



US010403051B2

(12) **United States Patent**
Soon-Shiong

(10) **Patent No.:** **US 10,403,051 B2**
(45) **Date of Patent:** **Sep. 3, 2019**

(54) **INTERFERENCE BASED AUGMENTED REALITY HOSTING PLATFORMS**

- (71) Applicant: **Nant Holdings IP, LLC**, Culver City, CA (US)
- (72) Inventor: **Patrick Soon-Shiong**, Los Angeles, CA (US)
- (73) Assignee: **Nant Holdings IP, LLC**, Culver City, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

- (21) Appl. No.: **16/186,405**
- (22) Filed: **Nov. 9, 2018**

(65) **Prior Publication Data**
US 2019/0080518 A1 Mar. 14, 2019

Related U.S. Application Data

(60) Continuation of application No. 15/786,242, filed on Oct. 17, 2017, now Pat. No. 10,127,733, which is a (Continued)

(51) **Int. Cl.**
A63F 13/21 (2014.01)
A63F 13/65 (2014.01)
(Continued)

(52) **U.S. Cl.**
CPC *G06T 19/006* (2013.01); *A63F 13/21* (2014.09); *A63F 13/212* (2014.09); *A63F 13/32* (2014.09);
(Continued)

(58) **Field of Classification Search**

USPC 345/633
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 5,625,765 A 4/1997 Ellenby et al.
 - 5,682,332 A 10/1997 Ellenby et al.
- (Continued)

FOREIGN PATENT DOCUMENTS

- EP 1 012 725 6/2000
 - EP 1 246 080 A2 10/2002
- (Continued)

OTHER PUBLICATIONS

International Search Report and Written Opinion issued in International Application No. PCT/US2012/032204 dated Oct. 29, 2012.
(Continued)

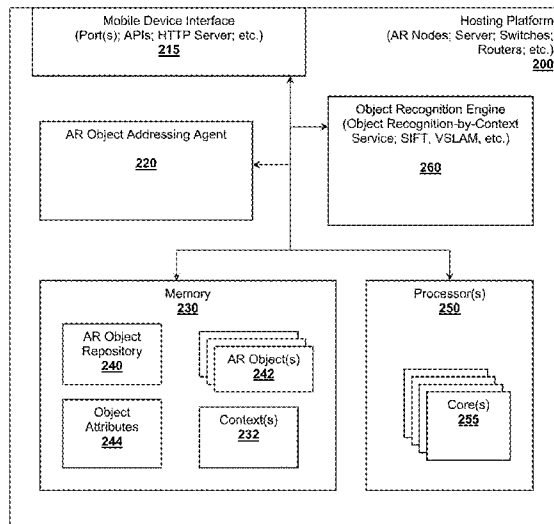
Primary Examiner — Wesner Sajous

(74) *Attorney, Agent, or Firm* — Mauriel Kapouytian Woods LLP; Lana Akopyan; Andrew A. Noble

(57) **ABSTRACT**

Interference-based augmented reality hosting platforms are presented. Hosting platforms can include networking nodes capable of analyzing a digital representation of scene to derive interference among elements of the scene. The hosting platform utilizes the interference to adjust the presence of augmented reality objects within an augmented reality experience. Elements of a scene can constructively interfere, enhancing presence of augmented reality objects; or destructively interfere, suppressing presence of augmented reality objects.

