,

thermometers, location sensors, microphones, cameras, etc., capable of measuring

5   various motion states, locations, positions, orientations, ambient environments, etc. of

the mobile device. Sensors may be utilized individually or may be used in combination

with other sensors, depending on an application.

[0003]   A popular and rapidly growing market trend in sensor-enabled technology

includes, for example, intelligent or smart mobile communication devices that may be

10   capable of understanding what associated users are doing (e.g., user activities,

intentions, goals, etc.) so as to assist, participate, or, at times, intervene in a more

meaningful way. Integration of an ever-expanding variety or suite of embedded or

associated sensors that continually capture, obtain, or process large volumes of

incoming information streams may, however, present a number of challenges. These

15   challenges may include, for example, multi-sensor parameter tracking, multi-modal

information stream integration, increased signal pattern classification or recognition

complexity, background processing bandwidth requirements, or the like, which may be

at least partially attributed to a more dynamic environment created by user mobility.

Accordingly, how to capture, integrate, or otherwise process multi-dimensional sensor

20   information in an effective or efficient manner for a more satisfying user experience

continues to be an area of development.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004]   Non-limiting and non-exhaustive aspects are described with reference to the following figures, wherein like reference numerals refer to like parts throughout the various figures unless otherwise specified.

5   [0005]   FIG. 1 is an example coordinate system that may be used for machine learning of situations via pattern matching or recognition according to an implementation.

[0006]   FIG. 2 is an example context plot of a multi-dimensional sensor information stream according to an implementation.

10   [0007]   FIG. 3 is an example temporal pattern and an example generated rule according to an implementation.

[0008]   FIG. 4 is a flow diagram illustrating an implementation of an example process for machine learning of situations via pattern matching or recognition according to an implementation.

15   [0009]   FIG. 5 is a schematic diagram illustrating an example computing environment associated with a mobile device according to an implementation.

SUMMARY

[0010]   Example implementations relate to machine learning of known or unknown motion states with sensor fusion. In one implementation, a method may comprise monitoring, at a mobile device, input signals from a plurality of information sources associated with the mobile device; detecting at least one condition based, at least in part, on at least one of the monitored input signals; identifying a first pattern based, at least in part, on the at least one detected condition; and fixing a subset of varying parameters associated with the first pattern, the varying parameters derived, at least in part, from the monitored input signals.

[0011]   In another implementation, an apparatus may comprise a mobile device comprising at least one processor to monitor input signals from a plurality of information sources associated with the mobile device; detect at least one condition based, at least in part, on at least one of the monitored input signals; identify a first pattern based, at least in part, on the at least one detected condition; and fix a subset of varying parameters associated with the first pattern, the varying parameters are being derived, at least in part, from the monitored input signals.

[0012]   In yet another implementation, an apparatus may comprise means for monitoring, at a mobile device, input signals from a plurality of information sources associated with the mobile device; means for detecting at least one condition based, at least in part, on at least one of the monitored input signals; means for identifying a first pattern based, at least in part, on the at least one detected condition; and means for fixing a subset of varying parameters associated with the first pattern, the varying parameters are being derived, at least in part, from the monitored input signals.

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[0013] In yet another implementation, an article may comprise a non-transitory storage medium having instructions stored thereon executable by a special purpose computing platform at a mobile device to monitor input signals from a plurality of information sources associated with the mobile device; detect at least one condition

5 based, at least in part, on at least one of the monitored input signals; identify a first pattern based, at least in part, on the at least one detected condition; and fix a subset of varying parameters associated with the first pattern, the varying parameters derived, at least in part, from the monitored input signals. It should be understood, however, that these are merely example implementations, and that claimed subject matter is not

10 limited to these particular implementations.

DETAILED DESCRIPTION

[0014] In the following detailed description, numerous specific details are set forth to provide a thorough understanding of claimed subject matter. However, it will be understood by those skilled in the art that claimed subject matter may be practiced

15 without these specific details. In other instances, methods, apparatuses, or systems that would be known by one of ordinary skill have not been described in detail so as not to obscure claimed subject matter.

[0015] Some example methods, apparatuses, or articles of manufacture are disclosed herein that may be implemented, in whole or in part, to facilitate or support

20 one or more operations or techniques for learning one or more situations via pattern matching or recognition for use in or with a mobile communication device. As used herein, "mobile device," "mobile communication device," "wireless device," "hand-held device," or the plural form of such terms may be used interchangeably and may

refer to any kind of special purpose computing platform or apparatus that may from

time to time have a position or location that changes. In some instances, a mobile

communication device may, for example, be capable of communicating with other

devices, mobile or otherwise, through wireless transmission or receipt of information

5   over suitable communications networks according to one or more communication

protocols. As a way of illustration, special purpose mobile communication devices,

which may herein be called simply mobile devices, may include, for example, cellular

telephones, satellite telephones, smart telephones, personal digital assistants (PDAs),

laptop computers, personal entertainment systems, tablet personal computers (PC),

10   personal audio or video devices, personal navigation devices, or the like. It should be

appreciated, however, that these are merely illustrative examples of mobile devices that

may be utilized in connection with machine learning of situations via pattern matching

or recognition, and that claimed subject matter is not limited in this regard.

[0016]   As previously mentioned, a mobile device may comprise a suite or a variety

15   of sensors providing measurement signals that may be processed in some manner, such

as via a suitable application processor, for example, so as to draw a number of

inferences with respect to an associated user activity, intention, goal, or the like. As will

be described in greater detail below, in some instances, an inference may include a

certain context, which may characterize or specify a particular situation or

20   circumstances relevant to a user experience. Particular examples of a context may

include, for example, traveling between home and a place of work, being on a plane or

vehicle, participating in a meeting, having lunch, exercising in a gym, sending or

receiving a text message or e-mail, or the like, though claimed subject matter is not so

limited. As described below, a mobile device may utilize one or more measurement

25   signals obtained or received from certain sensors specifying a particular situation, for

example, while considering signals from other sensors so as to make a more complete, accurate, or otherwise sufficient inference of what an associated user is doing, about to do, or the like. A mobile device may, for example, make an inference while being co-located with a portion of the user's body, such as via a suitable sensor-enabled body

5   area network (e.g., in a pocket, belt clip, armband, etc.), just to illustrate one possible implementation. At times, an inference may be made in connection with an input of a user operating a mobile device in some manner, such as, for example, sending an e-mail, silencing a ringer, muting a call, or the like, which may facilitate or support learning or recognition of situations via pattern matching, as will also be seen.

10   **[0017]**   In some instances, a mobile device may, for example, utilize or employ, in whole or in part, one or more suitable pattern matching or recognition techniques to classify sensor-related observations in order to make a number of relevant or otherwise sufficient inferences with respect to user activities, intentions, goals, situations, or the like. For example, a suitable application processor (e.g., of a mobile device, etc.) may

15   associate one or more varying parameters of interest or so-called variables received or derived from one or more information streams with one or more user-related mobility patterns or other sensor-captured patterns that may be indicative of whether an associated user is in a particular context. By way of example but not limitation, varying parameters or variables of interest may comprise, for example, an acceleration,

20   vibration, gyroscopic rotation, wireless connectivity, luminous intensity of the ambient light, temperature, variance, velocity, background noise level, or the like. Particular examples of certain pattern matching or recognition techniques that may be used, in whole or in part, in connection with machine learning of various situations will be described in greater detail below.

[0018] As was indicated, a mobile device may include, for example, a number of sensors, such as one or more accelerometers, gyroscopes, magnetometers, ambient light detectors, proximity sensors, cameras, microphones, thermometers, or the like. In addition, a mobile device may feature a number of devices that may be used, at least in part, for sensing, such as Global Positioning System (GPS), Wireless Fidelity (WiFi), Bluetooth™-enabled devices, or the like. Thus, it should be appreciated that "sensor," "sensing device," or the plural form of such terms may be used interchangeably herein. These sensors or sensing devices, as well as other possible sensors or devices not listed, may be capable of providing signals for use by a variety of host applications (e.g., navigation, location, communication, etc.) while measuring various motion states, locations, positions, orientations, ambient environments, etc. of a mobile device using appropriate techniques.

[0019] An accelerometer, for example, may sense a direction of gravity toward the center of the Earth and may detect or measure a motion with reference to one, two, or three directions often referenced in a Cartesian coordinate space as dimensions or axes X, Y, and Z. Optionally or alternatively, an accelerometer may also provide measurements of magnitude of various accelerations, for example. A direction of gravity may be measured in relation to any suitable frame of reference, such as, for example, in a coordinate system in which the origin or initial point of gravity vectors is fixed to or moves with a mobile device. An example coordinate system that may be used, in whole or in part, to facilitate or support one or more processes in connection with machine learning of situations via pattern matching or recognition will be described in greater detail below in connection with FIG. 1. A gyroscope may utilize the Coriolis effect and may provide angular rate measurements in roll, pitch, or yaw dimensions and may be used, for example, in applications determining heading or

azimuth changes. A magnetometer may measure the direction of a magnetic field in X, Y, Z dimensions and may be used, for example, in sensing true North or absolute heading in various navigation applications.

