US010279247B2

(12) **United States Patent**
Kiani

(10) **Patent No.: US 10,279,247 B2**
(45) **Date of Patent: May 7, 2019**

(54) **AVATAR-INCENTIVE HEALTHCARE THERAPY**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 562 days.

(21) Appl. No.: **14/571,286**

(22) Filed: **Dec. 15, 2014**

(65) **Prior Publication Data**

US 2015/0165312 A1 Jun. 18, 2015

Related U.S. Application Data

(60) Provisional application No. 61/916,136, filed on Dec. 13, 2013.

(51) **Int. Cl.**

A63F 13/212	(2014.01)
A61B 5/00	(2006.01)
A61B 5/0205	(2006.01)
A61B 5/024	(2006.01)
A61B 5/021	(2006.01)
A61B 5/145	(2006.01)
A61B 5/1455	(2006.01)

(52) **U.S. Cl.**

CPC ***A63F 13/212*** (2014.09); ***A61B 5/0205*** (2013.01); ***A61B 5/744*** (2013.01); *A61B 5/0022* (2013.01); *A61B 5/021* (2013.01); *A61B 5/024* (2013.01); *A61B 5/1455* (2013.01); *A61B 5/14532* (2013.01)

(58) **Field of Classification Search**

USPC 434/257

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,960,128	A	10/1990	Gordon et al.
4,964,408	A	10/1990	Hink et al.
5,041,187	A	8/1991	Hink et al.
5,069,213	A	12/1991	Polczynski
5,163,438	A	11/1992	Gordon et al.
5,319,355	A	6/1994	Russek
5,337,744	A	8/1994	Branigan
5,341,805	A	8/1994	Stavridi et al.
D353,195	S	12/1994	Savage et al.
D353,196	S	12/1994	Savage et al.
5,377,676	A	1/1995	Vari et al.
D359,546	S	6/1995	Savage et al.
5,431,170	A	7/1995	Mathews
D361,840	S	8/1995	Savage et al.
D362,063	S	9/1995	Savage et al.
5,452,717	A	9/1995	Branigan et al.
D363,120	S	10/1995	Savage et al.

(Continued)

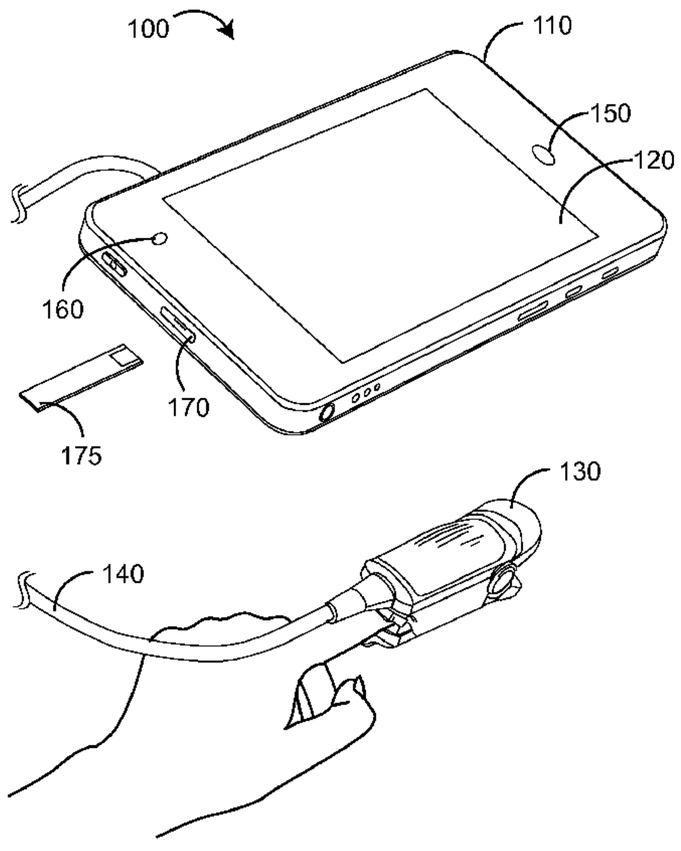
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(57) **ABSTRACT**

An avatar-incentive healthcare therapy system has a physiological monitor for generating a physiological parameter indicative of physical health. An academic test for generating a test score is indicative of mental acuity. The avatar has outward characteristics and game play capabilities proportional to the physiological health and the mental acuity so as to incentivize improved physical health and academic performance.

