

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
5 July 2007 (05.07.2007)

PCT

(10) International Publication Number
WO 2007/075367 A3

(51) International Patent Classification:
G09G 5/08 (2006.01)

(21) International Application Number:

PCT/US2006/047802

(22) International Filing Date:

14 December 2006 (14.12.2006)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

11/313,133 20 December 2005 (20.12.2005) US

(71) Applicant (for all designated States except US): **SILICON LIGHT MACHINES CORPORATION** [US/US]; 3939 N. First Street, San Jose, California 95134 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SPURLOCK, Brett, A** [US/US]; 974 Lundy Lane, Los Altos, California 94024 (US). **TRISNADI, Jahja, I** [US/US]; 21757 McClellan Road, Cupertino, California 95014 (US). **SANDERS, Steven** [US/US]; 3606 Reposo Way, Belmont, California 94002 (US). **CARLISLE, Clinton, B** [US/US]; 840 Miranda Greet Street, Palo Alto, California 94306 (US).

(74) Agents: **OKAMOTO, James, K** et al.; Okamoto & Benedicto LLP, P.O. Box 641330, San Jose, California 95164-1330 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

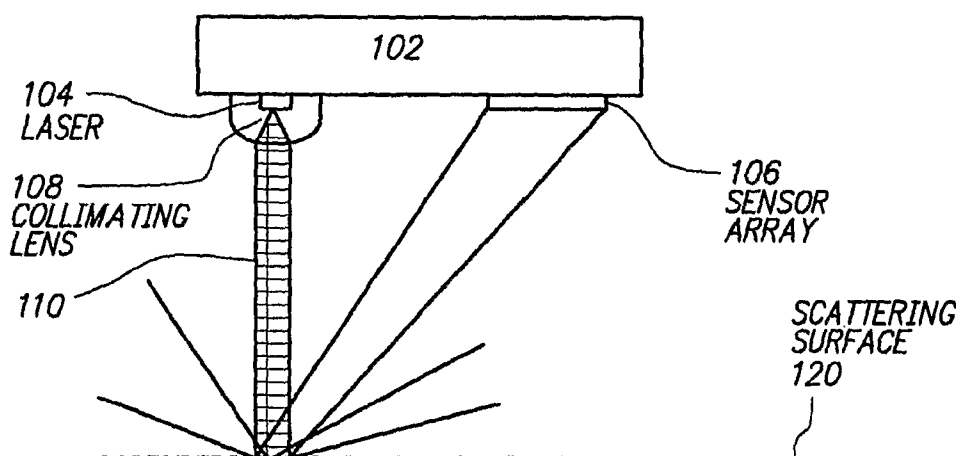
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

[Continued on next page]

(54) Title: **SPECKLE NAVIGATION SYSTEM**



(57) Abstract: One embodiment relates to a laser positioning device for sensing relative movement between a data input device and a surface (120) by determining displacement of image features in a succession of images of the surface. The device forms a single integrated package, which includes a planar substrate (102) and a transparent encapsulant that also embodies a collimating lens (108). Both a coherent light source (104) and a sensor array (106) and associated circuitry are configured on the planar substrate. Another embodiment relates to a method of sensing relative movement between a data input device and a surface. Coherent light is emitted from a laser and collimated so as to form a collimated illumination beam with a predetermined diameter, D, and a substantially uniform phase front. A speckle pattern is generated by impingement of the collimated illumination beam on the surface and detected by a sensor array. Other embodiments are also disclosed.

WO 2007/075367 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:

24 April 2008

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/47802

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G09G 5/08 (2007.01)

USPC - 345/166

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)

IPC(8) - G09G 5/08 (2007.01)

USPC - 345/166

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)

USPTO EAST System (US, USPG-PUB, EPO, DERWENT), MicroPatent

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0094154 A1 (BANEY et al) 05 May 2005 (05.05.2005) entire document	1-2,5,11,19
Y		3-4,6-8,12-16,18,20
Y	US 2005/0109961 A1 (BITTNER) 26 May 2005 (26.05.2005) entire document	3-4,12, 20
Y	US 2005/0259098 A1 (TRISNADI et al) 24 November 2005 (24.11.2005) entire document	6-8,13-16,18
Y	US 4,560,881 A1 (BRIGGS) 24 December 1985 (24.12.1985) entire document	18
A	US 2005/0024624 A1 (GRUHLKE et al) 03 February 2005 (03.02.2005) entire document	1-20

☐ Further documents are listed in the continuation of Box C.

* 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

04 September 2007

Date of mailing of the international search report

25 FEB 2008

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774