[0020]   Following the above discussion, measurement signals received or obtained from a variety of sources of information, such as, for example, one or more sensors, applications, user actions, etc. may be integrated in some manner so as to make a more complete, accurate, or otherwise sufficient inference or classification of a motion state, activity, intention, goal, situation, etc. of an associated user. FIG. 1 illustrates an implementation of an example coordinate system 100 that may be used, in whole or in part, to facilitate or support one or more operations or techniques for machine learning of situation via pattern matching or recognition for use in or with a mobile device, such as a mobile device 102, for example. As illustrated, example coordinate system 100 may comprise, for example, three-dimensional Cartesian coordinate system, though claimed subject matter is not so limited. In this illustrated example, one or more translational aspects or characteristics of motion of mobile device 102 representing, for example, acceleration vibration may be detected or measured, at least in part, by a suitable accelerometer, such as a 3D accelerometer, with reference to three dimensions or axes X, Y, and Z relative to an origin 104 of example coordinate system 100. It should be appreciated that example coordinate system 100 may or may not be aligned with a body of mobile device 102. It should also be noted that in certain implementations a non-Cartesian coordinate system may be used or that a coordinate system may define dimensions that are mutually orthogonal.

[0021]   One or more rotational aspects or characteristics of motion of mobile device 102, such as orientation changes about gravity, for example, may also be detected or

measured, at least in part, by a suitable accelerometer with reference to one or two

dimensions. For example, rotational motion of mobile device 102 may be detected or

measured in terms of coordinates (φ, τ), where phi (φ) represents roll or rotation about

an X axis, as illustrated generally by arrow at 106, and tau (τ) represents pitch or

5   rotation about an Y axis, as illustrated generally at 108. Accordingly, here, a 3D

accelerometer may detect or measure, at least in part, a level of acceleration vibration as

well as a change about gravity with respect to roll or pitch dimensions, for example,

thus, providing five dimensions of observability (X, Y, Z, φ, τ). It should be

understood, however, that these are merely examples of various motions that may be

10   detected or measured, at least in part, by an accelerometer with reference to example

coordinate system 100, and that claimed subject matter is not limited to these particular

motions or coordinate system.

[0022]   At times, one or more rotational aspects or characteristics of motion of

mobile device 102 may, for example, be detected or measured, at least in part, by a

15   suitable gyroscope capable of providing adequate degrees of observability, just to

illustrate another possible implementation. For example, a gyroscope may detect or

measure rotational motion of mobile device 102 with reference to one, two, or three

dimensions. Thus, gyroscopic rotation may, for example, be detected or measured, at

least in part, in terms of coordinates (φ, τ, ψ), where phi (φ) represents roll or rotation

20   106 about an X axis, tau (τ) represents pitch or rotation 108 about a Y axis, and psi (ψ)

represents yaw or rotation about a Z axis, as referenced generally at 110. A gyroscope

may typically, although not necessarily, provide measurements in terms of angular

acceleration or vibration (e.g., a change in an angle per unit of time squared), angular

velocity (e.g., a change in an angle per unit of time), or the like. Of course, details

25   relating to various motions that may be detected or measured, at least in part, by a

gyroscope with reference to example coordinate system 100 are merely examples, and claimed subject matter is not so limited.

[0023]   In certain implementations, mobile device 102 may include one or more ambient environment or like sensors, such as, for example, an ambient light detector, a proximity sensor, a temperature sensor, a barometric pressure sensor, or the like. For example, a proximity sensor may typically comprise an infrared (IR) emitter-receiver pair placed sufficiently closely on mobile device 102 so as to detect a presence of nearby objects, measure a distance to such objects, etc. without physical contact. A proximity sensor may be often featured in mobile devices to turn off a display while not in use, for example, deactivate a touch screen to avoid unwanted input during a call, or the like. Certain implementations of mobile device 102 may feature an ambient light detector to help in adjusting a touch screen backlighting or visibility of a display in a dimly lit environment, for example, via measuring an increase in luminous intensity of the ambient light. Ambient environment sensors are generally known and need not be described here in greater detail.

[0024]   It should be appreciated that in some example implementations mobile device 102 may include other types of sensors or sensing devices beyond sensors or devices listed herein so as to facilitate or support machine learning of situations via a pattern matching or recognition. For example, mobile device 102 may include one or more digital cameras that may track optical motion of an object or associated environment so as to make a context-relevant inference, facilitate or support context recognition, or the like. In addition, mobile device 102 may be equipped with a microphone, for example, and may be capable of sensing an audio that may be associated with a particular context or activity of a user, such as, being in a gym, having

a conversation, listening to the music, cooking or making coffee, watching a movie, or the like, as another possible example. In some instances, mobile device 102 may comprise one or more devices that may be used, at least in part, for sensing, such as, for example, GPS, WiFi, Bluetooth™ -enabled devices, as previously mentioned. For

5   example, a GPS-enabled device in conjunction with measurements from an accelerometer may enable mobile device 102 to make an inference with respect to a mode of transportation of a user, such as being in a car or riding a bike, taking a bus or train, or the like. Of course, these are merely examples relating to sensors that may be used, at least in part, in connection with machine learning of situations via pattern

10   matching or recognition, and claimed subject matter is not so limited.

[0025]   As alluded to previously, how to design or implement a machine learning approach for mobile devices to be able to understand what associated users are doing (e.g., user activities, intentions, goals, situations, etc.) so as to assist, participate, or, at times, intervene in a more meaningful way, for example, continues to be an area of

15   development. In some instances, a learning approach, such as in supervised or unsupervised machine learning, for example, may include one or more signal-related pattern recognition techniques (e.g., statistical, structural, etc.) that may help to classify one or more sensor-related observations, as was indicated. Typically, although not necessarily, signal-related patterns may be specified or observed in a multi-dimensional

20   space with respect to multiple sources of information. Thus, one or more patterns to be identified may, for example, be represented via one or more vectors of observations in multiple dimensions. As will be seen, in some instances, dimensions may correspond, for example, to a signal attribute (e.g., represented via a variable, etc.) in a set of information sources that may be monitored in some manner. At times, pattern

25   recognition techniques may, for example, employ or utilize, at least in part, one or more

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pattern-matching templates, but some prior knowledge of an applicable domain may be needed or otherwise useful to find variations that may fit a somewhat generalized template, if any. Typical approaches to pattern matching or recognition may include, for example, utilizing or otherwise considering a relatively rigid specification of a

5   particular pattern to be found. For example, at times, a match may imply that an identical pattern is found or located in one or more testing or training datasets, suitable information repositories, or the like. In addition, one or more suitable distance metrics may, for example, be applied in some manner, in whole or in part, to facilitate or support approximate pattern matching or recognition.

10   **[0026]**   Since typical pattern recognition approaches generally employ processes or algorithms that work with a fixed known number of information sources, pattern recognition with respect to a multi-dimensional information stream acquired or obtained via a suite of sensors may present a number of challenges. These challenges may include, for example, detecting or "picking up" patterns from a large number of

15   information sources with an unknown or different subset of sources being relevant to different situations or contexts. In other words, in some instances, it may be somewhat difficult to detect or recognize an existing pattern if such a pattern is not pre-defined or pre-specified in some manner for a certain information source. Another challenge with typical approaches may be, for example, identifying one or more relevant situations and

20   learning patterns that are correlated with or correspond to these relevant situations. Consider, for example, a multi-dimensional information stream captured or obtained via a variety of sensors with respect to a typical "return-home-after-work" experience of a user.

[0027]   By way of example but not limitation, an example context plot 200 of a multi-dimensional sensor information stream captured or obtained in connection with certain simulations or experiments is illustrated in FIG. 2. For this example, a multi-dimensional sensor information stream is captured via a suite of sensors, such as, for

5   example, an accelerometer, WiFi, ambient light detector, and microphone for an "Office → Parking Lot → Driving → Home" routine (e.g., between 5 and 6 p.m., etc.) of a user. Here, an acceleration vibration may, for example, indicate that a user is driving or walking, a lost WiFi connectivity may indicate that a user is no longer at work (e.g., disconnected with a work-related network or service set identifier (SSID), etc.), an

10   ambient light detector may sense that a user is outside or in a brighter outdoor environment, a microphone may sense a background noise for context-relevant inference (e.g., driving, etc.), or the like, just to illustrate a few examples. Claimed subject matter is not so limited, of course.

[0028]   As seen, because of an increased dimensionality of an information stream

15   due, at least in part, to a large variation of sensor-tracked parameters indicative of user-related events or conditions (e.g., walking, driving, fidgeting, etc.), finding exact or approximate matches to a template, pre-defined or otherwise, may be rather difficult. In other words, at times, a relatively large number of varying parameters or variables associated with a multi-dimensional sensor information stream may be difficult to track,

20   correlate, process, associate, etc., which in turn may limit the ability of a mobile device to react to different situations, make relevant inferences, or otherwise be aware of its context with sufficient accuracy. In addition, certain varying parameters or variables may be irrelevant to a particular user situation or context, in which case it may be important or otherwise useful to identify irrelevant or incidental variables so as to ignore

or omit one or more corresponding irrelevant patterns from consideration, as described below.

[0029]   As alluded to previously, continually tracking or monitoring all or most varying parameters or variables that may be associated with a multi-dimensional stream of sensor information may be a computationally intensive, resource-consuming, at times intractable, or otherwise less than efficient or effective approach for pattern matching or recognition. Accordingly, as will be seen, rather than continually tracking all or most information stream-related variables to match or recognize all or most possible or existing patterns, a mobile device may, for example, monitor one or more conditions or events of interest. By way of example but not limitation, a condition or event may include, for example, a time of day, day of week, state or action of a host application, action of a user operating a mobile device (e.g., silencing a ringer, muting a call, sending a text message, etc.) or the like, just to name a few examples. As will be described in greater detail below, in an implementation, upon or after detecting these one or more conditions or events, a mobile device may, for example, selectively initiate a process to attempt to recognize a particular signal-related pattern that occurs in connection with the detected condition or event.

