

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 March 2007 (01.03.2007)

PCT

(10) International Publication Number
WO 2007/024635 A3

(51) International Patent Classification:
G01C 5/00 (2006.01)

(21) International Application Number:
PCT/US2006/032215

(22) International Filing Date: 17 August 2006 (17.08.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11/213,110 26 August 2005 (26.08.2005) US

(71) Applicant (for all designated States except US): **SIKORSKY AIRCRAFT CORPORATION** [US/US]; Legal IP Dept., Mail Stop S316A, 6900 Main Street, Stratford, CT 06615-9129 (US).

(72) Inventors: **MATUSKA, David, G.**; 11 Winthrop Woods Road, Huntington, CT 06484 (US). **SAHASRABUDHE, Vineet**; 8 Woodland Avenue, Hamden, CT 06514 (US). **ANTTILA, Donald, S.**; 888 Hulls Hill Road, Southbury, CT 06488 (US).

(74) Agent: **SUFFREDINI, Brian, R.**; SIKORSKY AIRCRAFT CORPORATION, Legal-IP Dept., Mail Stop S316A, 6900 Main Street, Stratford, CT 06615-9129 (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, 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).

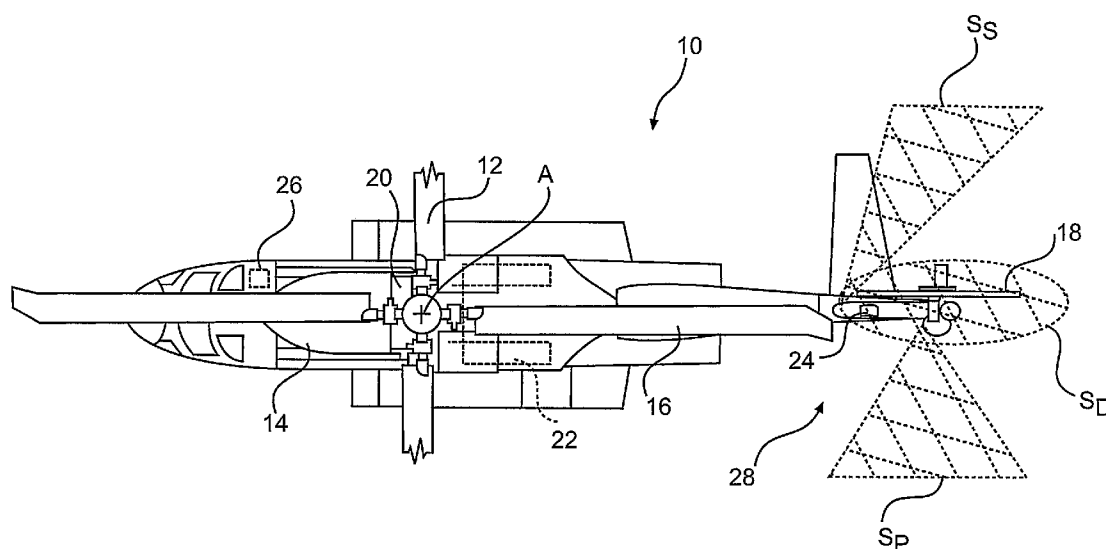
Published:

- with international search report
- 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:
13 December 2007

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ROTARY WING AIRCRAFT FLIGHT CONTROL SYSTEM WITH A PROXIMITY CUEING AND AVOIDANCE SYSTEM



(57) Abstract: The invention includes an input control device, a sensor suite, and a communication feedback loop. The input control operates to create a first force. Sensor suite is configured to detect nearby obstacles, and the communication feedback loop is in communication with the input control device and the sensor suite so that said communication feedback loop generates a command signal in response to detection of a nearby obstacle. The command signal causes an actuator to generate a second force different from said first force. Preferably, the obstacle avoidance system is used in combination with an apparatus, such as a rotary wing aircraft, wherein the input control device at least partially controls the movement of the apparatus in response to a user's input.

WO 2007/024635 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 06/32215

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8):G01C 5/00 (2007.01)

USPC: 701/301

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)

USPC: 701/301, 9

IPC(8): G01C 5/00 (2007.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

US: 701/301, 9

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

USPTO Full Text, Pre-grant publication Full, EPO Abstract, JPO Abstract
sensor; feedback; avoidance; aircraft; collision; vehicle; obstacle; rotary wing; servo; actuator

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0125155 A1 (Kudo) 09 June 2005 (09.06.2005)	1-7
-	para. [0023], [0029], [0055], [0074]	8-35
Y	US 6,487,500 B2 (Lemelson et al.) 26 November 2002 (26.11.2002)	12, 18, 29-32, 34, 35
Y	col. 20, ln 35-40	13-18, 27, 29-35
Y	US 2004/0217883 A1 (Judge et al.) 04 November 2004 (04.11.2004)	8-11, 19-32
Y	para. [0012], [0029], [0035], [0036]	18
Y	US 2005/0113985 A1 (Greene) 26 May 2005 (26.05.2005)	
Y	para. [0009]	
Y	US 5,012,423 A (Osder) 30 April 1991 (30.04.1991)	

☐ 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

03 July 2007 (03.07.2007)

Date of mailing of the international search report

15 OCT 2007

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:

Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774