44 Claims, 6 Drawing Sheets



Related U.S. Application Data

	continuation of application No. 15/213,113, filed on Jul. 18, 2016, now Pat. No. 9,824,501, which is a continuation of application No. 14/329,882, filed on Jul. 11, 2014, now Pat. No. 9,396,589, which is a division of application No. 13/173,244, filed on Jun. 30, 2011, now Pat. No. 8,810,598.	8,427,508 B2	4/2013	Mattila et al.	
		8,427,598 B2	4/2013	Mattila et al.	
		8,472,972 B2	6/2013	Nadler et al.	
		8,502,835 B1*	8/2013	Meehan	G06T 19/006 345/633
		8,519,844 B2	8/2013	Richey et al.	
		8,527,340 B2	9/2013	Fisher et al.	
		8,537,113 B2	9/2013	Weising et al.	
		8,576,756 B2	11/2013	Ko et al.	
		8,605,141 B2	12/2013	Dialameh et al.	
		8,606,657 B2	12/2013	Chesnut et al.	
(60)	Provisional application No. 61/473,324, filed on Apr. 8, 2011.	8,700,060 B2	4/2014	Huang	
		8,711,176 B2	4/2014	Douris et al.	
		8,810,598 B2	8/2014	Soon-Shiong	
(51)	Int. Cl.	8,872,851 B2	10/2014	Choubassi et al.	
	<i>A63F 13/33</i> (2014.01)	8,933,841 B2	1/2015	Valacee et al.	
	<i>A63F 13/32</i> (2014.01)	8,965,741 B2	2/2015	McCulloch et al.	
	<i>G06T 19/00</i> (2011.01)	9,128,520 B2	9/2015	Geisner et al.	
	<i>G06F 17/30</i> (2006.01)	9,129,644 B2	9/2015	Gay et al.	
	<i>G09G 5/00</i> (2006.01)	9,131,208 B2	9/2015	Jin	
	<i>G06F 16/00</i> (2019.01)	9,167,386 B2	10/2015	Valacee et al.	
	<i>G06F 16/9537</i> (2019.01)	9,177,381 B2	11/2015	McKinnon	
	<i>A63F 13/212</i> (2014.01)	9,182,815 B2	11/2015	Small et al.	
	<i>A63F 13/335</i> (2014.01)	9,230,367 B2	1/2016	Stroila	
(52)	U.S. Cl.	9,311,397 B2	4/2016	Meadow et al.	
	CPC <i>A63F 13/335</i> (2014.09); <i>A63F 13/65</i> (2014.09); <i>G06F 16/00</i> (2019.01); <i>G06F 16/9537</i> (2019.01); <i>G09G 5/00</i> (2013.01); <i>H05K 999/99</i> (2013.01); <i>G06T 2219/016</i> (2013.01)	9,396,589 B2	7/2016	Soon-Shiong	
		9,482,528 B2	11/2016	Baker et al.	
		9,495,591 B2	11/2016	Visser et al.	
		9,536,251 B2	1/2017	Huang et al.	
		9,582,516 B2	2/2017	McKinnon	
		9,582,561 B2*	2/2017	Krishnan	G06F 17/30575
		9,817,848 B2	11/2017	McKinnon et al.	
		9,824,501 B2	11/2017	Soon-Shiong	
		10,127,733 B2	11/2018	Soon-Shiong	
(56)	References Cited	10,140,317 B2	11/2018	McKinnon et al.	
	U.S. PATENT DOCUMENTS	2002/0163521 A1	11/2002	Ellenby et al.	
		2004/0203380 A1	10/2004	Hamdi et al.	
		2005/0024501 A1	2/2005	Ellenby et al.	
		2005/0208457 A1	9/2005	Fink et al.	
		2005/0285878 A1	12/2005	Singh et al.	
		2005/0289590 A1	12/2005	Cheok et al.	
		2006/0025229 A1	2/2006	Mahajan et al.	
		2006/0038833 A1	2/2006	Mallinson et al.	
		2006/0047704 A1	3/2006	Gopalakrishnan	
		2006/0161379 A1	7/2006	Ellenby et al.	
		2006/0190812 A1	8/2006	Ellenby et al.	
		2007/0109619 A1	5/2007	Eberl et al.	
		2007/0146391 A1	6/2007	Pentenrieder et al.	
		2007/0182739 A1	8/2007	Platonov et al.	
		2008/0024594 A1	1/2008	Ritchey	
		2008/0154538 A1	6/2008	Stathis	
		2008/0157946 A1	7/2008	Eberl et al.	
		2008/0198159 A1	8/2008	Liu et al.	
		2008/0198222 A1	8/2008	Gowda	
		2009/0003662 A1	1/2009	Joseph et al.	
		2009/0081959 A1	3/2009	Gyorfi et al.	
		2009/0102859 A1	4/2009	Athsani et al.	
		2009/0167787 A1	7/2009	Bathiche et al.	
		2009/0193055 A1	7/2009	Kuberka et al.	
		2009/0237546 A1	9/2009	Bloebaum et al.	
		2009/0271160 A1	10/2009	Copenhagen et al.	
		2009/0271715 A1	10/2009	Tumuluri	
		2010/0017722 A1	1/2010	Cohen	
		2010/0023878 A1	1/2010	Douris et al.	
		2010/0045933 A1	2/2010	Eberl et al.	
		2010/0188638 A1	7/2010	Eberl et al.	
		2010/0208033 A1	8/2010	Edge et al.	
		2010/0257252 A1	10/2010	Dougherty et al.	
		2010/0287485 A1	11/2010	Bettolami et al.	
		2010/0315418 A1	12/2010	Woo	
		2010/0321540 A1	12/2010	Woo et al.	
		2010/0325154 A1	12/2010	Schloter et al.	
		2011/0038634 A1	2/2011	DeCusatis et al.	
		2011/0221771 A1	9/2011	Cramer et al.	
		2011/0279445 A1	11/2011	Murphy et al.	
		2011/0316880 A1	12/2011	Ojala et al.	