[0030]   More specifically, a subset of one or more varying parameters or variables associated with a condition or event may, for example, be fixed in some manner and stored in a suitable database. As described below, such a subset may comprise, for example, a distinct signal-related pattern corresponding to a certain detected condition or event, just to illustrate one possible implementation. Such a condition or event-related pattern may be fixed, for example, by associating corresponding parameters or variables having a particular, distinct, or otherwise suitable pattern to represent the

condition or event. In the next or otherwise suitable occurrence of such a condition or event-related pattern, an electronic "snapshot" of one or more other co-occurring signal-related patterns representative of associated sensors' behavior may be captured. A suitable processor may then look or search for a pattern match, exact or approximate, in one or more other signal-related patterns every time a condition or event-related pattern occurs, for example, by utilizing a "snapshot," in whole or in part, using any suitable pattern matching processes or algorithms.

[0031]   To illustrate, a user may silence a ringer or mute a call, which may comprise a condition or event of interest, for example, and at that moment a "snapshot' of one or more sensors associated with a monitored information stream and their respective electronic behavior (e.g., associated signal patterns, etc.) may be captured and stored in a suitable database. As will be seen, a monitored information stream may comprise, for example, one or more input signals obtained by one or more sensors associated with a mobile device and defining one or more context-related information streams. A mobile device may then search for a pattern that co-occurs with silencing a call, for example, in a set of stored signal-related patterns every time the call is silenced and may initiate an appropriate action, such as routing a call to voice mail. In other words, by fixing a subset of varying parameters or variables (e.g., dimensions, etc.) representing a particular condition or event (e.g., silencing a ringer, muting a call, etc.), a set of variables associated with a multi-dimensional sensor information stream may be advantageously reduced. This may make pattern matching more tractable or otherwise allow for a more effective or efficient pattern recognition since a pattern matching process is performed in a remaining or reduced set of variables. In turn, more tractable approach may facilitate or support machine learning (e.g., via a processor associated with a mobile device, etc.), for example, of a condition or event of interest

characterizing a particular situation relevant to a user activity, intention, goal, or the like, such that an appropriate action may be initiated by a mobile device in real time. For example, a mobile device may ring louder in response to an incoming call if a learned situation indicates a noisy ambient environment, or may silence a ringer and

5   route an incoming call to voice mail if a learned situation indicates that a user may not want to be disturbed, or may launch an application if a learned situation indicates a user's intent to use the application, or the like. In this context, "real time" may refer to an amount of timeliness of data or information, which may have been delayed by an amount of time attributable to electronic communication as well as other information or

10   signal processing. Of course, details relating to a particular condition or event, user actions, or corresponding patterns are merely examples, and claimed subject matter is not limited in these respects.

[0032]   As will be described in greater detail below, a "snapshot" representative of a signal behavior captured in connection with a condition or event of interest may

15   comprise or otherwise be correlated with any one of several types of different signal-related patterns. In some instances, particular types of patterns may include, for example, one or more temporal patterns, action-correlated patterns, transition-correlated patterns, or relational patterns, though claimed subject matter is not so limited. For example, any suitable combination of these patterns as well as other patterns not listed

20   may also be utilized, in whole or in part.

[0033]   A temporal pattern may comprise, for example, a signal-related pattern defined, at least in part, by a time-related parameter or characteristic. For example, a temporal pattern may be associated with a repetitive situation likely to occur several times per day, on a daily basis, or the like. It should be appreciated that a temporal

pattern may occur aperiodically, meaning that its repetition period may be unknown, such as, for example, several times per day but at unknown times, only on weekdays, one day per week, or the like. In some instances, a temporal pattern may comprise or be associated with one or more events or conditions that exist or last for a certain threshold

5   duration. A threshold duration may be determined experimentally and pre-defined, for example, or otherwise dynamically defined in some manner. In some instances, a threshold may comprise, for example, a duration relevant to a detected condition, just to illustrate one possible implementation. By way of example but not limitation, in the context of a user driving, for example, a relevant threshold may be in a range of tens of

10   minutes (e.g., between 10 and 15, etc. min.) rather than minutes since people typically, although not necessarily, drive for more than a minute at a time prior to parking. Claimed subject matter is not limited to such a threshold duration, of course.

[0034]   An action-correlated pattern may comprise, for example, a signal-related pattern that may associate a particular context with a user behavior or action. For

15   example, one or more user actions may be observed or tracked in some manner and may be subsequently evaluated to determine whether there is a correlation between a certain action and a particular context. As a way of illustration, a pattern of a user ignoring or muting incoming calls, for example, may be tracked or evaluated to determine whether the user is in a meeting or otherwise not to be interrupted.

20   [0035]   A transition-correlated pattern may comprise, for example, a signal-related pattern that may characterize or define an observed transition between contexts, such as a transition between a user driving in a car and walking in a parking lot. A relational pattern may comprise, for example, a signal-related pattern that may characterize or define a possible relationship between contexts. For example, in case of a user driving,

the context "location" may continually change from X → X', Y → Y', etc., while the context "driving" may remain the same. Particular examples of various signal-related patterns or respective pattern identification techniques will be described in greater detail below.

5   **[0036]**   As alluded to previously, a signal-related pattern may comprise, for example, a number of varying parameters or variables of interest that may be represented via one or more signal sample values derived from a multi-dimensional stream of sensor-related information. In some instances, signal sample values may be derived, for example, from measurement signals obtained via one or more associated

10   sensors using appropriate techniques. In an implementation, based, at least in part, on one or more varying parameters or variables, one or more suitable patterns may be detected or identified in a suitable manner, such as, for example, in connection with an electronic "snapshot" of signal-related behavior discussed above. For example, a temporal pattern may be identified, at least in part, via monitoring signal sample values

15   representative of different variables that are repetitive at or around a given situation, such as a time of the day, day of the week, every given number of hours or minutes, or the like, though claimed subject matter is not so limited. As previously mentioned, it should be appreciated that a pattern may last or exist for a threshold duration relevant to a certain user-related condition, such as a certain number of minutes for driving, hours

20   for watching a movie, or the like. It should also be noted that, at times, unless a pattern lasts or exists for a minimum or threshold amount of time, for example, derived signal sample values may not comprise or otherwise be indicative of an actual pattern, as was also indicated.

[0037] In an implementation, a temporal pattern may correspond to or correlate

with a particular situation if, for example, a given subset of variables has repetitive

values in time. At times, identifying a subset of variables that may be relevant to a

particular user situation may be challenging, however, if a cardinality of the subset is

5   unknown. For purposes of explanation, typically, although not necessarily, a cardinality

of a set may refer to a measure of a number of elements in a set. As discussed above,

identifying a repetitive pattern within a smaller number of variables due, at least in part,

to fixing at least one subset of variables of a multi-dimensional information stream, for

example, may, therefore, prove beneficial. A particular example of a temporal pattern

10   300 observed via repetitive values in connection with one particular simulation or

experiment and a rule 302 applicable or relevant to a particular user situation derived or

generated based, at least in part, on the temporal pattern is illustrated in FIG. 3. As

seen, repetitive values derived from a context-related multi-dimensional sensor stream

may comprise, for example, values sampled via an accelerometer, a microphone, and a

15   location sensor (e.g., GPS-enabled, etc.) relevant to identifying the situation "running in

a gym," which may be derived and subsequently designated as a rule. For this example,

accelerometer, microphone, and location sensor-related variables have repetitive values

relevant to identifying the situation while a time of the day may change in some manner,

such as every day, just to illustrate one possible implementation. It should be noted that

20   ensuring relatively large or rich dimensionality of a sampled information stream may

facilitate or support learning of various situations relevant to a user experience via a

larger variety of corresponding patterns. Of course, details relating to a temporal pattern

or pattern identification are merely examples to which claimed subject matter is not

limited.

[0038]   In an implementation, an action-correlated pattern may, for example, map a correspondence to the same or similar user action if one or more variables exhibit a pattern in themselves, such as in the case of a user silencing one or more incoming calls while in a meeting, mentioned above. Thus, an action-correlated pattern may, for

5   example, be identified or detected by keeping track of one or more user actions in a database of events and keeping track of all or some monitored sources in a suitable database as a continuous "context stream." A context stream may comprise, for example, multi-dimensional sensor information (e.g., walking, driving, etc.), pre-processed or otherwise, or higher-level situations (e.g., being in a meeting, driving to

10   work, walking in a parking lot, etc.). Here, a "snapshot" of a context stream may, for example, be captured in some manner, such as at or upon occurrence of a given condition or event of interest, as previously mentioned. In some instances, it may be useful to consider, for example, a history of a context stream for some duration prior to an occurrence of a condition or event of interest. A "snapshot" comprising a correlation

15   between a condition or event and a context stream may be stored in a suitable database, such as in an event correlation database, as one possible example. An event correlation database may, for example, be subsequently accessed and analyzed for pattern matching or recognition with respect to one or more context streams corresponding to or correlating with the same event that occurred multiple or otherwise sufficient number of

20   times.