7 Claims, 5 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,456,252	A	10/1995	Vari et al.
5,479,934	A	1/1996	Imran
5,482,036	A	1/1996	Diab et al.
5,490,505	A	2/1996	Diab et al.
5,494,043	A	2/1996	O'Sullivan et al.
5,533,511	A	7/1996	Kaspari et al.
5,534,851	A	7/1996	Russek
5,561,275	A	10/1996	Savage et al.
5,562,002	A	10/1996	Lalin
5,590,649	A	1/1997	Caro et al.
5,602,924	A	2/1997	Durand et al.
5,632,272	A	5/1997	Diab et al.
5,638,816	A	6/1997	Kiani-Azarbayjany et al.
5,638,818	A	6/1997	Diab et al.
5,645,440	A	7/1997	Tobler et al.
5,685,299	A	11/1997	Diab et al.
D393,830	S	4/1998	Tobler et al.
5,743,262	A	4/1998	Lepper, Jr. et al.
5,758,644	A	6/1998	Diab et al.
5,760,910	A	6/1998	Lepper, Jr. et al.
5,769,785	A	6/1998	Diab et al.
5,782,757	A	7/1998	Diab et al.
5,785,659	A	7/1998	Caro et al.
5,791,347	A	8/1998	Flaherty et al.
5,810,734	A	9/1998	Caro et al.
5,823,950	A	10/1998	Diab et al.
5,830,131	A	11/1998	Caro et al.
5,833,618	A	11/1998	Caro et al.
5,860,919	A	1/1999	Kiani-Azarbayjany et al.
5,890,929	A	4/1999	Mills et al.
5,904,654	A	5/1999	Wohltmann et al.
5,919,134	A	7/1999	Diab
5,934,925	A	8/1999	Tobler et al.
5,940,182	A	8/1999	Lepper, Jr. et al.
5,987,343	A	11/1999	Kinast
5,995,855	A	11/1999	Kiani et al.
5,997,343	A	12/1999	Mills et al.
6,002,952	A	12/1999	Diab et al.
6,011,986	A	1/2000	Diab et al.
6,027,452	A	2/2000	Flaherty et al.
6,036,642	A	3/2000	Diab et al.
6,045,509	A	4/2000	Caro et al.
6,067,462	A	5/2000	Diab et al.
6,081,735	A	6/2000	Diab et al.
6,088,607	A	7/2000	Diab et al.
6,110,522	A	8/2000	Lepper, Jr. et al.
6,124,597	A	9/2000	Shehada
6,128,521	A	10/2000	Marro et al.
6,129,675	A	10/2000	Jay
6,144,868	A	11/2000	Parker
6,151,516	A	11/2000	Kiani-Azarbayjany et al.
6,152,754	A	11/2000	Gerhardt et al.
6,157,850	A	12/2000	Diab et al.
6,165,005	A	12/2000	Mills et al.
6,184,521	B1	2/2001	Coffin, IV et al.
6,206,830	B1	3/2001	Diab et al.
6,229,856	B1	5/2001	Diab et al.
6,232,609	B1	5/2001	Snyder et al.
6,236,872	B1	5/2001	Diab et al.
6,241,683	B1	6/2001	Macklem et al.
6,253,097	B1	6/2001	Aronow et al.
6,256,523	B1	7/2001	Diab et al.
6,263,222	B1	7/2001	Diab et al.
6,278,522	B1	8/2001	Lepper, Jr. et al.
6,280,213	B1	8/2001	Tobler et al.
6,285,896	B1	9/2001	Tobler et al.
6,301,493	B1	10/2001	Marro et al.
6,308,089	B1	10/2001	von der Ruhr et al.
6,317,627	B1	11/2001	Ennen et al.
6,321,100	B1	11/2001	Parker
6,325,761	B1	12/2001	Jay
6,334,065	B1	12/2001	Al-Ali et al.
6,343,224	B1	1/2002	Parker
6,349,228	B1	2/2002	Kiani et al.
6,360,114	B1	3/2002	Diab et al.
6,368,283	B1	4/2002	Xu et al.
6,371,921	B1	4/2002	Caro et al.
6,377,829	B1	4/2002	Al-Ali
6,388,240	B2	5/2002	Schulz et al.
6,397,091	B2	5/2002	Diab et al.
6,430,437	B1	8/2002	Marro
6,430,525	B1	8/2002	Weber et al.
6,463,311	B1	10/2002	Diab
6,470,199	B1	10/2002	Kopotic et al.
6,501,975	B2	12/2002	Diab et al.
6,505,059	B1	1/2003	Kollias et al.
6,515,273	B2	2/2003	Al-Ali
6,519,487	B1	2/2003	Parker
6,525,386	B1	2/2003	Mills et al.
6,526,300	B1	2/2003	Kiani et al.
6,541,756	B2	4/2003	Schulz et al.
6,542,764	B1	4/2003	Al-Ali et al.
6,580,086	B1	6/2003	Schulz et al.
6,584,336	B1	6/2003	Ali et al.
6,595,316	B2	7/2003	Cybulski et al.
6,597,932	B2	7/2003	Tian et al.
6,597,933	B2	7/2003	Kiani et al.
6,606,511	B1	8/2003	Ali et al.
6,632,181	B2	10/2003	Flaherty et al.
6,639,668	B1	10/2003	Trepagnier
6,640,116	B2	10/2003	Diab
6,643,530	B2	11/2003	Diab et al.
6,650,917	B2	11/2003	Diab et al.
6,654,624	B2	11/2003	Diab et al.
6,658,276	B2	12/2003	Kiani et al.
6,661,161	B1	12/2003	Lanzo et al.
6,671,531	B2	12/2003	Al-Ali et al.
6,678,543	B2	1/2004	Diab et al.
6,684,090	B2	1/2004	Ali et al.
6,684,091	B2	1/2004	Parker
6,697,656	B1	2/2004	Al-Ali
6,697,657	B1	2/2004	Shehada et al.
6,697,658	B2	2/2004	Al-Ali
RE38,476	E	3/2004	Diab et al.
6,699,194	B1	3/2004	Diab et al.
6,714,804	B2	3/2004	Al-Ali et al.
RE38,492	E	4/2004	Diab et al.
6,721,582	B2	4/2004	Trepagnier et al.
6,721,585	B1	4/2004	Parker
6,725,075	B2	4/2004	Al-Ali
6,728,560	B2	4/2004	Kollias et al.
6,735,459	B2	5/2004	Parker
6,745,060	B2	6/2004	Diab et al.
6,760,607	B2	7/2004	Al-Ali
6,770,028	B1	8/2004	Ali et al.
6,771,994	B2	8/2004	Kiani et al.
6,792,300	B1	9/2004	Diab et al.
6,813,511	B2	11/2004	Diab et al.
6,816,741	B2	11/2004	Diab
6,822,564	B2	11/2004	Al-Ali
6,826,419	B2	11/2004	Diab et al.
6,830,711	B2	12/2004	Mills et al.
6,850,787	B2	2/2005	Weber et al.
6,850,788	B2	2/2005	Al-Ali
6,852,083	B2	2/2005	Caro et al.
6,861,639	B2	3/2005	Al-Ali
6,898,452	B2	5/2005	Al-Ali et al.
6,920,345	B2	7/2005	Al-Ali et al.
6,931,268	B1	8/2005	Kiani-Azarbayjany et al.
6,934,570	B2	8/2005	Kiani et al.
6,939,305	B2	9/2005	Flaherty et al.
6,943,348	B1	9/2005	Coffin, IV
6,950,687	B2	9/2005	Al-Ali
6,961,598	B2	11/2005	Diab
6,970,792	B1	11/2005	Diab
6,979,812	B2	12/2005	Al-Ali
6,985,764	B2	1/2006	Mason et al.
6,993,371	B2	1/2006	Kiani et al.
6,996,427	B2	2/2006	Ali et al.
6,999,904	B2	2/2006	Weber et al.
7,003,338	B2	2/2006	Weber et al.
7,003,339	B2	2/2006	Diab et al.
7,015,451	B2	3/2006	Dalke et al.
7,024,233	B2	4/2006	Ali et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,027,849	B2	4/2006	Al-Ali
7,030,749	B2	4/2006	Al-Ali
7,039,449	B2	5/2006	Al-Ali
7,041,060	B2	5/2006	Flaherty et al.
7,044,918	B2	5/2006	Diab
7,048,687	B1	5/2006	Reuss et al.
7,067,893	B2	6/2006	Mills et al.
7,096,052	B2	8/2006	Mason et al.
7,096,054	B2	8/2006	Abdul-Hafiz et al.
7,132,641	B2	11/2006	Schulz et al.
7,142,901	B2	11/2006	Kiani et al.
7,149,561	B2	12/2006	Diab
7,186,966	B2	3/2007	Al-Ali
7,190,261	B2	3/2007	Al-Ali
7,215,984	B2	5/2007	Diab
7,215,986	B2	5/2007	Diab
7,221,971	B2	5/2007	Diab
7,225,006	B2	5/2007	Al-Ali et al.
7,225,007	B2	5/2007	Al-Ali
RE39,672	E	6/2007	Shehada et al.
7,239,905	B2	7/2007	Kiani-Azarbayjany et al.
7,245,953	B1	7/2007	Parker
7,254,429	B2	8/2007	Schurman et al.
7,254,431	B2	8/2007	Al-Ali
7,254,433	B2	8/2007	Diab et al.
7,254,434	B2	8/2007	Schulz et al.
7,272,425	B2	9/2007	Al-Ali
7,274,955	B2	9/2007	Kiani et al.
D554,263	S	10/2007	Al-Ali
7,280,858	B2	10/2007	Al-Ali et al.
7,289,835	B2	10/2007	Mansfield et al.
7,292,883	B2	11/2007	De Felice et al.
7,295,866	B2	11/2007	Al-Ali
7,328,053	B1	2/2008	Diab et al.
7,332,784	B2	2/2008	Mills et al.
7,340,287	B2	3/2008	Mason et al.
7,341,559	B2	3/2008	Schulz et al.
7,343,186	B2	3/2008	Lamego et al.
D566,282	S	4/2008	Al-Ali et al.
7,355,512	B1	4/2008	Al-Ali
7,356,365	B2	4/2008	Schurman
7,371,981	B2	5/2008	Abdul-Hafiz
7,373,193	B2	5/2008	Al-Ali et al.
7,373,194	B2	5/2008	Weber et al.
7,376,453	B1	5/2008	Diab et al.
7,377,794	B2	5/2008	Al Ali et al.
7,377,899	B2	5/2008	Weber et al.
7,383,070	B2	6/2008	Diab et al.
7,415,297	B2	8/2008	Al-Ali et al.
7,428,432	B2	9/2008	Ali et al.
7,438,683	B2	10/2008	Al-Ali et al.
7,440,787	B2	10/2008	Diab
7,454,240	B2	11/2008	Diab et al.
7,467,002	B2	12/2008	Weber et al.
7,469,157	B2	12/2008	Diab et al.
7,471,969	B2	12/2008	Diab et al.
7,471,971	B2	12/2008	Diab et al.
7,483,729	B2	1/2009	Al-Ali et al.
7,483,730	B2	1/2009	Diab et al.
7,489,958	B2	2/2009	Diab et al.
7,496,391	B2	2/2009	Diab et al.
7,496,393	B2	2/2009	Diab et al.
D587,657	S	3/2009	Al-Ali et al.
7,499,741	B2	3/2009	Diab et al.
7,499,835	B2	3/2009	Weber et al.
7,500,950	B2	3/2009	Al-Ali et al.
7,509,154	B2	3/2009	Diab et al.
7,509,494	B2	3/2009	Al-Ali
7,510,849	B2	3/2009	Schurman et al.
7,526,328	B2	4/2009	Diab et al.
7,530,942	B1	5/2009	Diab
7,530,949	B2	5/2009	Al Ali et al.
7,530,955	B2	5/2009	Diab et al.
7,563,110	B2	7/2009	Al-Ali et al.
7,596,398	B2	9/2009	Al-Ali et al.
7,618,375	B2	11/2009	Flaherty
D606,659	S	12/2009	Kiani et al.
7,647,083	B2	1/2010	Al-Ali et al.
D609,193	S	2/2010	Al-Ali et al.
D614,305	S	4/2010	Al-Ali et al.
RE41,317	E	5/2010	Parker
7,729,733	B2	6/2010	Al-Ali et al.
7,734,320	B2	6/2010	Al-Ali
7,761,127	B2	7/2010	Al-Ali et al.
7,761,128	B2	7/2010	Al-Ali et al.
7,764,982	B2	7/2010	Dalke et al.
D621,516	S	8/2010	Kiani et al.
7,791,155	B2	9/2010	Diab
7,801,581	B2	9/2010	Diab
7,822,452	B2	10/2010	Schurman et al.
RE41,912	E	11/2010	Parker
7,844,313	B2	11/2010	Kiani et al.
7,844,314	B2	11/2010	Al-Ali
7,844,315	B2	11/2010	Al-Ali
7,865,222	B2	1/2011	Weber et al.
7,873,497	B2	1/2011	Weber et al.
7,880,606	B2	2/2011	Al-Ali
7,880,626	B2	2/2011	Al-Ali et al.
7,891,355	B2	2/2011	Al-Ali et al.
7,894,868	B2	2/2011	Al-Ali et al.
7,899,507	B2	3/2011	Al-Ali et al.
7,899,518	B2	3/2011	Trepagnier et al.
7,904,132	B2	3/2011	Weber et al.
7,909,772	B2	3/2011	Popov et al.
7,910,875	B2	3/2011	Al-Ali
7,919,713	B2	4/2011	Al-Ali et al.
7,937,128	B2	5/2011	Al-Ali
7,937,129	B2	5/2011	Mason et al.
7,937,130	B2	5/2011	Diab et al.
7,941,199	B2	5/2011	Kiani
7,951,086	B2	5/2011	Flaherty et al.
7,957,780	B2	6/2011	Lamego et al.
7,962,188	B2	6/2011	Kiani et al.
7,962,190	B1	6/2011	Diab et al.
7,976,472	B2	7/2011	Kiani
7,988,637	B2	8/2011	Diab
7,990,382	B2	8/2011	Kiani
7,991,446	B2	8/2011	Al-Ali et al.
8,000,761	B2	8/2011	Al-Ali
8,008,088	B2	8/2011	Bellott et al.
RE42,753	E	9/2011	Kiani-Azarbayjany et al.
8,019,400	B2	9/2011	Diab et al.
8,028,701	B2	10/2011	Al-Ali et al.
8,029,765	B2	10/2011	Bellott et al.
8,036,727	B2	10/2011	Schurman et al.
8,036,728	B2	10/2011	Diab et al.
8,046,040	B2	10/2011	Ali et al.
8,046,041	B2	10/2011	Diab et al.
8,046,042	B2	10/2011	Diab et al.
8,048,040	B2	11/2011	Kiani
8,050,728	B2	11/2011	Al-Ali et al.
RE43,169	E	2/2012	Parker
8,118,620	B2	2/2012	Al-Ali et al.
8,126,528	B2	2/2012	Diab et al.
8,128,572	B2	3/2012	Diab et al.
8,130,105	B2	3/2012	Al-Ali et al.
8,145,287	B2	3/2012	Diab et al.
8,150,487	B2	4/2012	Diab et al.
8,175,672	B2	5/2012	Parker
8,180,420	B2	5/2012	Diab et al.
8,182,443	B1	5/2012	Kiani
8,185,180	B2	5/2012	Diab et al.
8,190,223	B2	5/2012	Al-Ali et al.
8,190,227	B2	5/2012	Diab et al.
8,203,438	B2	6/2012	Kiani et al.
8,203,704	B2	6/2012	Merritt et al.
8,204,566	B2	6/2012	Schurman et al.
8,219,172	B2	7/2012	Schurman et al.
8,224,411	B2	7/2012	Al-Ali et al.
8,228,181	B2	7/2012	Al-Ali
8,229,533	B2	7/2012	Diab et al.
8,233,955	B2	7/2012	Al-Ali et al.
8,244,325	B2	8/2012	Al-Ali et al.
8,255,026	B1	8/2012	Al-Ali