(56)

References Cited

U.S. PATENT DOCUMENTS

2012/0122570 A1* 5/2012 Baronoff A63F 13/655
463/31
2012/0127201 A1 5/2012 Kim et al.
2012/0293506 A1* 11/2012 Vertucci G06F 3/012
345/419
2013/0073988 A1 3/2013 Groten et al.
2013/0128060 A1 5/2013 Rhoads et al.
2013/0176202 A1 7/2013 Gervautz
2014/0161323 A1 6/2014 Livyatan et al.
2014/0184749 A1 7/2014 Hilliges et al.
2015/0172626 A1 6/2015 Martini

FOREIGN PATENT DOCUMENTS

EP 1 354 260 10/2003
EP 1 119 798 B1 3/2005
EP 2 207 113 A1 7/2010
JP 2010-118019 A 5/2010
JP 2011-153324 A 8/2011
JP 2011-253324 A 12/2011
KR 2010-0124947 A 11/2010
KR 10-1171264 B1 8/2012
WO WO 97/44737 A1 11/1997
WO WO 99/42946 A2 8/1999
WO WO 99/42947 A2 8/1999
WO WO 00/20929 A1 4/2000
WO WO 01/63487 A1 8/2001
WO WO 01/71282 A1 9/2001
WO WO 02/03091 A2 1/2002
WO WO 02/059716 A2 8/2002
WO WO 02/073818 A1 9/2002
WO WO 2007/140155 A2 12/2007
WO WO 2010/079876 A1 7/2010
WO WO 2010/138344 A2 12/2010
WO WO 2011/028720 A1 3/2011
WO WO 2013/023705 A1 2/2013

OTHER PUBLICATIONS

Wauters, "Stanford Graduates Release Pulse, A Must-Have News App For The iPad", Techcrunch.com, techcrunch.com/2010/05/31/pulse-ipad/.
Hickins, "A License to Pry", The Wall Street Journal, http://blogs.wsj.com/digits/2011/03/10/a-license-to-pry/tab/print/.
Notice of Reasons for Rejection issued in Japanese Patent Application No. 2014-503962 dated Sep. 22, 2014.
Notice of Reasons for Rejection issued in Japanese Patent Application No. 2014-503962 dated Jun. 30, 2015.