[0039]   In certain implementations, one or more tunable parameters may be utilized, at least in part, in connection with machine learning of situations, action-correlated or otherwise, via pattern matching or recognition. An example of a tunable parameter may include a duration of a history relevant to an action-correlated situation, though claimed

25   subject matter is not so limited. It should be noted that a tunable parameter may be

different for different situations. For example, an instantaneous or otherwise suitable set of contexts may be relevant in some situations, while in other situations captured duration of history may be required or otherwise useful to find a certain action-correlated pattern. Similarly to a temporal pattern, an action-correlated pattern may

5   suffer or otherwise be affected in some manner by a number of irrelevant information sources. As such, it may be useful to determine whether certain sensor-related information associated with a multi-dimensional information stream is relevant or incidental to a particular user situation. For example, a set of contributing contexts corresponding to a particular situation may be presented to a user so as to identify a

10   subset of relevant contextual information or sources. Some examples of identifying irrelevant information sources with respect to a multi-dimensional information stream will be described in greater detail below.

[0040]   Action-correlated pattern recognition may, for example, be useful in identifying one or more user actions in various situations without tagging or labeling

15   situations themselves. For example, knowing that a user silences one or more incoming calls if a motion state corresponds to "running" that exists or lasts over a certain threshold duration (e.g., more than 10 minutes, etc.) may be sufficient even if a mobile device does not know that the user is "exercising in a gym." In addition, here, a semi-supervised learning approach may, for example, be advantageously employed by

20   involving a user in labeling a detected condition or event of interest so as to allow relatively higher-level reasoning with respect to a discovered situation. Of course, details relating to a particular action-correlated pattern are merely examples to which claimed subject matter is not limited.

[0041]   As previously mentioned, one or more transition-correlated patterns may be used, at least in part, to facilitate or support machine learning of situations via pattern matching or recognition. A transition between contexts may, for example, be an indication of a condition or event of interest corresponding to a particular situation

5   relevant to a user experience. For example, a number of appropriate or applicable information sources may be monitored to determine or infer a destination if a motion state of an associated user changes from "walking" to "driving." Information sources may be monitored to detect a condition or event of interest in any suitable dimension corresponding to an attribute or variable in a suitable or applicable set, for example,

10   such that if a transition in any dimension occurs, a state or behavior of other attributes or variables is captured. As such, a pattern in the rest of attributes or variables may capture a relevant transition-based situation, such as, for example, in connection with an electronic "snapshot" discussed above. Here, one or more irrelevant sources may, for example, also be identified or filtered out, as described below, so as to facilitate or

15   support meaningful pattern identification.

[0042]   As alluded to previously, a relational pattern may facilitate or support situation learning, for example, by defining or characterizing a possible relationship between two or more variables of interest rather than a pattern in values, absolute or otherwise, of these variables. To illustrate, a change in location from X $\rightarrow$ X' (e.g., via

20   a changed address, etc.) occurring if a received WiFi-enabled SSID remains the same, for example, and if a situation "in the office" changes to "in the meeting" may express a pattern corresponding to "attending a meeting in another building." As another possible example, a change in a motion state, such as from jumping to jogging, for example, while a location remains unchanged may be indicative of a situation corresponding to

"being in a gym." Claimed subject matter is not limited to particular patterns or situations illustrated, of course.

[0043]   In some instances, a relational pattern may, for example, be identified, at least in part, via one or more associated characteristics. For example, certain variables associated with a relational pattern may have a so-called "constant context" occurring for at least a minimum duration of time. To illustrate, the context "driving" may occur or exist for at least 15 minutes, as previously mentioned. In addition, one or more variables associated with a relational pattern may exhibit or express a changing context, such as a continuous change in a location, for example, or change in a location from X → X' during the context "driving" (e.g., from the beginning to the end, etc.). Here, these observed variables may be considered, at least in part, as a suitable characteristic of a relational pattern. At times, a combination of a constant context for a certain duration, for example, along with a changed context of a particular detected pattern may comprise a characteristic of a relevant relational pattern. For example, "driving from home to work" may comprise a situation corresponding to the patterns of "driving" and "location change" discussed above, though claimed subject matter is not so limited.

[0044]   It should be appreciated that in some instances certain a priori knowledge so as to distinguish between variables representative of a constant context and changing context may not be needed or otherwise useful. In addition, it should be noted that both constant and changing contexts may not co-occur or be present to identify a valid relational pattern. In some instances, a bi-directional relational pattern between variables, if present, may, for example, be modeled as an inverse relationship. For example, a constant motion state with a changing location or a constant location with a changing motion state may potentially be modeled as one or more inverse relational

properties between variables "motion state" and "location." As such, one or more suitable pattern matching processes or algorithms may then be able to recognize or "pick up" either pattern in a less than exponential search of an applicable variable space. Of course, details relating to characteristics of a relational pattern or pattern

5   identification are merely examples, and claimed subject matter is not so limited.

[0045]   As previously mentioned, one or more relevant situations may be identified, at least in part, via one or more subsets of varying parameters or variables of interest. Identifying a relevant subset of variables corresponding to various situations, however, may present a number of challenges, statistical or otherwise. For example, identifying a

10   relevant subset of variables may be somewhat similar to an exhaustive search with a non-deterministic polynomial-time hard-type (NP-hard) problem at its core, which may make it computationally expensive or otherwise more complex. In addition to these challenges, a lack or insufficiency of knowledge with respect to one or more logical operators may add to a complexity of the task. To illustrate, with a logical operator

15   being unknown, for example, it may be difficult to determine whether the "location X AND motion state Y" or "location X AND NOT motion state Y" comprises a relevant pattern. Of course, claimed subject matter is not limited to these particular patterns or logical operators.

[0046]   Accordingly, as discussed below, one or more approaches may be

20   advantageously utilized, at least in part, to identify a subset of variables corresponding to various situations relevant to a user's experience. For example, in an implementation, one or more suitable variables may be individually monitored for patterns. At least one subset of variables of interest may be fixed, as discussed above, and one or more patterns in a second subset of variables may be identified, for example,

if there is a pattern in the fixed subset of variables. By way of example but not limitation, an application processor associated with a mobile device may observe what other variables have patterns if a motion state corresponds, for example, to "driving," as one possible illustration. Here, a cardinality of one or more subsets may be described or

5   defined, for example, via one or more suitable experimental parameters. For example, in some instances, a parameter similar to the value of "k" in a k-Nearest Neighbor classification process or algorithm in k-means clustering may be used, though claimed subject matter is not so limited. It should be appreciated that, at times, a fixed subset of a relatively smaller number of variables, such as of one variable, for example, may be

10   less than sufficient to identify a related pattern. For example, fixing one variable associated with or corresponding to "driving" may not be helpful in meaningful pattern identification.

   [0047]   As previously mentioned, in some instances, to facilitate or support machine learning of situations via pattern matching, it may, for example, be helpful to

15   identify one or more irrelevant patterns. As used herein, "irrelevant pattern" may refer to one or more signal-related patterns having a lesser likelihood of identifying a situation or circumstances relevant to a user's experience. For example, an irrelevant pattern may include the "sunny" condition, detected via an ambient light detector (e.g., an irrelevant source, etc.), with respect to identifying the situation "driving to work" if a

20   user typically commutes during the daylight in a sun-dominated geographic area, such as Southern California (e.g., San Diego, etc.). Here, one or more variables derived from a multi-dimensional stream of sensor information captured or otherwise obtained via a respective accelerometer, GPS, and potentially a WiFi, for example, may have a higher likelihood of identifying the situation "driving to work." As such, these variables may

25   prove more useful than variables derived in connection with measurement signals from

an ambient light detector, which may be filtered out in a suitable manner or otherwise ignored. Of course, claimed subject matter is not limited to a particular pattern or information sources.

[0048] In an implementation, an irrelevant pattern may be identified, for example, via one or more human computation models suitable for a determination of one or more applicable semantic labels for context or situational information. For example, if a certain pattern of a particular context information is identified or encountered, a user may be presented with a choice to provide an appropriate label for such a pattern (e.g., via a user display, touch screen, voice command, etc.). A label may be provided, for example, in connection with a context labeling-type process, a situation labeling-type process, or any combination thereof. Appropriately labeled information may then be used, at least in part, in one or more training datasets in machine learning so as to allow the information to be fed back into a system for effective or efficient pattern recognition. Subsequently, similar patterns may be similarly labeled by a suitable processor, for example, such as in accordance with a label learned via an initial user input. Accuracy of one or more labels may be improved overtime via any suitable optimization techniques used, at least in part, in any suitable human computation models. An example of context labeling may include associating a specific accelerometer pattern with the context "surfing," for example, by providing other context, such as a camera view, location corresponding to a beach, detecting "wetness", or the like. Situation labeling may comprise, for example, seeking a user's input with respect to labeling a pattern of location, time of day, day of week, or WiFi network connectivity in connection with the situation "at work." As such, labeling meaningful context or situational information using, at least in part, one or more human computation models may, for example, allow for improvements in label consistency,

complex pattern identification, contextual awareness, or the like for a more satisfying user experience. Thus, based, at least in part, on these one or more machine learning approaches, a pattern matching or recognition behavior of a suitable processor, such as a processor associated with a mobile device, for example, may be advantageously

5   evolved.

[0049]   Attention is now drawn to FIG. 4, which is a flow diagram illustrating an implementation of an example process 400 that may be implemented, in whole or in part, for learning one or more situations via pattern matching or recognition for use in or with a mobile communication device. It should be appreciated that even though one or

10   more operations are illustrated or described concurrently or with respect to a certain sequence, other sequences or concurrent operations may also be employed. In addition, although the description below references particular aspects or features illustrated in certain other figures, one or more operations may be performed with other aspects or features.