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,255,027 B2 8/2012 Al-Ali et al.
8,255,028 B2 8/2012 Al-Ali et al.
8,260,577 B2 9/2012 Weber et al.
8,265,723 B1 9/2012 McHale et al.
8,274,360 B2 9/2012 Sampath et al.
8,280,473 B2 10/2012 Al-Ali
8,301,217 B2 10/2012 Al-Ali et al.
8,306,596 B2 11/2012 Schurman et al.
8,310,336 B2 11/2012 Muhsin et al.
8,315,683 B2 11/2012 Al-Ali et al.
RE43,860 E 12/2012 Parker
8,337,403 B2 12/2012 Al-Ali et al.
8,346,330 B2 1/2013 Lamego
8,353,842 B2 1/2013 Al-Ali et al.
8,355,766 B2 1/2013 MacNeish, III et al.
8,359,080 B2 1/2013 Diab et al.
8,364,223 B2 1/2013 Al-Ali et al.
8,364,226 B2 1/2013 Diab et al.
8,374,665 B2 2/2013 Lamego
8,385,995 B2 2/2013 Al-ali et al.
8,385,996 B2 2/2013 Smith et al.
8,388,353 B2 3/2013 Kiani et al.
8,399,822 B2 3/2013 Al-Ali
8,401,602 B2 3/2013 Kiani
8,405,608 B2 3/2013 Al-Ali et al.
8,414,499 B2 4/2013 Al-Ali et al.
8,418,524 B2 4/2013 Al-Ali
8,423,106 B2 4/2013 Lamego et al.
8,428,967 B2 4/2013 Olsen et al.
8,430,817 B1 4/2013 Al-Ali et al.
8,437,825 B2 5/2013 Dalvi et al.
8,455,290 B2 6/2013 Siskavich
8,457,703 B2 6/2013 Al-Ali
8,457,707 B2 6/2013 Kiani
8,463,349 B2 6/2013 Diab et al.
8,466,286 B2 6/2013 Bellot et al.
8,471,713 B2 6/2013 Poeze et al.
8,473,020 B2 6/2013 Kiani et al.
8,483,787 B2 7/2013 Al-Ali et al.
8,489,364 B2 7/2013 Weber et al.
8,498,684 B2 7/2013 Weber et al.
8,504,128 B2 8/2013 Blank et al.
8,509,867 B2 8/2013 Workman et al.
8,515,509 B2 8/2013 Bruinsma et al.
8,523,781 B2 9/2013 Al-Ali
8,529,301 B2 9/2013 Al-Ali et al.
8,532,727 B2 9/2013 Ali et al.
8,532,728 B2 9/2013 Diab et al.
D692,145 S 10/2013 Al-Ali et al.
8,547,209 B2 10/2013 Kiani et al.
8,548,548 B2 10/2013 Al-Ali
8,548,549 B2 10/2013 Schurman et al.
8,548,550 B2 10/2013 Al-Ali et al.
8,560,032 B2 10/2013 Al-Ali et al.
8,560,034 B1 10/2013 Diab et al.
8,570,167 B2 10/2013 Al-Ali
8,570,503 B2 10/2013 Vo et al.
8,571,617 B2 10/2013 Reichgott et al.
8,571,618 B1 10/2013 Lamego et al.
8,571,619 B2 10/2013 Al-Ali et al.
8,577,431 B2 11/2013 Lamego et al.
8,581,732 B2 11/2013 Al-Ali et al.
8,584,345 B2 11/2013 Al-Ali et al.
8,588,880 B2 11/2013 Abdul-Hafiz et al.
8,600,467 B2 12/2013 Al-Ali et al.
8,606,342 B2 12/2013 Diab
8,626,255 B2 1/2014 Al-Ali et al.
8,630,691 B2 1/2014 Lamego et al.
8,634,889 B2 1/2014 Al-Ali et al.
8,641,631 B2 2/2014 Sierra et al.
8,652,060 B2 2/2014 Al-Ali
8,663,107 B2 3/2014 Kiani
8,666,468 B1 3/2014 Al-Ali
8,667,967 B2 3/2014 Al-Ali et al.
8,670,811 B2 3/2014 O'Reilly
8,670,814 B2 3/2014 Diab et al.
8,676,286 B2 3/2014 Weber et al.
8,682,407 B2 3/2014 Al-Ali
RE44,823 E 4/2014 Parker
RE44,875 E 4/2014 Kiani et al.
8,690,799 B2 4/2014 Telfort et al.
8,700,112 B2 4/2014 Kiani
8,702,627 B2 4/2014 Telfort et al.
8,706,179 B2 4/2014 Parker
8,712,494 B1 4/2014 MacNeish, III et al.
8,715,206 B2 5/2014 Telfort et al.
8,718,735 B2 5/2014 Lamego et al.
8,718,737 B2 5/2014 Diab et al.
8,718,738 B2 5/2014 Blank et al.
8,720,249 B2 5/2014 Al-Ali
8,721,541 B2 5/2014 Al-Ali et al.
8,721,542 B2 5/2014 Al-Ali et al.
8,723,677 B1 5/2014 Kiani
8,740,792 B1 6/2014 Kiani et al.
8,754,776 B2 6/2014 Poeze et al.
8,755,535 B2 6/2014 Telfort et al.
8,755,856 B2 6/2014 Diab et al.
8,755,872 B1 6/2014 Marinow
8,761,850 B2 6/2014 Lamego
8,764,671 B2 7/2014 Kiani
8,768,423 B2 7/2014 Shakespeare et al.
8,771,204 B2 7/2014 Telfort et al.
8,777,634 B2 7/2014 Kiani et al.
8,781,543 B2 7/2014 Diab et al.
8,781,544 B2 7/2014 Al-Ali et al.
8,781,549 B2 7/2014 Al-Ali et al.
8,788,003 B2 7/2014 Schurman et al.
8,790,268 B2 7/2014 Al-Ali
8,801,613 B2 8/2014 Al-Ali et al.
8,821,397 B2 9/2014 Al-Ali et al.
8,821,415 B2 9/2014 Al-Ali et al.
8,830,449 B1 9/2014 Lamego et al.
8,831,700 B2 9/2014 Schurman et al.
8,840,549 B2 9/2014 Al-Ali et al.
8,847,740 B2 9/2014 Kiani et al.
8,849,365 B2 9/2014 Smith et al.
8,852,094 B2 10/2014 Al-Ali et al.
8,852,994 B2 10/2014 Wojtczuk et al.
8,868,147 B2 10/2014 Stippick et al.
8,868,150 B2 10/2014 Al-Ali et al.
8,870,792 B2 10/2014 Al-Ali et al.
8,886,271 B2 11/2014 Kiani et al.
8,888,539 B2 11/2014 Al-Ali et al.
8,888,708 B2 11/2014 Diab et al.
8,892,180 B2 11/2014 Weber et al.
8,897,847 B2 11/2014 Al-Ali
8,909,310 B2 12/2014 Lamego et al.
8,911,377 B2 12/2014 Al-Ali
8,912,909 B2 12/2014 Al-Ali et al.
8,920,317 B2 12/2014 Al-Ali et al.
8,921,699 B2 12/2014 Al-Ali et al.
8,922,382 B2 12/2014 Al-Ali et al.
8,929,964 B2 1/2015 Al-Ali et al.
8,942,777 B2 1/2015 Diab et al.
8,948,834 B2 2/2015 Diab et al.
8,948,835 B2 2/2015 Diab
8,965,471 B2 2/2015 Lamego
8,983,564 B2 3/2015 Al-Ali
8,989,831 B2 3/2015 Al-Ali et al.
8,996,085 B2 3/2015 Kiani et al.
8,998,809 B2 4/2015 Kiani
9,022,930 B2 * 5/2015 Sachanandani A61B 5/0205 600/300
9,028,429 B2 5/2015 Telfort et al.
9,037,207 B2 5/2015 Al-Ali et al.
9,060,721 B2 6/2015 Reichgott et al.
9,066,666 B2 6/2015 Kiani
9,066,680 B1 6/2015 Al-Ali et al.
9,072,474 B2 7/2015 Al-Ali et al.
9,078,560 B2 7/2015 Schurman et al.
9,084,569 B2 7/2015 Weber et al.
9,095,316 B2 8/2015 Welch et al.
9,106,038 B2 8/2015 Telfort et al.
9,107,625 B2 8/2015 Telfort et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