European Search Report issued in European Patent Application No. 12767566.8 dated Mar. 20, 2015.
Vu et al., "High Accuracy and Visibility-Consistent Dense Multiview Stereo," IEEE Transactions on Pattern Analysis and Machine Intelligence, 2012, vol. 34, No. 5, 13 pages.
International Search Report and Written Opinion issued in International Application No. PCT/US2014/061283 dated Aug. 5, 2015, 11 pages.
Pang et al., "Development of a Process-Based Model for Dynamic Interaction in Spatio-Temporal GIS", GeoInformatica, 2002, vol. 6, No. 4, pp. 323-344.
Zhu et al., "The Geometrical Properties of Irregular 2D Voronoi Tessellations," Philosophical Magazine A, 2001, vol. 81, No. 12, pp. 2765-2783.
"3D Laser Mapping Launches Mobile Indoor Mapping System," 3D Laser Mapping, Dec. 3, 2012, 1 page.
Banwell et al., "Combining Absolute Positioning and Vision for Wide Area Augmented Reality," Proceedings of the International Conference on Computer Graphics Theory and Applications. 2010, 4 pages.
Li et al., "3-D Motion Estimation and Online Temporal Calibration for Camera-IMU Systems," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2013, 8 pages.
Li et al., "High-fidelity Sensor Modeling and Self-Calibration in Vision-aided Inertial Navigation," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2014, 8 pages.
Li et al., "Online Temporal Calibration for Camera-IMU Systems: Theory and Algorithms," International Journal of Robotics Research, vol. 33, Issue 7, 2014, 16 pages.
Li et al., "Real-time Motion Tracking on a Cellphone using Inertial Sensing and a Rolling-Shutter Camera," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2013, 8 pages.
Mourikis, "Method for Processing Feature Measurements in Vision-Aided Inertial Navigation," 3 pages.
Mourikis et al., "Methods for Motion Estimation With a Rolling-Shutter Camera," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Karlsruhe, Germany May 6-10, 2013, 9 pages.
Panzarino, "What Exactly WiFiSlam Is, And Why Apple Acquired It," http://thenextweb.com/apple/2013/03/26/what-exactly-wifislamis-and-why-apple-acquired-it, Mar. 26, 2013, 10 pages.
Vondrick et al., "HOGgles: Visualizing Object Detection Features," IEEE International Conference on Computer Vision (ICCV), 2013, 9 pages.
U.S. Appl. No. 16/168,419, filed Oct. 23, 2018.