15   [0050]   Example process 400 may begin at operation 402, for example, with monitoring, at a mobile device, one or more input signals from a plurality of information sources associated with such a mobile device. For example, input signals may be monitored, at least in part, via measurement signals derived from a multi-dimensional information stream sampled or obtained by a suite or variety of sensors or

20   sensing devices associated with a mobile device. As previously mentioned, associated sensors may include, for example, one or more accelerometers, gyroscopes, magnetometers, ambient light detectors, proximity sensors, thermometers, location sensors, microphones, digital cameras, or the like. With regard to operation 404, at least one condition or event of interest may, for example, be detected based, at least in part,

on at least one of monitored input signals. These one or more monitored input signals may, for example, define at least one context-related information stream, as was also indicated. By way of example but not limitation, a condition or event of interest may include, for example, a time of day, day of week, state or action of a host application,

5 action of a user operating a mobile device (e.g., silencing a ringer, muting a call, sending a text message, etc.) or the like, just to name a few examples.

[0051] Having detected at least one condition or event, at operation 406, a first pattern may be identified based, at least in part, on at least one detected condition or event. For example, a first pattern may comprise a distinct signal-related pattern having

10 one or more varying parameters or variables of interest that may be representative of or otherwise correspond to such a condition or event, as previously mentioned. At operation 408, one or more varying parameters or variables may be fixed in some manner, such as in a suitable subset having one or more signal sample values and may be stored in a suitable database. In some instances, a subset may be fixed, for example,

15 by associating parameters or variables with a particular, distinct, or otherwise suitable pattern to represent a certain detected condition or event, as one possible example. By fixing a subset of varying parameters or variables representing a particular condition or event, a set of variables associated with a multi-dimensional sensor information stream may be advantageously reduced, as was also indicated.

20 [0052] With regard to operation 410, a process to attempt a recognition of a second pattern in connection with monitoring these input signals based, at least in part, on a first identified pattern may be initiated. For example, in the next or otherwise suitable occurrence of a first pattern (e.g., a condition or event-related pattern, etc.), a "snapshot" of a second pattern co-occurring with a first pattern and representative of associated

sensors' behavior may be electronically captured. A "snapshot" may comprise, for example, a first pattern, a second pattern, a sensor information stream, or any combination thereof. A mobile device may perform a pattern matching, exact or approximate, with respect to a second pattern, for example, every suitable time a first or

5   condition-related pattern occurs, for example, by utilizing such a "snapshot," in whole or in part. As was also indicated, "snapshot"-related pattern matching or recognition may be performed, at least in part, in connection with a several types of different patterns. For example, types of patterns may include a temporal pattern, an action-correlated pattern, a transition-correlated pattern, a relational pattern, or any

10   combination thereof. As previously mentioned, this may make pattern matching or recognition more tractable, for example, since a process may be advantageously performed in a reduced set of varying parameters or variables derived from one or more input signals associated with a multi-dimensional sensor information stream. Having recognized a second pattern, a mobile device may initiate an appropriate action, such as

15   ring louder in response to an incoming call in a noisy ambient environment, silence a ringer and routing an incoming call to voice mail if a user is in a meeting, launch an application if a user is intending to use, or the like.

[0053]   FIG. 5 is a schematic diagram illustrating an implementation of an example computing environment 500 that may include one or more networks or devices capable

20   of partially or substantially implementing or supporting one or more processes for machine learning of situations via pattern matching or recognition. It should be appreciated that all or part of various devices or networks shown in computing environment 500, processes, or methods, as described herein, may be implemented using various hardware, firmware, or any combination thereof along with software.

[0054]   Computing environment 500 may include, for example, a mobile device 502, which may be communicatively coupled to any number of other devices, mobile or otherwise, via a suitable communications network, such as a cellular telephone network, the Internet, mobile ad-hoc network, wireless sensor network, or the like. In an

5   implementation, mobile device 502 may be representative of any electronic device, appliance, or machine that may be capable of exchanging information over any suitable communications network. For example, mobile device 502 may include one or more computing devices or platforms associated with, for example, cellular telephones, satellite telephones, smart telephones, personal digital assistants (PDAs), laptop

10   computers, personal entertainment systems, e-book readers, tablet personal computers (PC), personal audio or video devices, personal navigation devices, or the like. In certain example implementations, mobile device 502 may take the form of one or more integrated circuits, circuit boards, or the like that may be operatively enabled for use in another device. Thus, unless stated otherwise, to simplify discussion, various

15   functionalities, elements, components, etc. are described below with reference to mobile device 502 may also be applicable to other devices not shown so as to support one or more processes associated with example computing environment 500.

[0055]   Although not shown, optionally or alternatively, there may be additional devices, mobile or otherwise, communicatively coupled to mobile device 502 to

20   facilitate or otherwise support one or more processes associated with computing environment 500. For example, computing environment 500 may include various computing or communication resources capable of providing position or location information with regard to a mobile device 502 based, at least in part, on one or more wireless signals associated with a positioning system, location-based service, or the like.

25   To illustrate, in certain example implementations, mobile device 502 may include, for

example, one or more location devices capable of acquiring or providing all or part of orientation, position, or location information. Such information may be provided in support of one or more processes in response to user instructions, motion-controlled or otherwise, which may be stored in memory 504, for example, along with other suitable

5   or desired information, such as one or more signal-related patterns, templates, rules, snapshots, databases, or the like.

[0056]   Memory 504 may represent any suitable or desired information storage medium. For example, memory 504 may include a primary memory 506 and a secondary memory 508. Primary memory 506 may include, for example, a random

10   access memory, read only memory, etc. While illustrated in this example as being separate from a processing unit 510, it should be appreciated that all or part of primary memory 506 may be provided within or otherwise co-located/coupled with processing unit 510. Secondary memory 508 may include, for example, the same or similar type of memory as primary memory or one or more information storage devices or systems,

15   such as, for example, a disk drive, an optical disc drive, a tape drive, a solid state memory drive, etc. In certain implementations, secondary memory 508 may be operatively receptive of, or otherwise enabled to be coupled to, a computer-readable medium 512.

[0057]   Computer-readable medium 512 may include, for example, any medium

20   that can store or provide access to information, code or instructions (e.g., an article of manufacture, etc.) for one or more devices associated with operating environment 500. For example, computer-readable medium 512 may be provided or accessed by processing unit 510. As such, in certain example implementations, the methods or apparatuses may take the form, in whole or part, of a computer-readable medium that

may include computer-implementable instructions stored thereon, which, if executed by at least one processing unit or other like circuitry, may enable processing unit 510 or the other like circuitry to perform all or portions of a location determination processes, sensor-based or sensor-supported measurements (e.g., acceleration, deceleration,

5   orientation, tilt, rotation, distance, luminous intensity, etc.) or any like processes to facilitate or otherwise support gesture detection of mobile device 502. In certain example implementations, processing unit 510 may be capable of performing or supporting other functions, such as communications, gaming, or the like.

[0058]   It should be understood that a storage medium, such as memory 504,

10   computer-readable medium 512, etc. may typically, although not necessarily, be non-transitory or may comprise a non-transitory device. In this context, a non-transitory storage medium may include, for example, a device that is physical or tangible, meaning that the device has a concrete physical form, although the device may change state. For example, one or more electrical binary digital signals representative of information, in

15   whole or in part, in the form of zeros may change a state to represent information, in whole or in part, as binary digital electrical signals in the form of ones, to illustrate one possible implementation. As such, "non-transitory" may refer, for example, to any medium or device remaining tangible despite this change in state.

[0059]   Processing unit 510 may be implemented in hardware or a combination of

20   hardware and software. Processing unit 510 may be representative of one or more circuits capable of performing at least a portion of information computing technique or process. By way of example but not limitation, processing unit 510 may include one or more processors, controllers, microprocessors, microcontrollers, application specific

integrated circuits, digital signal processors, programmable logic devices, field

programmable gate arrays, or the like, or any combination thereof.

[0060] Mobile device 502 may include various components or circuitry, such as,

for example, one or more accelerometers 514, ambient light sensors or detectors 516,

5 proximity sensors 518, or various other sensor(s) 520, such as a gyroscope,

magnetometer, microphone, camera, GPS, WiFi, Bluetooth^{TM} -enabled devices, etc. to

facilitate or otherwise support one or more processes associated with operating

environment 500. For example, such sensors may provide analog or digital signals to

processing unit 510. Although not shown, it should be noted that mobile device 502

10 may include an analog-to-digital converter (ADC) for digitizing analog signals from one

or more sensors. Optionally or alternatively, such sensors may include a designated

(e.g., an internal, etc.) ADC(s) to digitize respective output signals, although claimed

subject matter is not so limited.

[0061] Although not shown, mobile device 502 may also include a memory or

15 information buffer to collect suitable or desired information, such as, for example,

inertial or ambient environment sensor measurement information, and a power source to

provide power to some or all of the components or circuitry. A power source may be a

portable power source, such as a battery, for example, or may comprise a fixed power

source, such as an outlet (e.g. in a house, electric charging station, car, etc.). It should

20 be appreciated that a power source may be integrated into (e.g., built-in, etc.) or

otherwise supported by (e.g., stand-alone, etc.) mobile device 502.

[0062] Mobile device 502 may include one or more connections 522 (e.g., buses,

lines, conductors, optic fibers, etc.) to operatively couple various circuits together, and a

user interface 524 (e.g., display, touch screen, keypad, buttons, knobs, microphone, speaker, trackball, data port, etc.) to receive user input, facilitate or support sensor measurements, or provide information to a user. Mobile device 502 may further include a communication interface 526 (e.g., wireless transmitter or receiver, modem, antenna,

5   etc.) to allow for communication with one or more other devices or systems over one or more suitable communications networks, as was indicated.