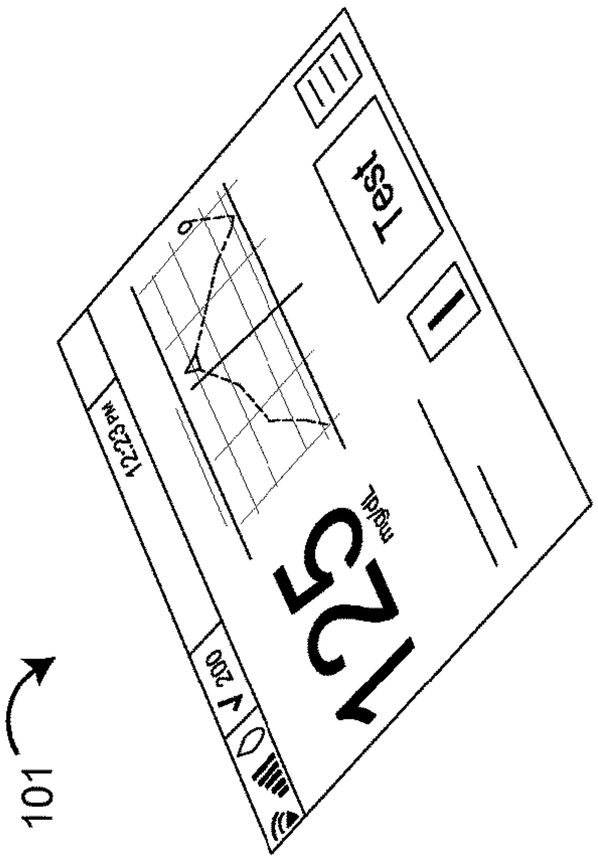
9,107,626	B2	8/2015	Al-Ali et al.
9,113,831	B2	8/2015	Al-Ali
9,113,832	B2	8/2015	Al-Ali
9,119,595	B2	9/2015	Lamego
9,131,881	B2	9/2015	Diab et al.
9,131,882	B2	9/2015	Al-Ali et al.
9,131,883	B2	9/2015	Al-Ali
9,131,917	B2	9/2015	Telfort et al.
9,138,180	B1	9/2015	Coverston et al.
9,138,182	B2	9/2015	Al-Ali et al.
9,138,192	B2	9/2015	Weber et al.
9,142,117	B2	9/2015	Muhsin et al.
9,153,112	B1	10/2015	Kiani et al.
9,153,121	B2	10/2015	Kiani et al.
9,161,696	B2	10/2015	Al-Ali et al.
9,161,713	B2	10/2015	Al-Ali et al.
9,167,995	B2	10/2015	Lamego et al.
9,176,141	B2	11/2015	Al-Ali et al.
9,186,102	B2	11/2015	Bruinsma et al.
9,192,312	B2	11/2015	Al-Ali
9,192,329	B2	11/2015	Al-Ali
9,192,351	B1	11/2015	Telfort et al.
9,195,385	B2	11/2015	Al-Ali et al.
9,211,072	B2	12/2015	Kiani
9,211,095	B1	12/2015	Al-Ali
9,218,454	B2	12/2015	Kiani et al.
9,226,696	B2	1/2016	Kiani
9,241,662	B2	1/2016	Al-Ali et al.
9,245,668	B1	1/2016	Vo et al.
9,259,185	B2	2/2016	Abdul-Hafiz et al.
9,267,572	B2	2/2016	Barker et al.
9,277,880	B2	3/2016	Poeze et al.
9,289,167	B2	3/2016	Diab et al.
9,295,421	B2	3/2016	Kiani et al.
9,307,928	B1	4/2016	Al-Ali et al.
9,323,894	B2	4/2016	Kiani
D755,392	S	5/2016	Hwang et al.
9,326,712	B1	5/2016	Kiani
9,333,316	B2	5/2016	Kiani
9,339,220	B2	5/2016	Lamego et al.
9,341,565	B2	5/2016	Lamego et al.
9,351,673	B2	5/2016	Diab et al.
9,351,675	B2	5/2016	Al-Ali et al.
9,364,181	B2	6/2016	Kiani et al.
9,368,671	B2	6/2016	Wojtczuk et al.
9,370,325	B2	6/2016	Al-Ali et al.
9,370,326	B2	6/2016	McHale et al.
9,370,335	B2	6/2016	Al-ali et al.
9,375,185	B2	6/2016	Ali et al.
9,386,953	B2	7/2016	Al-Ali
9,386,961	B2	7/2016	Al-Ali et al.
9,392,945	B2	7/2016	Al-Ali et al.
9,397,448	B2	7/2016	Al-Ali et al.
9,408,542	B1	8/2016	Kinast et al.
9,436,645	B2	9/2016	Al-Ali et al.
9,445,759	B1	9/2016	Lamego et al.
9,466,919	B2	10/2016	Kiani et al.
9,474,474	B2	10/2016	Lamego et al.
9,480,422	B2	11/2016	Al-Ali
9,480,435	B2	11/2016	Olsen
9,492,110	B2	11/2016	Al-Ali et al.
9,510,779	B2	12/2016	Poeze et al.
9,517,024	B2	12/2016	Kiani et al.
9,532,722	B2	1/2017	Lamego et al.
9,538,949	B2	1/2017	Al-Ali et al.
9,538,980	B2	1/2017	Telfort et al.
9,549,696	B2	1/2017	Lamego et al.
9,554,737	B2	1/2017	Schurman et al.
9,560,996	B2	2/2017	Kiani
9,560,998	B2	2/2017	Al-Ali et al.
9,566,019	B2	2/2017	Al-Ali et al.
9,579,039	B2	2/2017	Jansen et al.
9,591,975	B2	3/2017	Dalvi et al.
9,622,692	B2	4/2017	Lamego et al.
9,622,693	B2	4/2017	Diab
D788,312	S	5/2017	Al-Ali et al.
9,636,055	B2	5/2017	Al-Ali et al.
9,636,056	B2	5/2017	Al-Ali
9,649,054	B2	5/2017	Lamego et al.
9,662,052	B2	5/2017	Al-Ali et al.
9,668,679	B2	6/2017	Schurman et al.
9,668,680	B2	6/2017	Bruinsma et al.
9,668,703	B2	6/2017	Al-Ali
9,675,286	B2	6/2017	Diab
9,687,160	B2	6/2017	Kiani
9,693,719	B2	7/2017	Al-Ali et al.
9,693,737	B2	7/2017	Al-Ali
9,697,928	B2	7/2017	Al-Ali et al.
9,717,425	B2	8/2017	Kiani et al.
9,717,458	B2	8/2017	Lamego et al.
9,724,016	B1	8/2017	Al-Ali et al.
9,724,024	B2	8/2017	Al-Ali
9,724,025	B1	8/2017	Kiani et al.
9,730,640	B2	8/2017	Diab et al.
9,743,887	B2	8/2017	Al-Ali et al.
9,749,232	B2	8/2017	Sampath et al.
9,750,442	B2	9/2017	Olsen
9,750,443	B2	9/2017	Smith et al.
9,750,461	B1	9/2017	Telfort
9,775,545	B2	10/2017	Al-Ali et al.
9,775,546	B2	10/2017	Diab et al.
9,775,570	B2	10/2017	Al-Ali
9,778,079	B1	10/2017	Al-Ali et al.
9,782,077	B2	10/2017	Lamego et al.
9,782,110	B2	10/2017	Kiani
9,787,568	B2	10/2017	Lamego et al.
9,788,735	B2	10/2017	Al-Ali
9,788,768	B2	10/2017	Al-Ali et al.
9,795,300	B2	10/2017	Al-Ali
9,795,310	B2	10/2017	Al-Ali
9,795,358	B2	10/2017	Telfort et al.
9,795,739	B2	10/2017	Al-Ali et al.
9,801,556	B2	10/2017	Kiani
9,801,588	B2	10/2017	Weber et al.
9,808,188	B1	11/2017	Perea et al.
9,814,418	B2	11/2017	Weber et al.
9,820,691	B2	11/2017	Kiani
9,833,152	B2	12/2017	Kiani et al.
9,833,180	B2	12/2017	Shakespeare et al.
9,839,379	B2	12/2017	Al-Ali et al.
9,839,381	B1	12/2017	Weber et al.
2006/0161054	A1	7/2006	Reuss et al.
2007/0282478	A1	12/2007	Al-Ali et al.
2009/0247984	A1	10/2009	Lamego et al.
2009/0275813	A1	11/2009	Davis
2009/0275844	A1	11/2009	Al-Ali
2010/0004518	A1	1/2010	Vo et al.
2010/0030040	A1	2/2010	Poeze et al.
2011/0082711	A1	4/2011	Poeze et al.
2011/0105854	A1	5/2011	Kiani et al.
2011/0125060	A1	5/2011	Telfort et al.
2011/0208015	A1	8/2011	Welch et al.
2011/0230733	A1	9/2011	Al-Ali
2011/0237969	A1	9/2011	Eckerbom et al.
2012/0165629	A1	6/2012	Merritt et al.
2012/0189990	A1*	7/2012	Bavelier G09B 5/06 434/188
2012/0209082	A1	8/2012	Al-Ali
2012/0209084	A1	8/2012	Olsen et al.
2012/0283524	A1	11/2012	Kiani et al.
2012/0319816	A1	12/2012	Al-Ali
2013/0023775	A1	1/2013	Lamego et al.
2013/0041591	A1	2/2013	Lamego
2013/0060147	A1	3/2013	Welch et al.
2013/0096405	A1	4/2013	Garfio
2013/0096936	A1	4/2013	Sampath et al.
2013/0243021	A1	9/2013	Siskavich
2013/0253334	A1	9/2013	Al-Ali et al.
2013/0267804	A1	10/2013	Al-Ali
2013/0296672	A1	11/2013	O'Neil et al.
2013/0296713	A1	11/2013	Al-Ali et al.
