

US009064257B2

## (12) United States Patent Beigi

## (10) Patent No.: US 9,064,257 B2 (45) Date of Patent: Jun. 23, 2015

## (54) MOBILE DEVICE TRANSACTION USING MULTI-FACTOR AUTHENTICATION

(76) Inventor: **Homayoon Beigi**, Yorktown Heights,

NY (US)

(\*) Notice: Subject to any disclaimer, the term of this

patent is extended or adjusted under 35

U.S.C. 154(b) by 878 days.

(21) Appl. No.: 13/287,994

(22) Filed: Nov. 2, 2011

#### (65) **Prior Publication Data**

US 2012/0110341 A1 May 3, 2012

#### Related U.S. Application Data

- (60) Provisional application No. 61/409,151, filed on Nov. 2, 2010.
- (51) Int. Cl.

  G06F 21/00 (2013.01)

  G06Q 20/40 (2012.01)

  G06Q 20/32 (2012.01)

  G06Q 20/38 (2012.01)
- (58) Field of Classification SearchCPC combination set(s) only.See application file for complete search history.

#### (56) References Cited

#### U.S. PATENT DOCUMENTS

6,553,494 B1	* 4/2003	Glass	713/186
7,200,749 B2	* 4/2007	Wheeler et al	713/170
7,474,770 B2	1/2009	Beigi	
7,522,751 B2	* 4/2009	White et al	382/115
7,702,918 B2	* 4/2010	Tattan et al	713/186

7,711,152	B1*	5/2010	Davida et al 382/115
8,384,515	B2 *	2/2013	Rachlin 340/5.82
8,595,804	B2 *	11/2013	Pratt et al 726/5
2001/0000535	A1*	4/2001	Lapsley et al 705/64
2002/0095587	A1*	7/2002	Doyle et al 713/186
2004/0139332	A1*	7/2004	Lim 713/185
2004/0151353	A1*	8/2004	Topping

#### FOREIGN PATENT DOCUMENTS

WO	WO98/34203	8/1998
WO	WO0031699	6/2000
WO	WO02/41271	5/2002

#### OTHER PUBLICATIONS

"A k-nearest Neighbor Approach for User Authentication Through Biometric Keystroke Dynamics," Hu et al., Communications, 2008, ICC '08 IEEE International Conference, pp. 1556-1560.

"A New Approach for Hand-Palm Recognition", Saeed et al., Enhanced Methods in Computer Security, Biometric and Artificial Intelligence Systems, Lecture Notes in Computer Science, pp. 185-194, Springer London ISBN: 1-4020-7776-9.

(Continued)

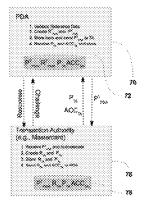
Primary Examiner — Eleni Shiferaw Assistant Examiner — Phy Anh Vu

(74) Attorney, Agent, or Firm — Gordon & Jacobson, PC

#### (57) ABSTRACT

The following is a system in which a person may use a Cellular (Mobile) Telephone, a PDA or any other handheld computer to make a purchase. This is an example only. The process may entail any type of transaction which requires authentication, such as any financial transaction, any access control (to account information, etc.), and any physical access scenario such as doubling for a passport or an access key to a restricted area (office, vault, etc.). It may also be used to conduct remote transactions such as those conducted on the Internet (E-Commerce, account access, etc.). In the process, a multi-factor authentication is used.

#### 30 Claims, 14 Drawing Sheets





#### (56) References Cited

#### OTHER PUBLICATIONS

"A Novel Approach for Ear Recognition Based on ICA and RBF Network", Zhang et al., 2005, Machine Learning and Cybernetics, Proceedings of 2005 International Conference, vol. 7, pp. 4511-4515. "Access Control System with Hand Geometry Verification and Smart Cards" Sanchez-Reillo et al., IEEE AES Systems Magazine, Feb. 2000

"Acoustic Ear Recognition for Person Identification," Akkermans et al., Automatic Identification Advanced Technologies, 2005, Fourth IEEE Workshop, pp. 219-223.

"An Approach to Feature Selection for Keystroke Dynamics Systems Based on Pso and Feature Weighting," Azevedo et al, Evolutionary Computation, CEC 2007, IEEE Congress, pp. 3577-3584.

"An Introduction to Near-Field Communication and the Contactless Communication API," C. Enrique Ortiz, sun, Jun. 2008, available at http://java.sun.com/developer/technicalArticles/javame/nfc/.

"Appearance-Based Facial Recognition Using Visible and Thermal Imagery: A Comparative Study", Selinger et al., 2003.

"Computer-Access Security Systems Using Keystroke Dynamics," Bleha et al., IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 12, No. 12, pp. 1217-1222, Dec. 1990.

"Ear Recognition by Means of a Rotation Invariant Descriptor," Fabate et al., Pattern Recognition, 2006, ICPR 2006, 18th International Conference, vol. 4, pp. 437-440.

"Evaluating the Reliability of Credential Hardening Through Keystroke Dynamics," Bartlow and Cukik, Software Reliability Engineering, 2006, ISSRE '06. 17th International Symposium, pp. 117-126.