[0063]   Methodologies described herein may be implemented by various means depending upon applications according to particular features or examples. For example, such methodologies may be implemented in hardware, firmware, software,

10   discrete/fixed logic circuitry, any combination thereof, and so forth. In a hardware or logic circuitry implementation, for example, a processing unit may be implemented within one or more application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers,

15   micro-controllers, microprocessors, electronic devices, other devices or units designed to perform the functions described herein, or combinations thereof, just to name a few examples.

[0064]   For a firmware or software implementation, the methodologies may be implemented with modules (e.g., procedures, functions, etc.) having instructions that

20   perform the functions described herein. Any machine readable medium tangibly embodying instructions may be used in implementing the methodologies described herein. For example, software codes may be stored in a memory and executed by a processor. Memory may be implemented within the processor or external to the processor. As used herein the term "memory" refers to any type of long term, short

term, volatile, nonvolatile, or other memory and is not to be limited to any particular

type of memory or number of memories, or type of media upon which memory is

stored. In at least some implementations, one or more portions of the herein described

storage media may store signals representative of data or information as expressed by a

5   particular state of the storage media. For example, an electronic signal representative of

data or information may be "stored" in a portion of the storage media (e.g., memory) by

affecting or changing the state of such portions of the storage media to represent data or

information as binary information (e.g., ones and zeros). As such, in a particular

implementation, such a change of state of the portion of the storage media to store a

10   signal representative of data or information constitutes a transformation of storage

media to a different state or thing.

[0065]   As was indicated, in one or more example implementations, the functions

described may be implemented in hardware, software, firmware, discrete/fixed logic

circuitry, some combination thereof, and so forth. If implemented in software, the

15   functions may be stored on a physical computer-readable medium as one or more

instructions or code. Computer-readable media include physical computer storage

media. A storage medium may be any available physical medium that can be accessed

by a computer. By way of example, and not limitation, such computer-readable media

can comprise RAM, ROM, EEPROM, CD-ROM or other optical disc storage, magnetic

20   disk storage or other magnetic storage devices, or any other medium that can be used to

store desired program code in the form of instructions or data structures and that can be

accessed by a computer or processor thereof. Disk and disc, as used herein, includes

compact disc (CD), laser disc, optical disc, digital versatile disc (DVD), floppy disk and

blue-ray disc where disks usually reproduce data magnetically, while discs reproduce

25   data optically with lasers.

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[0066] As discussed above, a mobile device may be capable of communicating with one or more other devices via wireless transmission or receipt of information over various communications networks using one or more wireless communication techniques. Here, for example, wireless communication techniques may be

5 implemented using a wireless wide area network (WWAN), a wireless local area network (WLAN),a wireless personal area network (WPAN), or the like. The term "network" and "system" may be used interchangeably herein. A WWAN may be a Code Division Multiple Access (CDMA) network, a Time Division Multiple Access (TDMA) network, a Frequency Division Multiple Access (FDMA) network, an

10 Orthogonal Frequency Division Multiple Access (OFDMA) network, a Single-Carrier Frequency Division Multiple Access (SC-FDMA) network, a Long Term Evolution (LTE) network, a WiMAX (IEEE 802.16) network, and so on. A CDMA network may implement one or more radio access technologies (RATs) such as cdma2000, Wideband-CDMA (W-CDMA), Time Division Synchronous Code Division Multiple

15 Access (TD-SCDMA), to name just a few radio technologies. Here, cdma2000 may include technologies implemented according to IS-95, IS-2000, and IS-856 standards. A TDMA network may implement Global System for Mobile Communications (GSM), Digital Advanced Mobile Phone System (D-AMPS), or some other RAT. GSM and W-CDMA are described in documents from a consortium named "3rdGeneration

20 Partnership Project" (3GPP). Cdma2000 is described in documents from a consortium named "3rd Generation Partnership Project 2"(3GPP2). 3GPP and 3GPP2 documents are publicly available. A WLAN may include an IEEE 802.11x network, and a WPAN may include a Bluetooth network, an IEEE 802.15x, or some other type of network, for example. The techniques may also be implemented in conjunction with any

25 combination of WWAN, WLAN, or WPAN. Wireless communication networks may

include so-called next generation technologies (e.g., "4G"), such as, for example, Long Term Evolution (LTE), Advanced LTE, WiMAX, Ultra Mobile Broadband (UMB), or the like.

[0067]   In one particular implementation, a mobile device may, for example, be capable of communicating with one or more femtocells facilitating or supporting communications with the mobile device for the purpose of estimating its location, orientation, velocity, situation, or the like. As used herein, "femtocell" may refer to one or more smaller-size cellular base stations that may be enabled to connect to a service provider's network, for example, via broadband, such as, for example, a Digital Subscriber Line (DSL) or cable. Typically, although not necessarily, a femtocell may utilize or otherwise be compatible with various types of communication technology such as, for example, Universal Mobile Telecommunications System (UTMS), Long Term Evolution (LTE), Evolution-Data Optimized or Evolution-Data only (EV-DO), GSM, Worldwide Interoperability for Microwave Access (WiMAX), Code division multiple access (CDMA) -2000, or Time Division Synchronous Code Division Multiple Access (TD-SCDMA), to name just a few examples among many possible. In certain implementations, a femtocell may comprise integrated WiFi, for example. However, such details relating to femtocells are merely examples, and claimed subject matter is not so limited.

[0068]   Also, computer-readable code or instructions may be transmitted via signals over physical transmission media from a transmitter to a receiver (e.g., via electrical digital signals). For example, software may be transmitted from a website, server, or other remote source using a coaxial cable, fiber optic cable, twisted pair, digital subscriber line (DSL), or physical components of wireless technologies such as infrared,

radio, and microwave. Combinations of the above may also be included within the scope of physical transmission media. Such computer instructions or data may be transmitted in portions (e.g., first and second portions) at different times (e.g., at first and second times).Some portions of this Detailed Description are presented in terms of

5   algorithms or symbolic representations of operations on binary digital signals stored within a memory of a specific apparatus or special purpose computing device or platform. In the context of this particular Specification, the term specific apparatus or the like includes a general purpose computer once it is programmed to perform particular functions pursuant to instructions from program software. Algorithmic

10   descriptions or symbolic representations are examples of techniques used by those of ordinary skill in the signal processing or related arts to convey the substance of their work to others skilled in the art. An algorithm is here, and generally, considered to be a self-consistent sequence of operations or similar signal processing leading to a desired result. In this context, operations or processing involve physical manipulation of

15   physical quantities. Typically, although not necessarily, such quantities may take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, or otherwise manipulated.

   [0069]   It has proven convenient at times, principally for reasons of common usage, to refer to such signals as bits, information, values, elements, symbols, characters,

20   variables, terms, numbers, numerals, or the like. It should be understood, however, that all of these or similar terms are to be associated with appropriate physical quantities and are merely convenient labels. Unless specifically stated otherwise, as is apparent from the discussion above, it is appreciated that throughout this Specification discussions utilizing terms such as "processing," "computing," "calculating," "determining,"

25   "ascertaining," "identifying," "associating," "measuring," "performing," or the like refer

to actions or processes of a specific apparatus, such as a special purpose computer or a similar special purpose electronic computing device. In the context of this Specification, therefore, a special purpose computer or a similar special purpose electronic computing device is capable of manipulating or transforming signals,

5 typically represented as physical electronic, electrical, or magnetic quantities within memories, registers, or other information storage devices, transmission devices, or display devices of the special purpose computer or similar special purpose electronic computing device.

[0070] Terms, "and" and "or" as used herein, may include a variety of meanings

10 that also is expected to depend at least in part upon the context in which such terms are used. Typically, "or" if used to associate a list, such as A, B, or C, is intended to mean A, B, and C, here used in the inclusive sense, as well as A, B, or C, here used in the exclusive sense. In addition, the term "one or more" as used herein may be used to describe any feature, structure, or characteristic in the singular or may be used to

15 describe some combination of features, structures or characteristics. Though, it should be noted that this is merely an illustrative example and claimed subject matter is not limited to this example.

[0071] While certain example techniques have been described and shown herein using various methods or systems, it should be understood by those skilled in the art that

20 various other modifications may be made, and equivalents may be substituted, without departing from claimed subject matter. Additionally, many modifications may be made to adapt a particular situation to the teachings of claimed subject matter without departing from the central concept described herein. Therefore, it is intended that claimed subject matter not be limited to particular examples disclosed, but that such

claimed subject matter may also include all implementations falling within the scope of

the appended claims, and equivalents thereof.

CLAIMS

What is claimed is:

5   1.   A method comprising:
monitoring, at a mobile device, input signals from a plurality of information
sources associated with said mobile device;
detecting at least one condition based, at least in part, on at least one of said
monitored input signals;
10   identifying a first pattern based, at least in part, on said at least one detected
condition; and
fixing a subset of varying parameters associated with said first pattern, said
varying parameters derived, at least in part, from said monitored input signals.

15   2.   The method of claim 1, wherein fixing said subset of varying parameters
comprises associating at least one parameter of said subset of varying parameters with
said first pattern to represent said at least one detected condition.

3.   The method of claim 2, wherein said fixing said subset of varying parameters
20   comprises associating said varying parameters to represent a condition derived from
said monitored input signals from at least one of the following disposed in said mobile
device: an accelerometer, a Global Positioning System (GPS)-enabled device, a
Wireless Fidelity (WiFi)-enabled device, or any combination thereof.