2013/0324808	A1	12/2013	Al-Ali et al.
2013/0331660	A1	12/2013	Al-Ali et al.
2014/0012100	A1	1/2014	Al-Ali et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2014/0051953	A1	2/2014	Lamego et al.	
2014/0081100	A1	3/2014	Muhsin et al.	
2014/0081175	A1	3/2014	Telfort	
2014/0120564	A1	5/2014	Workman et al.	
2014/0121482	A1	5/2014	Merritt et al.	
2014/0127137	A1	5/2014	Bellott et al.	
2014/0135588	A1	5/2014	Al-Ali et al.	
2014/0163344	A1	6/2014	Al-Ali	
2014/0163402	A1	6/2014	Lamego et al.	
2014/0166076	A1	6/2014	Kiani et al.	
2014/0171763	A1	6/2014	Diab	
2014/0180038	A1	6/2014	Kiani	
2014/0180154	A1	6/2014	Sierra et al.	
2014/0180160	A1	6/2014	Brown et al.	
2014/0187973	A1	7/2014	Brown et al.	
2014/0213864	A1	7/2014	Abdul-Hafiz et al.	
2014/0266790	A1	9/2014	Al-Ali et al.	
2014/0275808	A1	9/2014	Poeze et al.	
2014/0275835	A1*	9/2014	Lamego	A61B 5/0022 600/301
2014/0275871	A1	9/2014	Lamego et al.	
2014/0275872	A1	9/2014	Merritt et al.	
2014/0276115	A1	9/2014	Dalvi et al.	
2014/0288400	A1	9/2014	Diab et al.	
2014/0316217	A1	10/2014	Purdon et al.	
2014/0316218	A1	10/2014	Purdon et al.	
2014/0316228	A1	10/2014	Blank et al.	
2014/0323825	A1	10/2014	Al-Ali et al.	
2014/0323897	A1	10/2014	Brown et al.	
2014/0323898	A1	10/2014	Purdon et al.	
2014/0323899	A1*	10/2014	Silberstein	A61B 5/04842 600/544
2014/0330092	A1	11/2014	Al-Ali et al.	
2014/0330098	A1	11/2014	Merritt et al.	
2014/0357966	A1	12/2014	Al-Ali et al.	
2015/0005600	A1	1/2015	Blank et al.	
2015/0011907	A1	1/2015	Purdon et al.	
2015/0012231	A1	1/2015	Poeze et al.	
2015/0032029	A1	1/2015	Al-Ali et al.	
2015/0038859	A1	2/2015	Dalvi et al.	
2015/0045637	A1	2/2015	Dalvi	
2015/0080754	A1	3/2015	Purdon et al.	
2015/0087936	A1	3/2015	Al-Ali et al.	
2015/0094546	A1	4/2015	Al-Ali	
2015/0097701	A1	4/2015	Al-Ali et al.	
2015/0099950	A1	4/2015	Al-Ali et al.	
2015/0099955	A1	4/2015	Al-Ali et al.	
2015/0101844	A1	4/2015	Al-Ali et al.	
2015/0106121	A1	4/2015	Muhsin et al.	
2015/0112151	A1	4/2015	Muhsin et al.	
2015/0116076	A1	4/2015	Al-Ali et al.	
2015/0126830	A1	5/2015	Schurman et al.	
2015/0165312	A1	6/2015	Kiani	
2015/0196237	A1	7/2015	Lamego	
2015/0196249	A1	7/2015	Brown et al.	
2015/0216459	A1	8/2015	Al-Ali et al.	
2015/0230755	A1	8/2015	Al-Ali et al.	
2015/0238722	A1	8/2015	Al-Ali	
2015/0245773	A1	9/2015	Lamego et al.	
2015/0245794	A1	9/2015	Al-Ali	
2015/0257689	A1	9/2015	Al-Ali et al.	
2015/0272514	A1	10/2015	Kiani et al.	
2015/0351697	A1	12/2015	Weber et al.	
2015/0351704	A1	12/2015	Kiani et al.	
2015/0359429	A1	12/2015	Al-Ali et al.	
2015/0366507	A1	12/2015	Blank	
2015/0380875	A1	12/2015	Coverston et al.	
2016/0029932	A1	2/2016	Al-Ali	
2016/0051205	A1	2/2016	Al-Ali et al.	
2016/0058347	A1	3/2016	Reichgott et al.	
2016/0066823	A1	3/2016	Al-Ali et al.	
2016/0066824	A1	3/2016	Al-Ali et al.	
2016/0072429	A1	3/2016	Kiani et al.	
2016/0081552	A1	3/2016	Wojtczuk et al.	
2016/0095543	A1	4/2016	Telfort et al.	
2016/0095548	A1	4/2016	Al-Ali et al.	
2016/0103598	A1	4/2016	Al-Ali et al.	
2016/0143548	A1	5/2016	Al-Ali	
2016/0166182	A1	6/2016	Al-Ali et al.	
2016/0166183	A1	6/2016	Poeze et al.	
2016/0192869	A1	7/2016	Kiani et al.	
2016/0196388	A1	7/2016	Lamego	
2016/0197436	A1	7/2016	Barker et al.	
2016/0213281	A1	7/2016	Eckerbom et al.	
2016/0228043	A1	8/2016	O'Neil et al.	
2016/0233632	A1	8/2016	Scruggs et al.	
2016/0234944	A1	8/2016	Schmidt et al.	
2016/0270735	A1	9/2016	Diab et al.	
2016/0283665	A1	9/2016	Sampath et al.	
2016/0287090	A1	10/2016	Al-Ali et al.	
2016/0287786	A1	10/2016	Kiani	
2016/0296169	A1	10/2016	McHale et al.	
2016/0310052	A1	10/2016	Al-Ali et al.	
2016/0314260	A1	10/2016	Kiani	
2016/0324486	A1	11/2016	Al-Ali et al.	
2016/0324488	A1	11/2016	Olsen	
2016/0327984	A1	11/2016	Al-Ali et al.	
2016/0328528	A1	11/2016	Al-Ali et al.	
2016/0331332	A1	11/2016	Al-Ali	
2016/0367173	A1	12/2016	Dalvi et al.	
2017/0000394	A1	1/2017	Al-Ali et al.	
2017/0007134	A1	1/2017	Al-Ali et al.	
2017/0007190	A1	1/2017	Al-Ali et al.	
2017/0007198	A1	1/2017	Al-Ali et al.	
2017/0014083	A1	1/2017	Diab et al.	
2017/0014084	A1	1/2017	Al-Ali et al.	
2017/0027456	A1	2/2017	Kinast et al.	
2017/0042488	A1	2/2017	Muhsin	
2017/0055851	A1	3/2017	Al-Ali	
2017/0055882	A1	3/2017	Al-Ali et al.	
2017/0055887	A1	3/2017	Al-Ali	
2017/0055896	A1	3/2017	Al-Ali et al.	
2017/0079594	A1	3/2017	Telfort et al.	
2017/0086723	A1	3/2017	Al-Ali et al.	
2017/0143281	A1	5/2017	Olsen	
2017/0147774	A1	5/2017	Kiani	
2017/0156620	A1	6/2017	Al-Ali et al.	
2017/0173632	A1	6/2017	Al-Ali	
2017/0187146	A1	6/2017	Kiani et al.	
2017/0188919	A1	7/2017	Al-Ali et al.	
2017/0196464	A1	7/2017	Jansen et al.	
2017/0196470	A1	7/2017	Lamego et al.	
2017/0202490	A1	7/2017	Al-Ali et al.	
2017/0224231	A1	8/2017	Al-Ali	
2017/0224262	A1	8/2017	Al-Ali	
2017/0228516	A1	8/2017	Sampath et al.	
2017/0245790	A1	8/2017	Al-Ali et al.	
2017/0251974	A1	9/2017	Shreim et al.	
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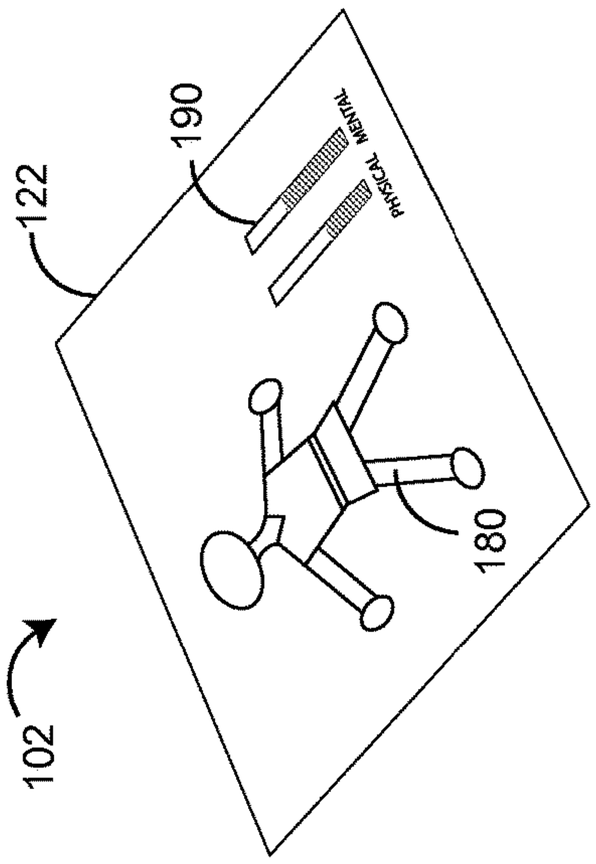
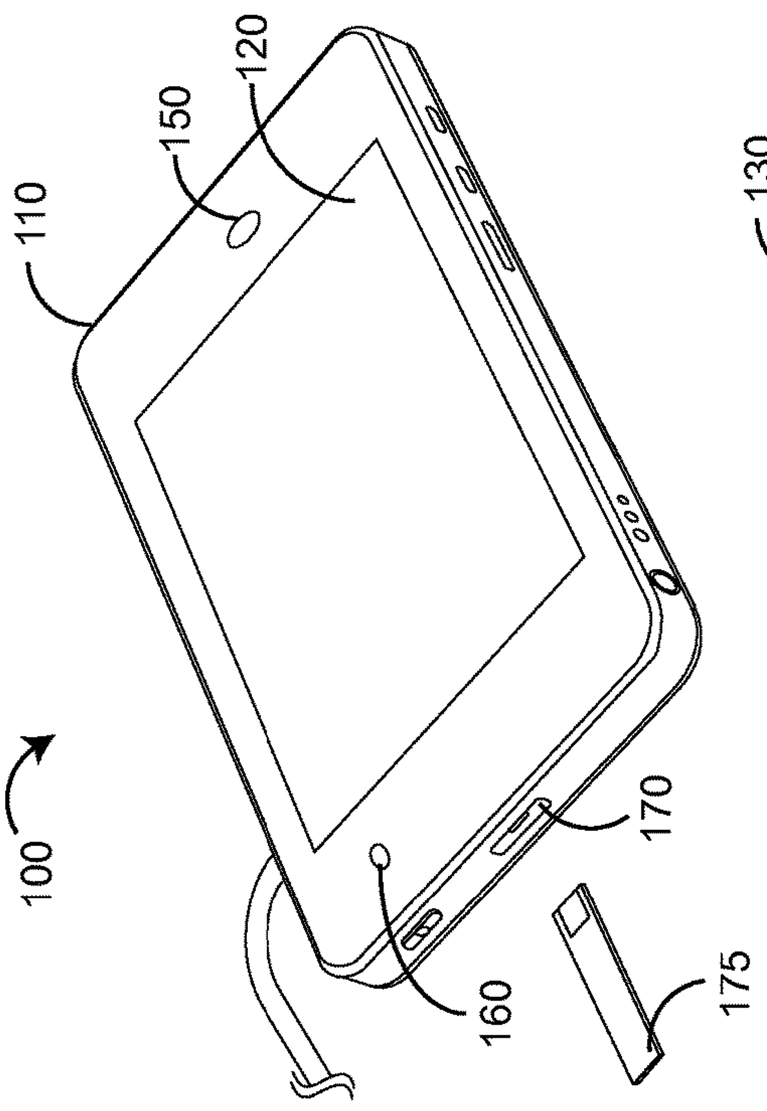

