

(51) International Patent Classification:
G05D 1/00 (2006.01)

(21) International Application Number:

PCT/US2014/012529

(22) International Filing Date:

22 January 2014 (22.01.2014)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

13/753,029 29 January 2013 (29.01.2013) US

(71) Applicant: **FOSTER-MILLER, INC.** [US/US]; 350
Second Avenue, Waltham, MA 02451 (US).(72) Inventors: **BRUCK, Kurt**; 9 Rawson Road, Cumberland,
RI 02864 (US). **BENTCHEV, Boian**; 58 Plymouth Drive,
Norwood, MA 02062 (US). **SHAPIRO, Julie**; 1039 Con-
cord Road, Marlborough, MA 01752 (US). **GRAHAM,
Todd**; 716 Delefield Road, Pittsburgh, PA 15215 (US).
DEGUIRE, Daniel; 64 Milk Street, Blackstone, MA
01504 (US).(74) Agents: **THOMPSON, Thomas, E., Jr.** et al.; Iandiorio
Teska & Coleman, LLP, 255 Bear Hill Road, Waltham,
MA 02451 (US).(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: TACTICAL ROBOT CONTROLLER

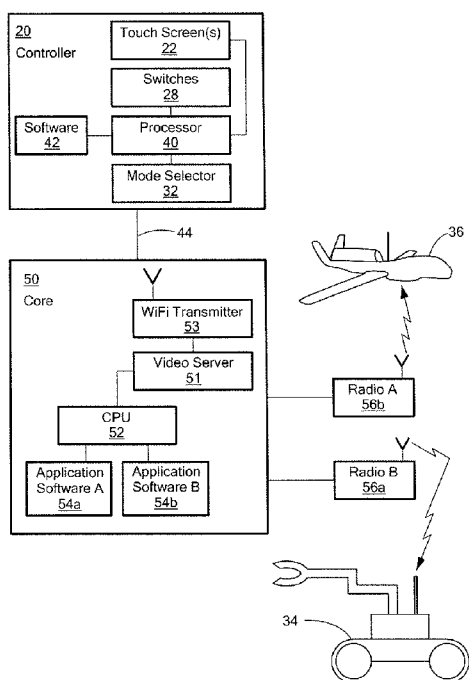


FIG. 2

(57) Abstract: An unmanned systems operator control system includes a hand held controller with a set of switches and control enumeration software specially configured to report a superset of virtual switches based on the physical switches. A core unit includes a first unmanned system control application subscribing to a first switch subset of the superset and outputting commands controlling a first unmanned system based on activation of the set of switches. A second unmanned system control application subscribes to a second switch subset of the superset and outputs commands controlling a second unmanned system based on activation of the set of switches. A mode switching subsystem is configured, in a first state, to map the set of switches to the first switch subset and, in a second state, to map the set of switches to the second switch subset.

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

5 February 2015

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

INTERNATIONAL SEARCH REPORT

11/01/2529 11.12.2014

International application No.

PCT/US14/12529

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G05D 1/00 (2014.01)

CPC - G07C 5/008; G08C 17/00, 17/02

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) Classification(s): G05D 1/00 (2014.01)

CPC Classification(s): G07C 5/008; G08C 17/00, 17/02; USPC Classification(s) (if searched): 340/12.5; 701/2

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)

MicroPatent (US Granted, US Applications, EP-A, EP-B, WO, JP, DE-G, DE-A, DE-T, DE-U, GB-A, FR-A);
Google.com, scholar.google.com; DialogPro (Derwent, INSPEC, NTIS, PASCAL, Current Contents Search, Dissertation Abstracts Online, Inside Conferences); KEYWORDS: robot, drone, unmanned vehicle, control, controller, switches, joysticks, buttons, radio, transmit, progr

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009/097895 A1 (NYLEN O. et al.) August 13, 2009; figure 2; page 10, lines 25-35	1-25
---		---
Y		3, 12
Y	US 2009/0265036 A1 (JAMIESON J. et al.) October 22, 2009; paragraphs [0031], [0050]	3, 12
A	US 6,484,083 B1 (HAYWARD D. R. et al.) November 19, 2002; entire document	1-25
A	US 6,491,566 B2 (PETERS G. W. et al.) December 10, 2002; entire document	1-25
A	US 7,193,384 B1 (NORMAN D. A. et al.) March 20, 2007; entire document	1-25
A	US 7,905,761 B2 (WEISS S. N. et al.) March 15, 2011; entire document	1-25
A	US 8,082,074 B2 (DUGGAN D. S. et al.) December 20, 2011; entire document	1-25
A	US 8,326,469 B2 (PHILLIPS E. et al.) December 04, 2012; entire document	1-25
A	US 2010/0100256 A1 (JURMAIN J. C. et al.) April 22, 2010; entire document	1-25
A	US 2009/0129003 A1 (BRUCK K. et al.) May 21, 2009; entire document	1-25

☐ 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

19 November 2014 (19.11.2014)

Date of mailing of the international search report

11 DEC 2014

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:

Shane Thomas

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

INTERNATIONAL SEARCH REPORT

International application No. **PCT/US14/12529**
17/01/2017

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

---Please See Supplemental Page---

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

-Continued from Box No. III: Observations where unity of invention is lacking-

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-13 are directed toward a superset of virtual switches; outputting commands controlling a first unmanned system based on activation of the set of switches, and outputting commands controlling a second unmanned system based on activation of the set of switches.

Group II: Claims 14-25 are directed toward outputting commands controlling a first unmanned system via a first radio, outputting commands controlling a second unmanned system via a second radio; and a handheld controller for controlling the first and second unmanned systems.

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons.

The special technical features of Group I include control enumeration software configured to report a superset of virtual switches; mapping the set of switches to a first switch subset of a superset of virtual switches; subscribing to the first switch subset; and mapping the set of switches to a second switch subset of a superset of virtual switches; and subscribing to the second switch subset (which is not present in Group II).

The special technical features of Group II include a first radio; a second radio; a handheld controller; and software delivering switch data (which is not present in Group I).

The common technical features of Groups I and II include a set of switches; a first unmanned system control application to output commands controlling a first unmanned system; at least a second unmanned system control application to output commands controlling a second unmanned system; and a mode switching subsystem configured, in a first state, to map the set of switches to the first switch subset and, in a second state, to map the set of switches to the second switch subset.

These common technical features are disclosed by WO 2009/097895 A1 (NYLEN): a set of switches (robot controllers 1-4; claim 1); a first unmanned system control application to output commands controlling a first unmanned system (login means (activation) permit information to be transmitted (commands are output) to controller 1 (first switch subset, link creating a first unmanned system control application) via control program (superset of virtual switches); claim 1); at least a second unmanned system control application to output commands controlling a second unmanned system (login means (activation) permit information to be transmitted (commands are output) to controller 2 (second switch subset, link creating a second unmanned system control application) via control program (superset of virtual switches); claim 1); and a mode switching subsystem configured, in a first state, to map the set of switches to the first switch subset and, in a second state, to map the set of switches to the second switch subset (user switches (via mode switching subsystem) between controllers 1 and 2 (e.g., between first and second states/switch subsets); page 6, lines 1-15).

Because the common technical features are disclosed by Nylen, the inventions are not so linked as to form a single general inventive concept. Therefore, Groups I and II lack unity.