25   4.   The method of claim 1, and further comprising initiating a process to attempt a
recognition of a second pattern in connection with said monitoring said input signals
based, at least in part, on said first identified pattern.

5.   The method of claim 4, wherein said second pattern is recognized in a reduced
30   set of varying parameters derived from said monitored input signals in response, at least
in part, to said fixing of said subset of varying parameters.

6.   The method of claim 4, wherein said process further comprises:

capturing a snapshot of said monitored input signals in response to said detection of said at least one condition, said monitored input signals defining at least one context-related information stream; and

correlating said snapshot with said second pattern in a database.

5

7.   The method of claim 6, wherein said second pattern is attempted to be recognized in connection with correlating said snapshot with at least one of the following: a temporal pattern, an action-correlated pattern, a transition-correlated pattern, a relational pattern, or any combination thereof.

10

8.   The method of claim 6, wherein said snapshot comprises at least one of the following: a snapshot of said first identified pattern, a snapshot of said second pattern, a snapshot of said at least one context-related information stream, or any combination thereof.

15

9.   The method of claim 6, wherein said snapshot is correlated in connection with a captured history of said at least one context-related information stream.

10.   The method of claim 9, wherein said history comprises a time period captured

20   prior to said detecting said at least one condition.

11.   The method of claim 10, wherein said time period comprises a time period existing for a threshold duration.

25   12.   The method of claim 11, wherein said threshold duration comprises a duration relevant to said at least one detected condition.

13.   The method of claim 6, wherein said database comprises at least one of the following: a condition database, a correlation database, or any combination thereof.

30

14.   The method of claim 13, wherein said condition database comprises said at least one context-related information stream.

15. The method of claim 13, wherein said correlation database comprises at least one of the following: a condition correlation database, a transition correlation database, or any combination thereof.

5 16. The method of claim 1, wherein at least one of said plurality of information sources comprises signals generated in response to at least one of the following: a user executing an instruction on said mobile device, a host application executing an instruction on said mobile device, or any combination thereof.

10 17. The method of claim 16, wherein said host application executes said instruction in response to at least one signal received from at least one sensor associated with said mobile device.

18. The method of claim 1, wherein said fixed subset of said varying parameters
15 comprises said first pattern.

19. The method of claim 1, and further comprising identifying at least one pattern irrelevant to said at least one condition in connection with said monitoring input signals.

20 20. The method of claim 19, wherein said irrelevant pattern is identified via an application of at least one of the following: a context labeling-type process, a situation labeling-type process, or any combination thereof.

21. The method of claim 19, wherein said irrelevant pattern is identified in
25 connection with a user identifying at least one of the following: a relevant information source among said plurality of information sources, a relevant information stream among a plurality of context-related information streams, or any combination thereof.

30 22. An apparatus comprising:
   a mobile device comprising at least one processor configured to:
      monitor input signals from a plurality of information sources
   associated with said mobile device;

detect at least one condition based, at least in part, on at least one of said monitored input signals;

identify a first pattern based, at least in part, on said at least one detected condition; and

5   fix a subset of varying parameters associated with said first pattern, said varying parameters derived, at least in part, from said monitored input signals.

23.   The apparatus of claim 22, wherein said at least one processor is further
10   configured to initiate a process to attempt a recognition of a second pattern in connection with said processor to monitor said input signals based, at least in part, on said first identified pattern.

24.   The apparatus of claim 23, wherein said second pattern is associated with a
15   reduced set of varying parameters derived from said monitored input signals due, at least in part, to fixing said subset of varying parameters.

25.   The apparatus of claim 23, wherein said processor is further configured to:
    capture a snapshot of said monitored input signals in response to said detection
20   of said at least one condition, said monitored input signals defining at least one context-related information stream; and
    correlate said snapshot with said second pattern in a database.

26.   The apparatus of claim 25, wherein said snapshot comprises at least one of the
25   following: a snapshot of said first identified pattern, a snapshot of said second pattern, a snapshot of said at least one context-related information stream, or any combination thereof.

27.   The apparatus of claim 25, wherein said second pattern is attempted to be
30   recognized in connection with said correlation of said snapshot with at least one of the following: a temporal pattern, an action-correlated pattern, a transition-correlated pattern, a relational pattern, or any combination thereof.

28.   The apparatus of claim 25, wherein said snapshot is correlated in connection with a captured history of said at least one context-related information stream.

29.   The apparatus of claim 22, wherein at least one of said plurality of information sources comprises signals generated in response to at least one of the following: a user executing an instruction on said mobile device, a host application executing an instruction on said mobile device, or any combination thereof.

30.   The apparatus of claim 22, wherein said fixed subset of said varying parameters comprises said first pattern.

31.   The apparatus of claim 22, wherein said at least one processor is further configured to identify at least one pattern irrelevant to said at least one condition in connection with said processor to monitor said input signals.

32.   An apparatus comprising:

        means for monitoring, at a mobile device, input signals from a plurality of information sources associated with said mobile device;

        means for detecting at least one condition based, at least in part, on at least one of said monitored input signals;

        means for identifying a first pattern based, at least in part, on said at least one detected condition; and

        means for fixing a subset of varying parameters associated with said first pattern, said varying parameters derived, at least in part, from said monitored input signals.

33.   The apparatus of claim 32, wherein said means for fixing said subset of varying parameters comprises means for associating at least one parameter of said subset of varying parameters with said first pattern to represent said at least one detected condition.

34.   The apparatus of claim 32, and further comprising means for initiating a process to attempt a recognition of a second pattern in connection with said monitoring said input signals based, at least in part, on said first identified pattern.

35.   The apparatus of claim 34, wherein said second pattern is associated with a reduced set of varying parameters derived from said monitored input signals due, at least in part, to said fixing of said subset of varying parameters.

5   36.   The apparatus of claim 34, wherein said means for initiating said process further comprises:
       means for capturing a snapshot of said monitored input signals in response to said detection of said at least one condition, said monitored input signals defining at least one context-related information stream; and
10   means for correlating said snapshot with said second pattern in a database.

37.   The apparatus of claim 36, wherein said second pattern is attempted to be recognized in connection with correlating said snapshot with at least one of the following: a temporal patter, an action-correlated pattern, a transition-correlated pattern;
15   a relational pattern, or any combination thereof.

38.   The apparatus of claim 36, wherein said snapshot comprises at least one of the following: a snapshot of said first identified pattern, a snapshot of said second pattern, a snapshot of said at least one context-related information stream, or any combination
20   thereof.

39.   The apparatus of claim 36, wherein said snapshot is correlated in connection with a captured history of said at least one context-related information stream.

25   40.   The apparatus of claim 39, wherein said history comprises a time period captured prior to said detecting said at least one condition.

41.   The apparatus of claim 40, wherein said time period comprises a time period existing for a threshold duration.
30
42.   The apparatus of claim 41, wherein said threshold duration comprises a duration relevant to said at least one detected condition.

43.   The apparatus of claim 36, wherein said database comprises at least one of the following: a condition database, a correlation database, or any combination thereof.

44.   The apparatus of claim 32, wherein at least one of said plurality of information
5   sources comprises signals generated in response to at least one of the following: a user executing an instruction on said mobile device, a host application executing an instruction on said mobile device, or any combination thereof.

45.   The apparatus of claim 32, wherein said fixed subset of said varying parameters
10   comprises said first pattern.

46.   The apparatus of claim 32, and further comprising means for identifying at least one pattern irrelevant to said at least one condition in connection with said monitoring said input signals.
15

47.   The apparatus of claim 46, wherein said irrelevant pattern is identified via an application of at least one of the following: a context labeling-type process, a situation labeling-type process, or any combination thereof.

20

48.   An article comprising:
        a non-transitory storage medium having instructions stored thereon executable by a special purpose computing platform at a mobile device to:
                monitor input signals from a plurality of information sources associated
25   with said mobile device;
                detect at least one condition based, at least in part, on at least one of said monitored input signals;
                identify a first pattern based, at least in part, on said at least one detected condition; and
30   fix a subset of varying parameters associated with said first pattern, said varying parameters derived, at least in part, from said monitored input signals.

49.   The article of claim 48, wherein said storage medium further includes instructions to initiate a process to attempt a recognition of a second pattern in

connection with said monitoring said input signals based, at least in part, on said first identified pattern.

50.   The article of claim 49, wherein said instructions to initiate said process further comprise instructions to:

    capture a snapshot of said monitored input signals in response to said detection of said at least one condition, said monitored input signals defining at least one context-related information stream; and

    correlate said snapshot with said second pattern in a database.

51.   The article of claim 49, wherein said second pattern is attempted to be recognized in connection with at least one of the following: a temporal pattern, an action-correlated pattern, a transition-correlated pattern, a relational pattern, or any combination thereof.

52.   The article of claim 50, wherein said snapshot comprises at least one of the following: a snapshot of said first identified pattern, a snapshot of said second pattern, a snapshot of said at least one context-related information stream, or any combination thereof.

53.   The article of claim 50, wherein said snapshot is correlated in connection with a captured history of said at least one context-related information stream.

54.   The article of claim 48, wherein said storage medium further includes instructions to identify at least one pattern irrelevant to said at least one condition in connection with said monitoring said input signals.

55.   The article of claim 54, wherein said irrelevant pattern is identified via an application of at least one of the following: a context labeling-type process, a situation labeling-type process, or any combination thereof.