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FIG. 1B


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170
175

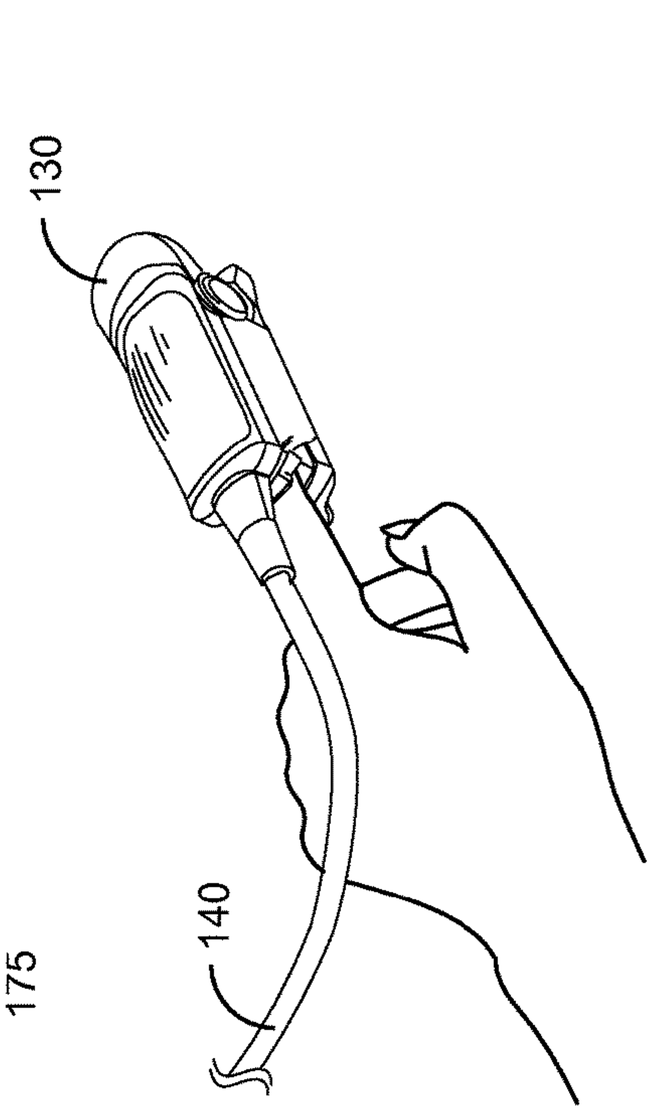

130
140

FIG. 1A

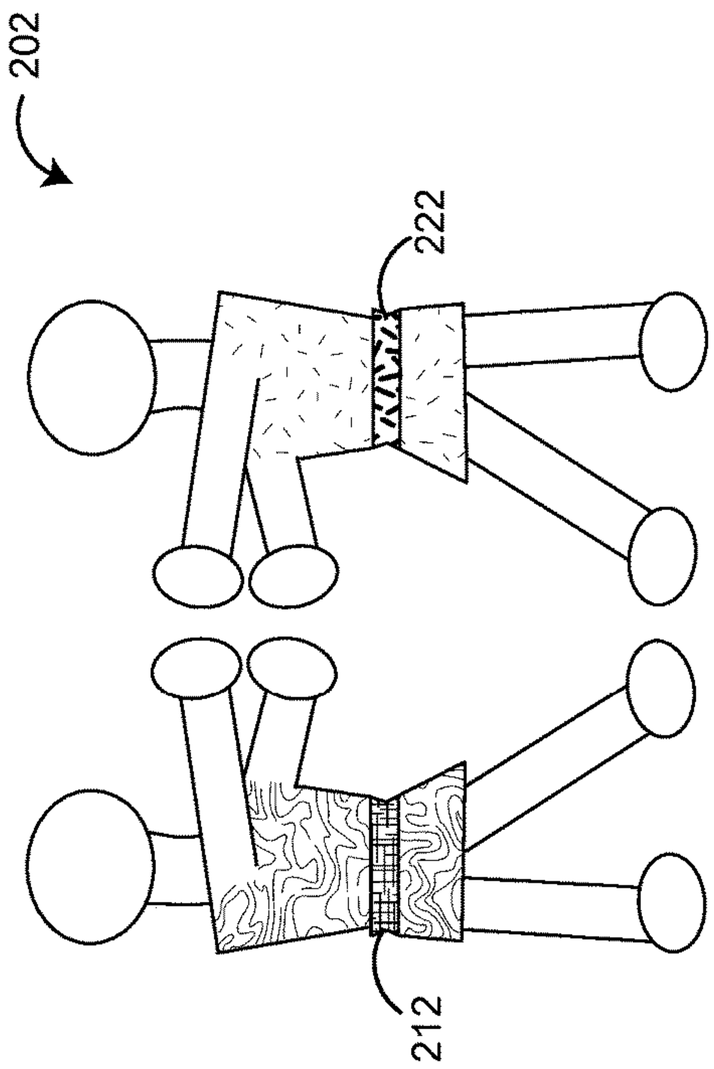


FIG. 2B

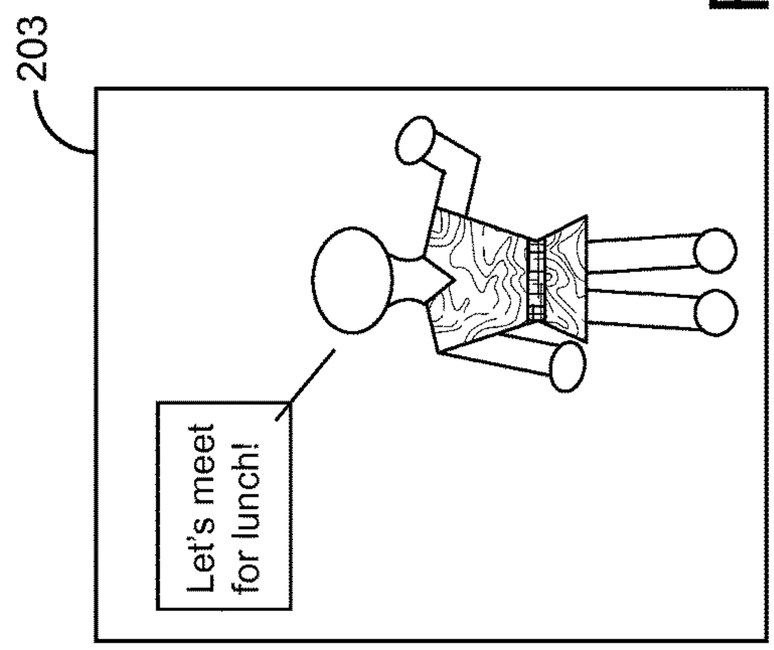


FIG. 2C

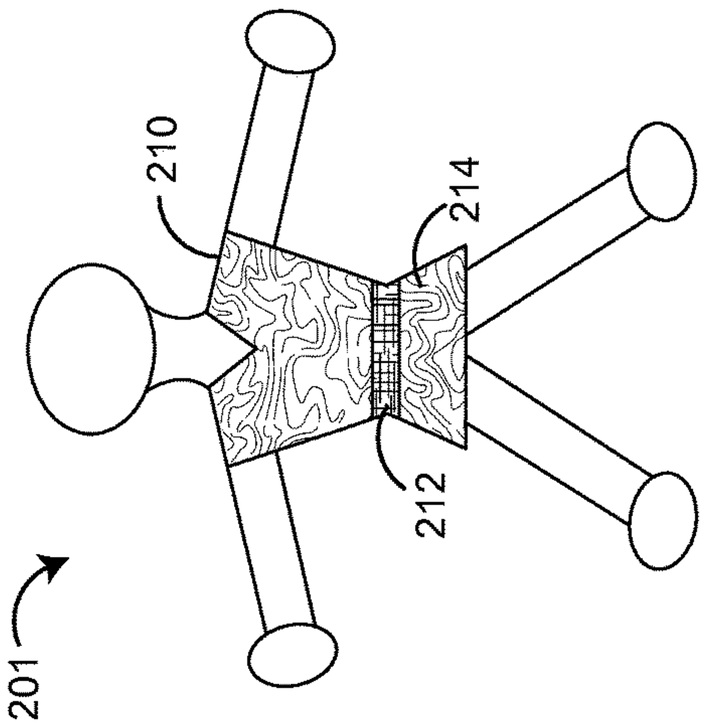


FIG. 2A

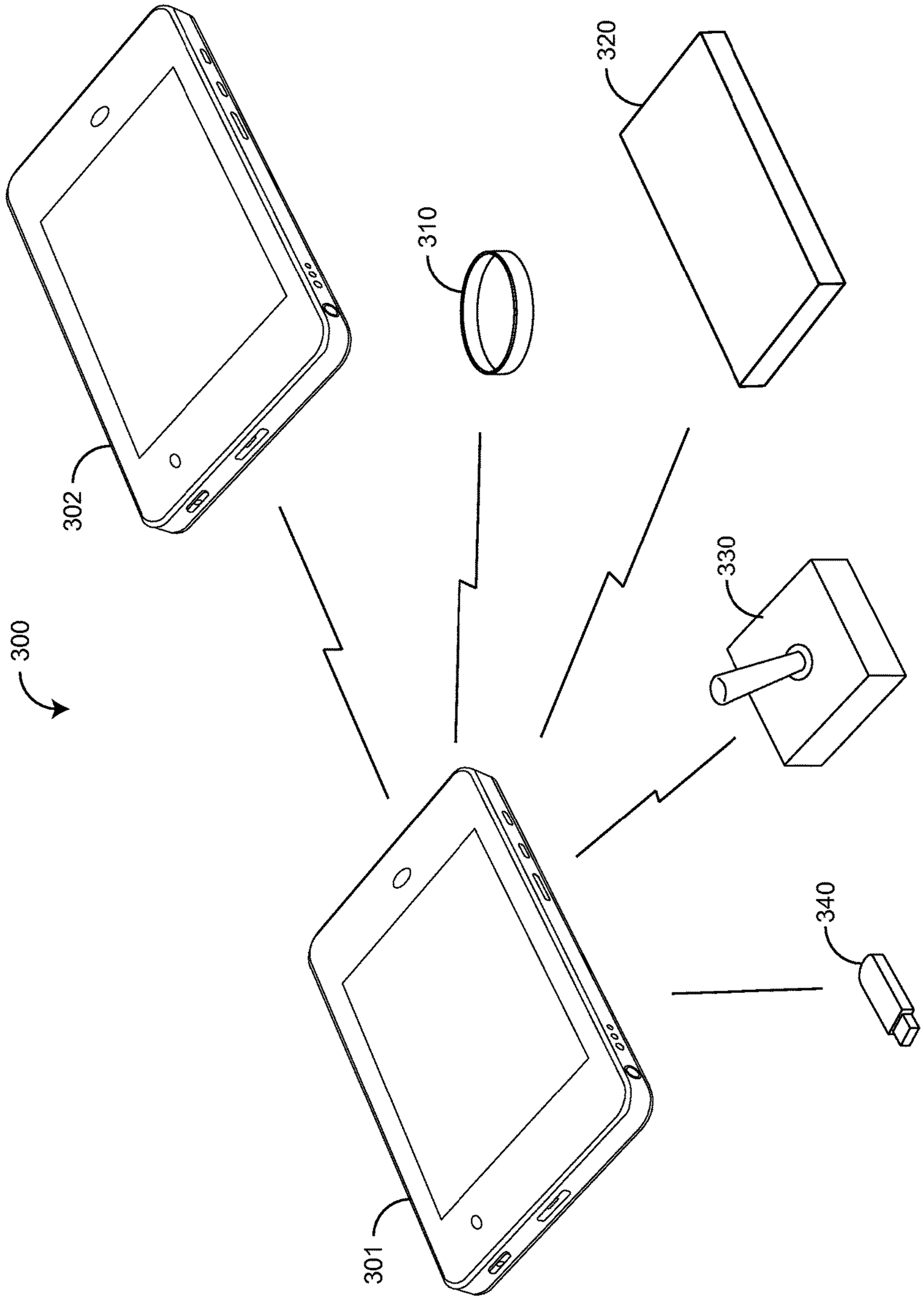


FIG. 3

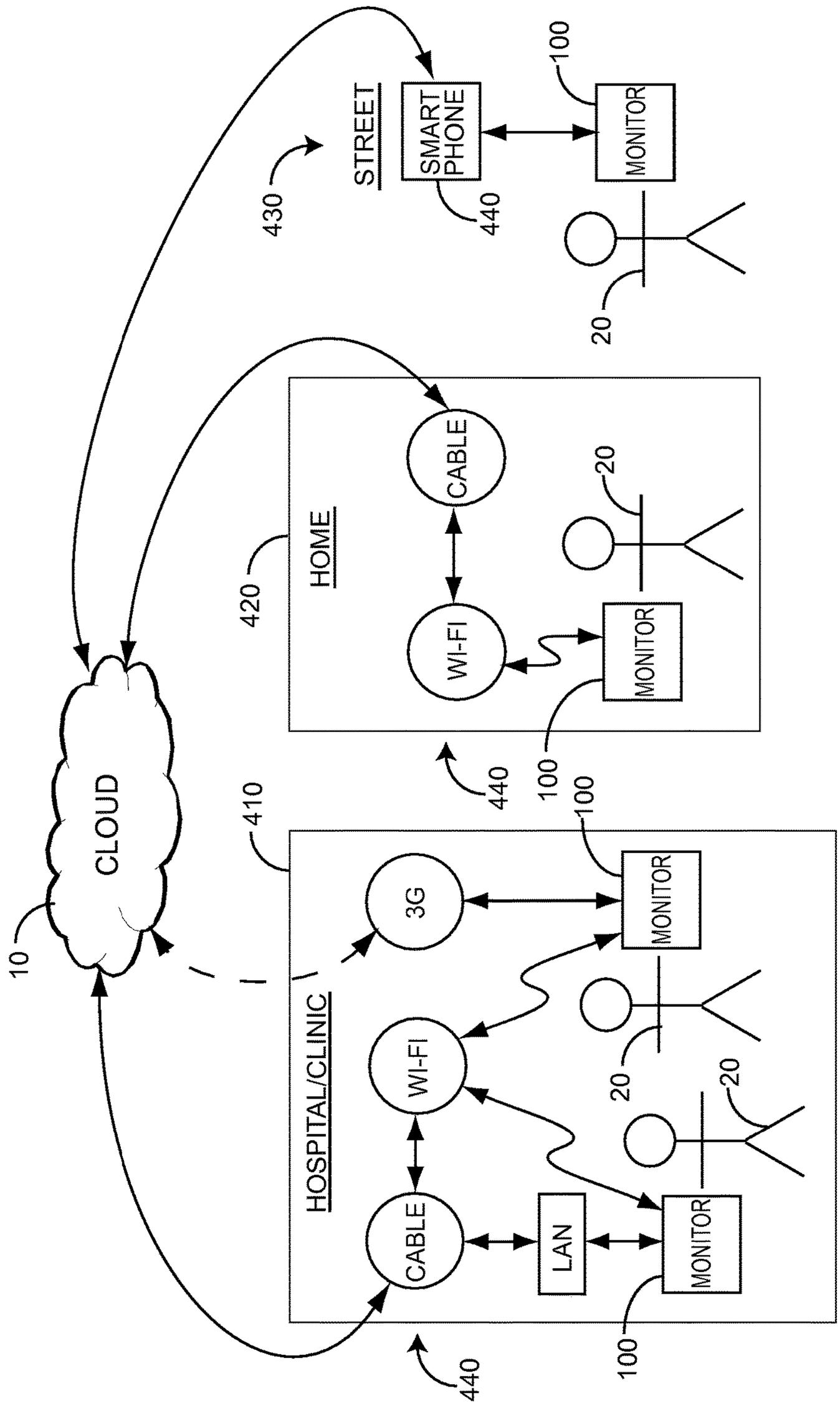

400
10
CLOUD
STREET
430
SMART PHONE
440
100
MONITOR
20
HOME
420
CABLE
WI-FI
MONITOR
20
440
100
410
HOSPITAL/CLINIC
3G
MONITOR
WI-FI
20
20
CABLE
LAN
MONITOR
440
100

FIG. 4

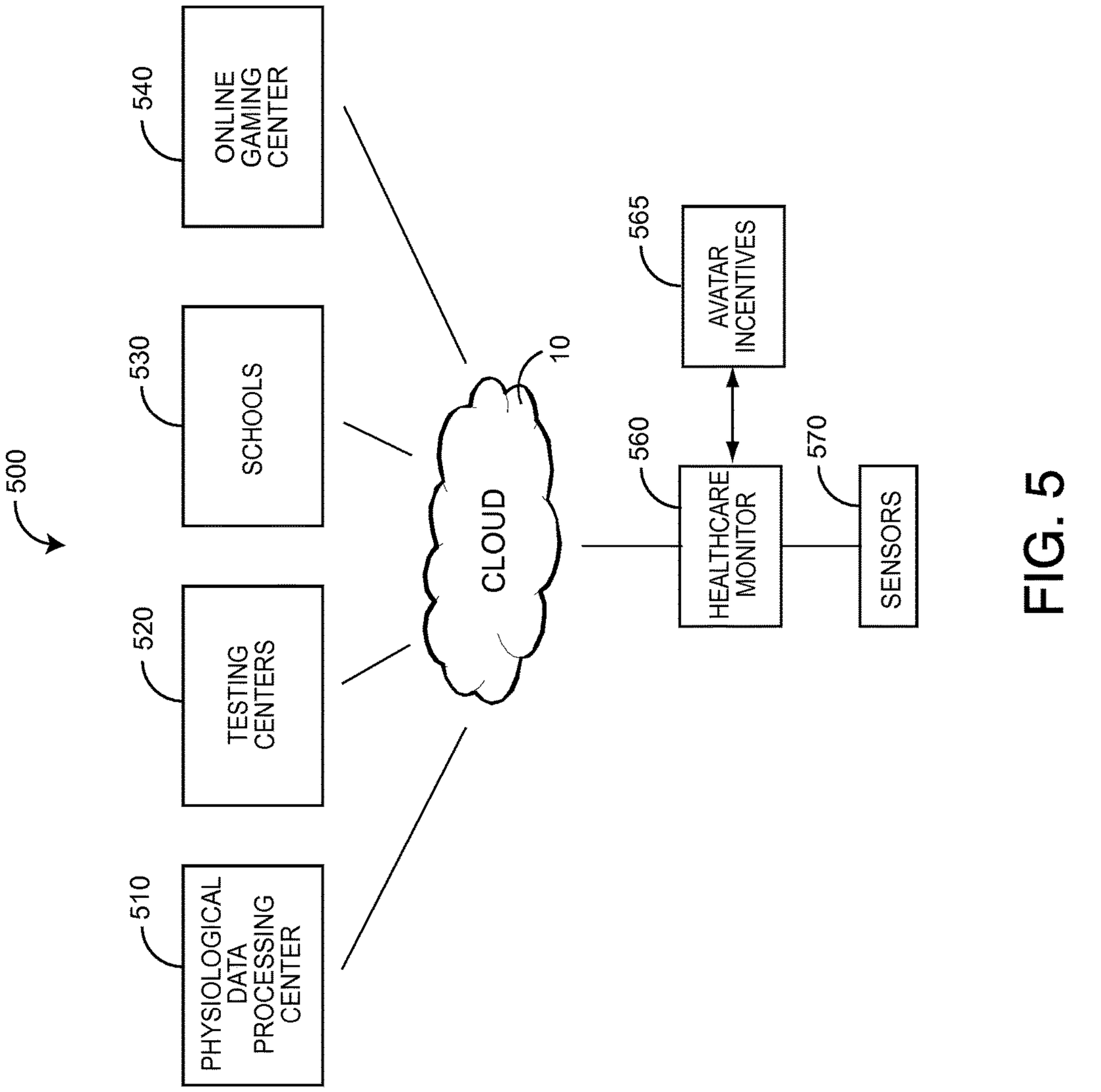

500
510
PHYSIOLOGICAL DATA PROCESSING CENTER
520
TESTING CENTERS
530
SCHOOLS
540
ONLINE GAMING CENTER
CLOUD
10
560
HEALTHCARE MONITOR
565
AVATAR INCENTIVES
570
SENSORS

FIG. 5

AVATAR-INCENTIVE HEALTHCARE THERAPY

PRIORITY CLAIM TO RELATED PROVISIONAL APPLICATIONS

The present application claims priority benefit under 35 U.S.C. § 119(e) to U.S. Provisional Patent Application Ser. No. 61/916,136 filed Dec. 13, 2013, titled Avatar Incentive Video Game, hereby incorporated in its entirety by reference herein.

BACKGROUND OF THE INVENTION

Medical device manufacturers are continually increasing the processing capabilities of patient monitors, specifically of patient monitors that process signals based on attenuation of light by patient tissue. In general, such patient monitoring systems include one or more optical sensors that irradiate tissue of a patient and one or more photodetectors that detect the radiation after attenuation thereof by the tissue. The sensor communicates the detected signal to a patient monitor, where the monitor often removes noise and preprocesses the signal. Advanced signal processors then perform time domain and/or frequency domain processing to determine measurements of blood constituents and other physiological parameters of the patient.

Manufacturers have advanced basic pulse oximeters that determine measurements for blood oxygen saturation ("SpO2"), pulse rate ("PR") and pethysmographic information, to read-through-motion oximeters, to co-oximeters that determine measurements of many constituents of circulating blood. For example, Masimo Corporation of Irvine Calif. ("Masimo") manufactures pulse oximetry systems including Masimo SET® low noise optical sensors and read through motion pulse oximetry monitors for measuring Sp**02**, PR, perfusion index ("PI") and others. Masimo sensors include any of LNOP®, LNCS®, SofTouch™ and Blue™ adhesive or reusable sensors. Masimo oximetry monitors include any of Rad-8®, Rad-5®, Rad®-5v or SatShare® monitors.

Many innovations improving the measurement of blood constituents are described in at least U.S. Pat. Nos. 6,770,028; 6,658,276; 6,157,850; 6,002,952; 5,769,785 and 5,758,644, which are assigned to Masimo and are incorporated by reference herein. Corresponding low noise optical sensors are disclosed in at least U.S. Pat. Nos. 6,985,764; 6,088,607; 5,782,757 and 5,638,818, assigned to Masimo and hereby incorporated in their entirety by reference herein.