* cited by examiner

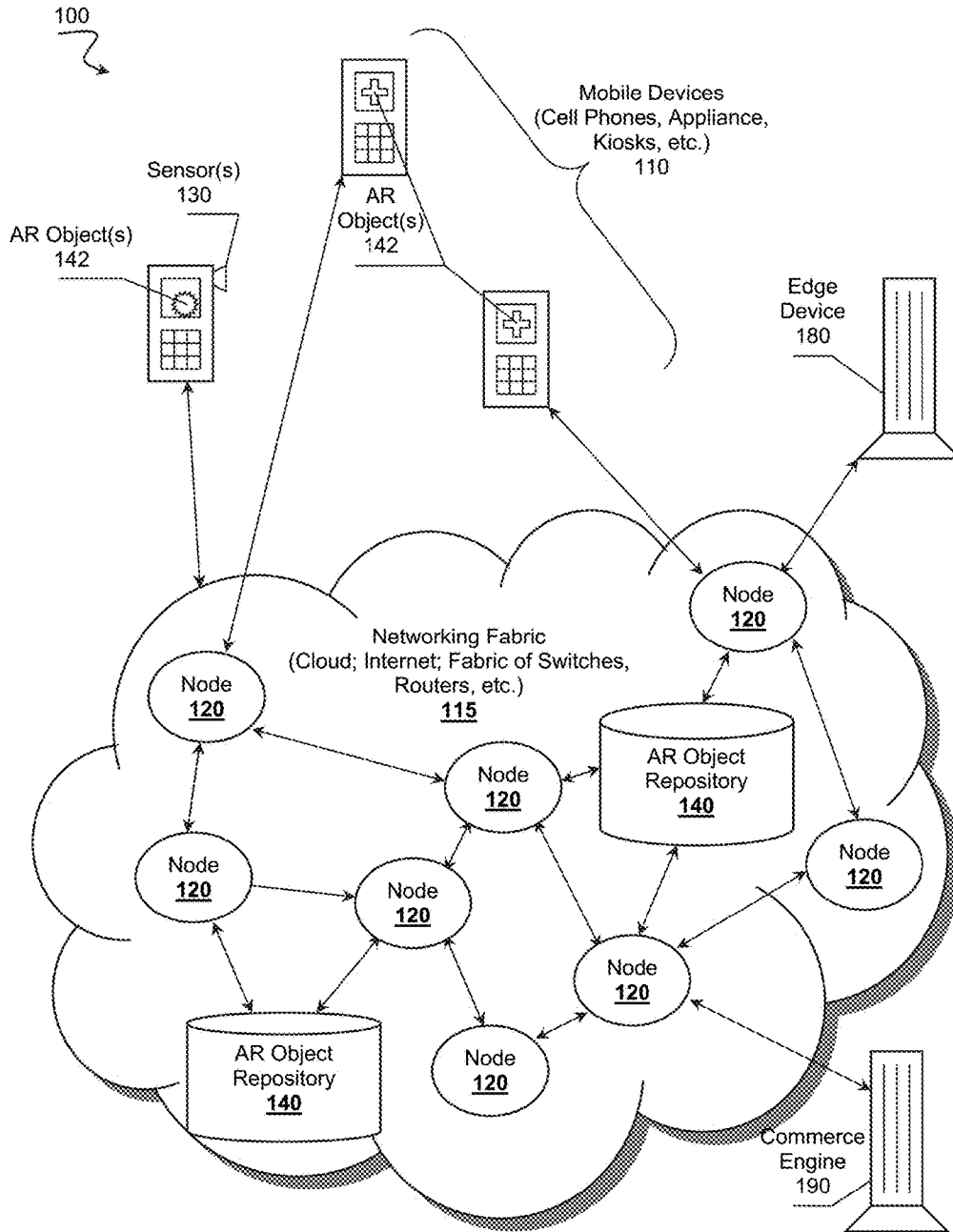


Figure 1

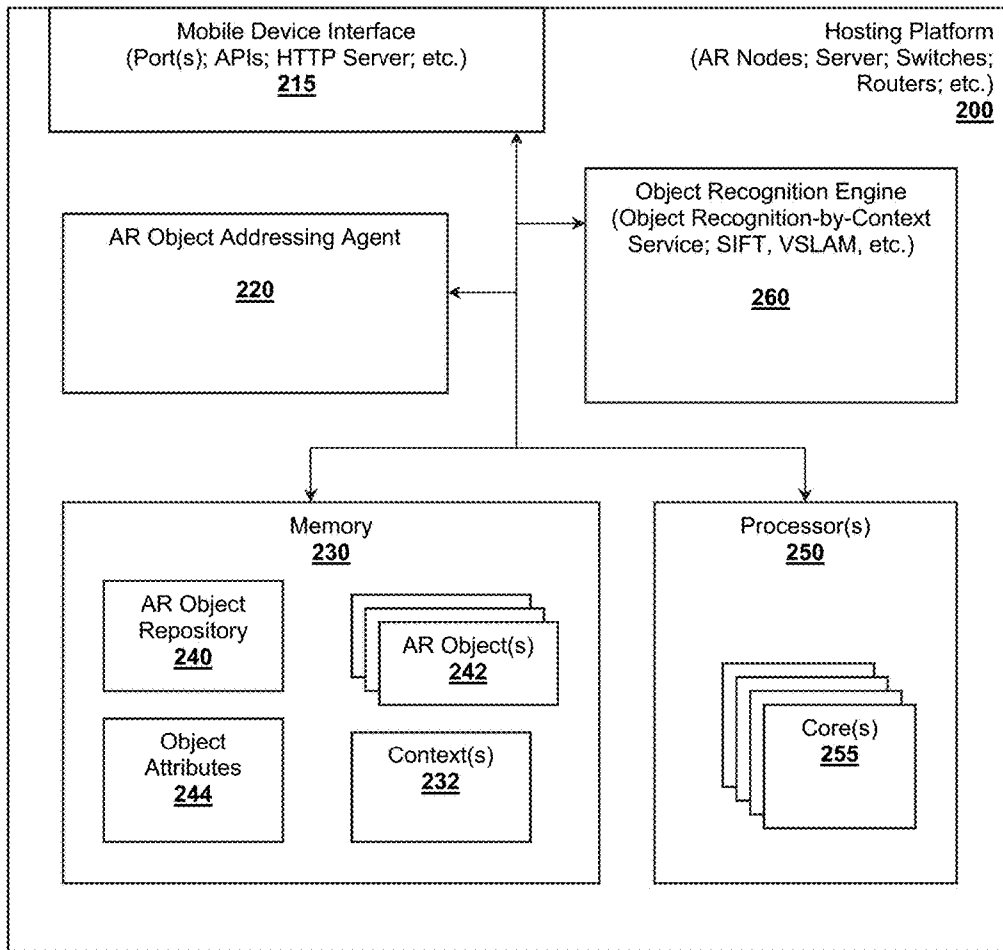


Figure 2

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.