ABSTRACT

Example methods, apparatuses, or articles of manufacture are disclosed herein that may be utilized, in whole or in part, to facilitate or support one or more operations or techniques for machine learning of situations via pattern matching or recognition.

5

FIG. 1

200

Context Plot

Legend:
◇ Walking
△ Fidgeting
▽ Driving
○ Bright
× Normal
+ Loud
∗ Moderate
⬦ Quiet
△ SSID_1
▬ SSID_2
▽ SSID_3
▮ SSID_5
○ SSID_6

FIG. 2

302

```
running_in_gym
[running_in_gym
(?user rdf:type http://xmlns.com/foaf foaf/0.1/Person)
(?ct0 rdf:type contextInfo#ContextInfo)
(?ct0 rdf:type contextInfo#ContextName 'Loud')
(?ct1 rdf:type contextInfo#ContextInfo)
(?ct1 rdf:type contextInfo#ContextName 'Running')
now(?x)
makeSkolem(?sit, ?x, ?ct0, ?ct1 )
->(?user situation#inSituation ?sit)
(?sit situation#detectedEventTime ?x)
(?sit situation#relevantContext ?ct0)
(?sit situation#relevantContext ?ct1)
(?sit situation#name 'running_in_gym')
]
```

Generated Rule
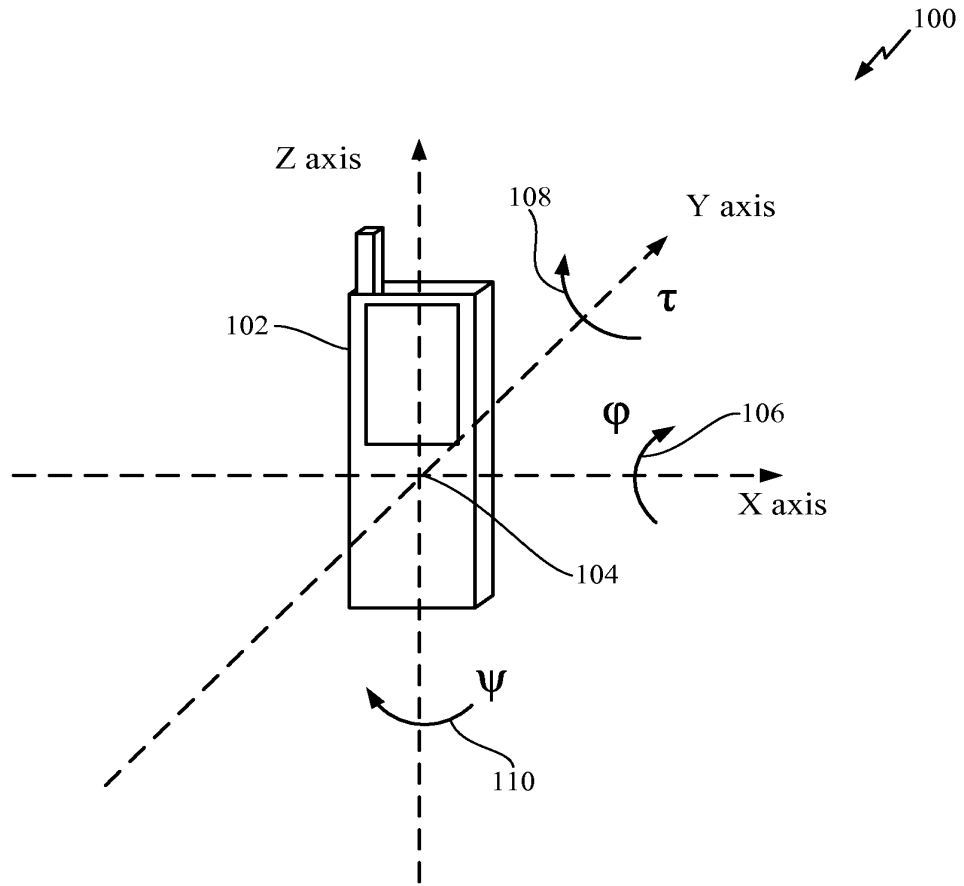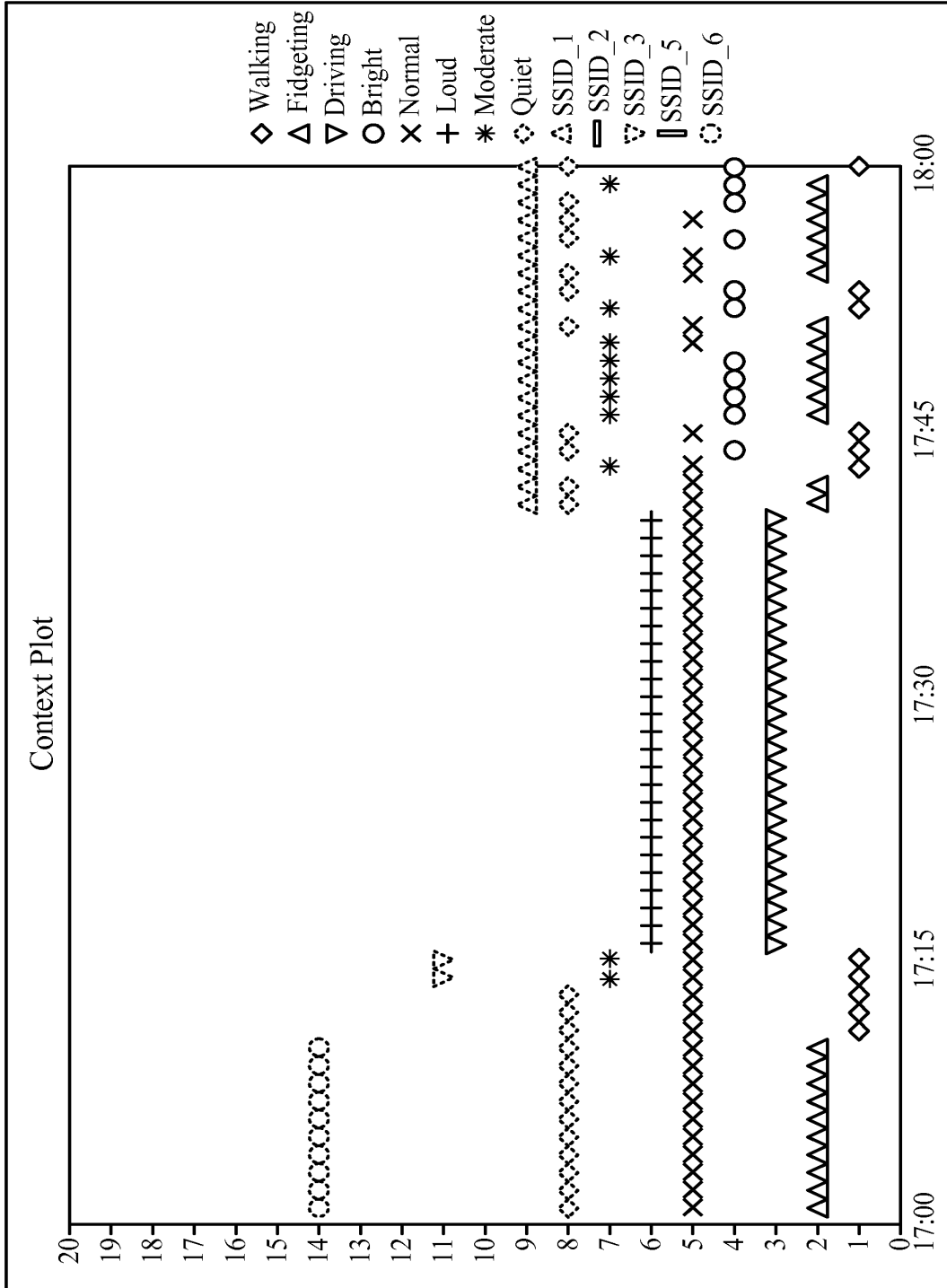
300

```
Found this pattern 5 this week
********* Begin of Pattern***********
[sensor_id: 6
time_stamp: 1281489300000
context_type: "SoundIntensity"
context_value: "Loud"
, sensor_id: 1
time_stamp: 2
context_type: "PeriodicMovement"
context_value: "Running"
value: ''''
]
*********** End of Pattern ***********
What situation is this? : running_in_gym
```

Pattern

FIG. 3

400

```
                                                                    ┌─402
┌─────────────────────────────────────────────────────────┐
│  Monitoring, at a mobile device, input signals from a     │
│  plurality of information sources associated with said    │
│  mobile device                                            │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼                             ┌─404
┌─────────────────────────────────────────────────────────┐
│  Detecting at least one condition based, at least in part,│
│  on at least one of said monitored input signals          │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼                             ┌─406
┌─────────────────────────────────────────────────────────┐
│  Identifying a first pattern based, at least in part,     │
│  on said at least one detected condition                  │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼                             ┌─408
┌─────────────────────────────────────────────────────────┐
│  Fixing a subset of varying parameters associated with    │
│  said first pattern, said varying parameters are being    │
│  derived, at least in part, from said monitored input     │
│  signals                                                  │
└─────────────────────────────────────────────────────────┘
                              │
                              ▼                             ┌─410
┌─────────────────────────────────────────────────────────┐
│  Initiating a process to attempt a recognition of a       │
│  second pattern in connection with said monitoring said   │
│  input signals based, at least in part, on said first     │
│  identified pattern                                       │
└─────────────────────────────────────────────────────────┘
```

FIG. 4

FIG. 5