Masimo also manufactures more advanced co-oximeters including Masimo Rainbow® SET, which provides measurements in addition to Sp02, such as total hemoglobin (SpHb™), oxygen content (SpCO™), methemoglobin (SpMet®), carboxyhemoglobin (SpCO®) and PVI®. Advanced blood parameter sensors include Masimo Rainbow® adhesive, ReSposable™ and reusable sensors. Masimo's advanced blood parameter monitors include Masimo Radical-7™, Rad87™, and Rad57™ monitors as well as Pronto and Pronto-7 spot check monitors.

Innovations relating to these more advanced blood parameter measurement systems are described in at least U.S. Pat. Nos. 7,647,083; 7,729,733; U.S. Pat. Pub. Nos. 2006/0211925; and 2006/0238358, assigned to Cercacor Laboratories of Irvine, Calif. ("Cercacor") and hereby incorporated in their entirety by reference herein.

Such advanced pulse oximeters, low noise sensors and advanced blood parameter systems have gained rapid acceptance in a wide variety of medical applications, including surgical wards, intensive care and neonatal units, general wards, home care, physical training, and virtually all types of monitoring scenarios.

Advanced pulse oximetry is described in at least U.S. Pat. Nos. 6,770,028; 6,658,276; 6,157,850; 6,002,952; 5,769,785 and 5,758,644, which are assigned to Masimo Corporation ("Masimo") of Irvine, Calif. and are incorporated in their entirety by reference herein. Corresponding low noise optical sensors are disclosed in at least U.S. Pat. Nos. 6,985,764; 6,813,511; 6,792,300; 6,256,523; 6,088,607; 5,782,757 and 5,638,818, which are also assigned to Masimo and are also incorporated in their entirety by reference herein. Advanced pulse oximetry systems including Masimo SET® low noise optical sensors and read through motion pulse oximetry monitors for measuring SpO_2, pulse rate (PR) and perfusion index (PI) are available from Masimo. Optical sensors include any of Masimo LNOP®, LNCS®, SofTouch™ and Blue™ adhesive or reusable sensors. Pulse oximetry monitors include any of Masimo Rad-8®, Rad-5®, Rad®-5v or SatShare® monitors.

Advanced blood parameter measurement systems are described in at least U.S. Pat. No. 7,647,083, filed Mar. 1, 2006, titled Multiple Wavelength Sensor Equalization; U.S. Pat. No. 7,729,733, filed Mar. 1, 2006, titled Configurable Physiological Measurement System; U.S. Pat. Pub. No. 2006/0211925, filed Mar. 1, 2006, titled Physiological Parameter Confidence Measure and U.S. Pat. Pub. No. 2006/0238358, filed Mar. 1, 2006, titled Noninvasive Multi-Parameter Patient Monitor, all assigned to Cercacor Laboratories, Inc., Irvine, Calif. (Cercacor) and all incorporated in their entirety by reference herein. An advanced parameter measurement system that includes acoustic monitoring is described in U.S. Pat. Pub. No. 2010/0274099, filed Dec. 21, 2009, titled Acoustic Sensor Assembly, assigned to Masimo and incorporated in its entirety by reference herein.