"Face Recognition: Features Versus Templates," Brunelli and Poggio, IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 15, No. 10, pp. 1042-1052, Oct. 1993.

"Human Ear Recognition in 3d," Chen and Bhanu, IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 29, No. 4, pp. 718-737, Apr. 2007.

"Human Identification Based on 3d Ear Models," Cadavid and Abdel-Mottaleb, Biometrics: Theory, Applications, and Systems, 2007. BTAS 2007, First IEEE International Conference, pp. 1-6. Internet X.509 Public Key Infrastructure Certificate and Certificate

Revocation List (CRL) Profile, RFC 5280 (Proposed Standard,) Cooper et al., 2008.

"Multimodal Recognition Based on Face and Ear", Yuan et al., Wavelet Analysis and Pattern Recognition, 2007 ICWAPR '07, International Conference, vol. 3, pp. 1203-1207.

"Multi-View Ear Shape Feature Extraction and Reconstruction," Liu and Yan, Signal-Image Technologies and Internet-Based System, 2007, SITIS '07 Third International IEEE Conference, pp. 652-658. "Personal Identification Based on Iris Texture Analysis" Ma et al., IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 25, No. 12, pp. 1519-1533, Dec. 2003.

Practice Note: Examples of Financial Services Using Mobile Phones, World Wide Web http://www.ictregulationtoolkit.org/en/PracticeNote.3096.html.

"Rapid Heterogeneous Connection Establishment: Accelerating Bluetooth Inquiry Using IrDA", Ryan Woodings et al., Proc. of the Third Annual IEEE Wireless Communications and Networking Conference (WCNC) 2002, vol. 1, Orlando, Florida, Mar. 2002, pp. 342-349.

"The Transformational Potential of M-Transactions", Vodaphone Group PLc, 2007.

"User Authentication Through Typing Biometrics Features," Araujo et al., IEEE Transactions on Signal Processing, vol. 53, No. 2, pp. 851-855, Feb. 2005.

"Using 2d Wavelet and Principal Component Analysis for Personal identification Based on 2d Ear Structure," Nosrati et al. 2007, Intelligent and Advanced Systems, ICIAS 2007, International Conference, pp. 616-620.

"Visible-Spectrum Biometric Retina Recognition," Borgen et al., 2008, International Conference on Intelligent Information Hiding and Multimedia Signal Processing (IIHMSP2008) pp. 1056-1062. Wizzit Has Done Its Homework, Says Mphahlele World Wid Web, Crotty, 2005, http://www.nextbillion.net/archive/files/Wizzit%20Business%20Report.pdf.

\* cited by examiner



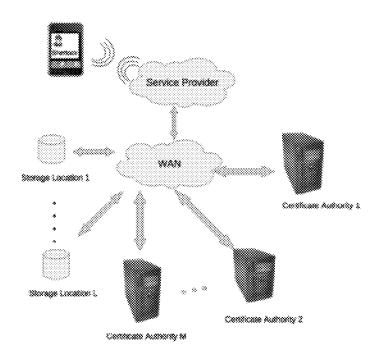
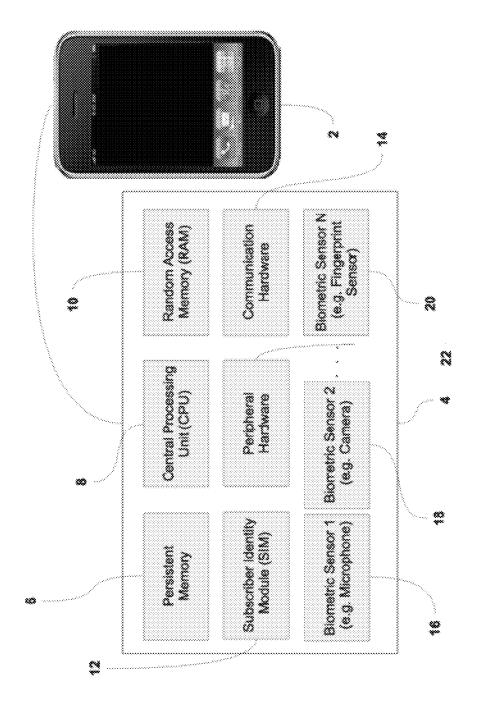


FIG. 1 Registration





F.G. 2 PDA Components

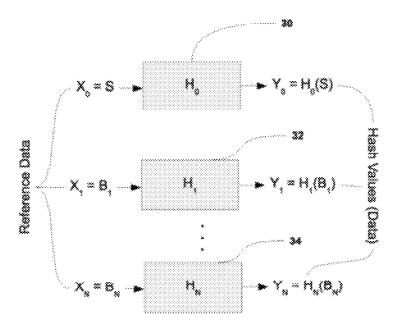


FIG. 3 Hash Function

# DOCKET

# Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## **Real-Time Litigation Alerts**



Keep your litigation team up-to-date with **real-time** alerts and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

### **Advanced Docket Research**



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## **Analytics At Your Fingertips**



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

#### API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

#### **LAW FIRMS**

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

#### **FINANCIAL INSTITUTIONS**

Litigation and bankruptcy checks for companies and debtors.

### **E-DISCOVERY AND LEGAL VENDORS**

Sync your system to PACER to automate legal marketing.