Advanced blood parameter measurement systems include Masimo Rainbow® SET, which provides measurements in addition to SpO_2, such as total hemoglobin (SpHb™), oxygen content (SpOC™), methemoglobin (SpMet®), carboxyhemoglobin (SpCO®) and PVI®. Advanced blood parameter sensors include Masimo Rainbow® adhesive, ReSposable™ and reusable sensors. Advanced blood parameter monitors include Masimo Radical-7™, Rad87™ and Rad57™ monitors, all available from Masimo. Advanced parameter measurement systems may also include acoustic monitoring such as acoustic respiration rate (RRa™) using a Rainbow Acoustic Sensor™ and Rad87™ monitor, available from Masimo. Such advanced pulse oximeters, low noise sensors and advanced parameter systems have gained rapid acceptance in a wide variety of medical applications, including surgical wards, intensive care and neonatal units, general wards, home care, physical training, and virtually all types of monitoring scenarios.

SUMMARY OF THE INVENTION

An avatar-incentive healthcare therapy system has a physiological monitor for generating a physiological parameter indicative of physical health. An academic test for generating a test score is indicative of mental acuity. The avatar has outward characteristics and game play capabilities proportional to the physiological health and the mental acuity so as to incentivize improved physical health and academic performance.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A-B are perspective views of a physiological monitor and corresponding monitor screens incorporating avatar-incentives for healthcare therapy;

FIGS. **2**A-C are avatar illustrations incorporating healthcare therapy incentives;

FIG. **3** are perspective views of physiological monitors and interfaced devices for incentivizing healthcare therapy;

FIG. **4** is a block diagram of physiological monitor communications for incentivizing healthcare therapy; and

FIG. **5** is a block diagram of a cloud-based physiological monitoring system for avatar-incentive healthcare therapy.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. **1**A-B illustrate a physiological monitor **100** and corresponding monitor screens **101**, **102** incorporating avatar-incentives for encouraging physical and mental fitness. As shown in FIG. **1**A, the physiological monitor **100** has a handheld processing device **110**, a touch screen display **120**, a noninvasive optical sensor **130**, a sensor cable **140** electrically and mechanically interconnecting the processing device **110** and the sensor **130**, a monitor-integrated test strip reader **170** that accepts test strips **175**, one or more input keys **150** and an integrated camera **160** among other features. An optical sensor is described in detail with respect to U.S. Pat. No. 13/646,659 titled Noninvasive Blood Analysis System, filed Oct. 5, 2012, assigned to Cercacor and incorporated in its entirety by reference herein. A blood glucose monitor is described in detail with respect to U.S. patent Ser. No. 13/308,461 titled Handheld Processing Device Including Medical Applications for Minimally and Noninvasive Glucose Measurements, filed Nov. 30, 2011, assigned to Cercacor and incorporated in its entirety by reference herein. A blood glucose monitor and sensor are described in U.S. Ser. No. 13/473,477 titled Personal Health Device, filed May 16, 2012, assigned to Cercacor and incorporated in its entirety by reference herein.

As shown in FIG. **1**B, in an embodiment, the touch screen display **120** has a physiological monitor display mode **101** and an incentive game play mode **102**. In a physiological monitor display mode **101**, the monitor displays measured physiological parameters. In an incentive game play mode **102**, the monitor constructs a video player avatar **180** having physical and mental strengths **190** based upon incentivizing criteria described below. In an embodiment, the avatar is inserted into physiological monitor-based video games according to its strengths **190** or exported externally to video games running on standalone video game systems or from the cloud, as described with respect to FIGS. **3-5**, below.

Also shown in FIG. **1**B, in an incentive game play mode **102**, the touch screen display **120** presents one or more video games advantageously incorporating a player avatar **180** that becomes stronger and/or smarter in proportion to the physical and/or mental capabilities of the player as an incentive for patient recovery. In an avatar communications mode, the player avatar and its corresponding physical and mental capabilities are communicated to an external video game system, as described with respect to FIGS. **3-5**, below.

In an embodiment, an avatar summary screen **122** is presented in the game play mode **102** illustrating the player's selected avatar **180** and indicators **190** of the avatar's accumulated physical strength and mental prowess. With respect to physical strength, the physiological monitor **100** is in wireless or wired communications with, for example, exercise equipment so as to incentivize patients recovering from, say, accidents or surgery to track physical exercise and healing progress. With respect to mental prowess, the physiological monitor **100** is in communications with mental skill test results, where the mental skills are either presented by the physiological monitor **100** itself in a mental challenge mode or input to the monitor **100** from external indicators of mental achievements, such as student report cards and standardized test results, to name a few.

In other embodiments, the physiological monitor **100** measures, records and tracks a person's physiological measurements such as resting heart rate, cholesterol and blood pressure among other physiological parameters. The person's avatar becomes physically stronger according to a health index based upon these parameters. Likewise, if a person passes certain quizzes or has a report card with straight A's, that person's avatar gets stronger and smarter for games simulating physical competition, such as racing, sports and combat. Advantageously, the physiological monitor **100** helps patients recovering from a stroke, provides a sports training tool for athletes and functions as a student teaching device, as a few examples.

FIGS. **2**A-C illustrate avatars incorporating healthcare therapy incentives. As shown in FIG. **2**A, a physiological monitor **110** (FIG. **1**A) allows a patient or other user to construct an avatar **201**. The avatar's clothing or other external characteristics may overtly display the avatar's physical or mental strength **190** (FIG. **1**B) as earned by the patient via improved physiological wellness or mental fitness tests measured by the monitor **110** (FIG. **1**A) or provided externally, as described below. In an embodiment, the avatar has clothing **210** that reflects earned physical/mental accomplishments/improvements. In an exemplar embodiment, the avatar's belt color **212** indicates earned physical strength and the avatar's tunic or dress color **214** indicates earned mental strength. For example, a black belt **212** and a bright colored tunic **214** indicates an avatar with high physical and mental strength as the result of high physical and mental test scores and other real-world physical and mental accomplishments. As shown in FIG. **2**B, earned avatar physical and mental strength are rewarded through video gaming, such as avatar combat, races and other player contests. As shown in FIG. **2**C, avatar rewards may also be displayed on emails, Internet posts and other electronic communications.

FIG. **3** illustrate physiological monitors and interfaced devices for incentivizing healthcare therapy. The video game may be incorporated within one physiological monitor **301** for single player games or incorporated within linked physiological monitors **301**, **302** for multiple-player games, as described with respect to FIG. **4**, below. Alternatively, a monitor **301** may be interfaced with an external video game system **320** that resides locally or in the cloud, such as an online gaming center **540** (FIG. **5**). Physiological data for constructing an avatar's physical strength may be derived by a physiological monitor **301**, such as described with respect to FIG. **1**, above, game play on an external video player **320**, data from wearable activity devices such as fitness bracelets **310**, data directly downloaded from a memory device such as a USB key **340** or from physiological data, game play, test scores, report cards **510-540** (FIG. **5**) accessed via the cloud **10** (FIG. **5**), as described with respect to FIG. **5**, below. Similarly, mental prowess may be assessed by mental ability tests provided by the physiological monitor **301**, such as described with respect to FIG. **1**, above, or from mental prowess data gathered via the cloud or other external sources, such as school grades and standardized test scores, as described with respect to FIG. **5**, above. Video game play on a monitor **301** may also be enhanced by interfaced game play devices, such as a joystick **330**.

FIG. **4** illustrates physiological monitor communications for incentivizing healthcare therapy. A cloud-based monitor

communications system **400** has a cloud server **10** in communications with various physiological monitors **100**. In this manner, monitor users **20** may freely network with each other whether located in various hospitals/clinics **410**, at home **420**, on the street **430** or any location remote from the cloud server **10**. Data is transmitted from monitors **100** to the cloud server **10** via wired (e.g. LAN) or wireless (e.g. Wi-Fi) local networks to wide area media, such as Internet cable, telecommunications (e.g. 3G) networks or cellular networks **440**. These wide area media, in turn, are in communications with the cloud server **10**, which calculates physiological parameters or simply provides patient-to-patient communications including conversations or interactive gaming through their avatars, as described above.

FIG. **5** illustrates a cloud-based physiological monitoring system for avatar-incentive healthcare therapy. A healthcare monitor **560**, such as described with respect to FIG. **1** (**100**), above, incorporating earned avatar incentives, also described above, may be in communications with a physiological data processing center **510**, testing centers **520**, schools **530** and online gaming centers **540**. Physiological data for determining avatar physical strength may be determined from the physiological data processing center **510** and received by the monitor **560**. Likewise, data for determining avatar mental acuity may be determined from standardized testing centers **520**, e.g. from standard tests such as PSAT, SAT, GMAT, GRE etc. Avatar mental acuity may also be determined from various schools via authorized access to a particular student's grades **530**. Further, earned avatar incentives can be exported to and used within games provided by online gaming centers **540**. Avatar-incentive healthcare therapy has been disclosed in detail in connection with various embodiments. These embodiments are disclosed by way of examples only and are not to limit the scope of the claims that follow. One of ordinary skill in the art will appreciate many variations and modifications.

What is claimed is:

1. An electronic system for providing healthcare therapy, the electronic system comprising:

a first computing device comprising a hardware processor, a touch screen display, a first port configured to connect with an optical sensor, and a second port configured to receive a measurement strip;

wherein the hardware processor is configured to determine a physiological parameter indicative of physical health of a person based on measurements acquired from the optical sensor and the measurement strip;

wherein the hardware processor is further configured to acquire an academic test score indicative of mental acuity of the person;

wherein the hardware processor is further configured to generate an avatar having outward characteristics and video game play capabilities proportional to the person's physical health and academic performance so as to incentivize exercise and study; and

wherein the avatar is simulated on the touch screen display.

2. The electronic system according to claim **1** wherein the avatar outward characteristics comprise and article of clothing having a color indicative of at least one of the person's physical health and academic performance.

3. The electronic system—according to claim **2** wherein the avatar game play capabilities comprise an apparent increase in avatar physical performance in proportion to an actual increase in the person's physical health.

4. The electronic system—according to claim **3** wherein the avatar game play capabilities comprise an apparent increase in avatar mental performance in proportion to an actual increase in the person's academic performance.

5. The electronic system—according to claim **4** further comprising communications between a physiological monitor and at least one external device so as to import information regarding the person's physical health and mental acuity and export information regarding the avatar.

6. The electronic system—according to claim **5** wherein the physiological parameter comprises at least one of heart rate and blood pressure.

7. The electronic system—according to claim **6** wherein the academic test score is determined using at least one standardized test.

* * * * *