

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

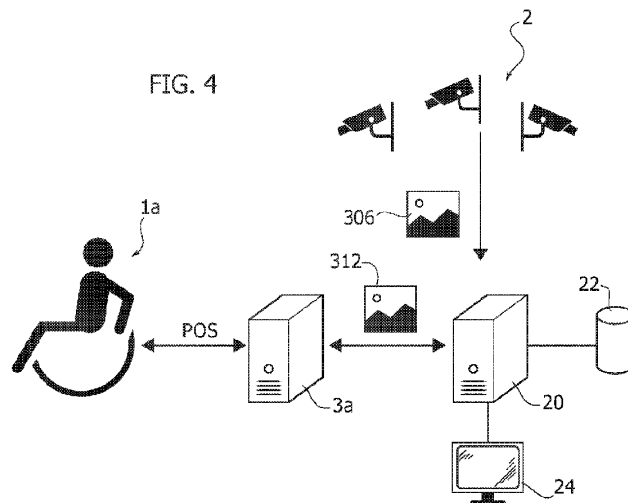
(43) International Publication Date
05 October 2023 (05.10.2023)



(10) International Publication Number
WO 2023/187694 A1

- (51) International Patent Classification:
G05D 1/02 (2020.01)
- (21) International Application Number:
PCT/IB2023/053168
- (22) International Filing Date:
30 March 2023 (30.03.2023)
- (25) Filing Language:
Italian
- (26) Publication Language:
English
- (30) Priority Data:
102022000006230 30 March 2022 (30.03.2022) IT
- (71) Applicant: **ALBA ROBOT S.R.L.** [IT/IT]; Via Vela 35,
10128 Torino (IT).
- (72) Inventor: **BERTAIA, Andrea**; c/o ALBA ROBOT S.r.l.,
via Vincenzo Vela, 35, I-10128 TORINO (TO) (IT).
- (74) Agent: **MEINDL, Tassilo**; Buzzi, Notaro & Antonielli
d'Oulx S.p.A., Corso Vittorio Emanuele II, 6, I-10123 Tori-
no (IT).
- (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, CV, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG,
KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY,
MA, MD, MG, MK, MN, MU, 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, ST, SV, SY, TH,

(54) Title: A METHOD OF LOCATING A VEHICLE AND RELATED SYSTEM



(57) Abstract: Described herein are solutions for locating a vehicle (1a) in an environment through a plurality of surveillance cameras (2) installed in the environment. The vehicle (1a) comprises a plurality of sensors (50) configured to detect data (S2) that identify a displacement of the vehicle (1a), and the vehicle (1a) estimates a position (POS') of an odometry centre (OC) of the vehicle (1a) via odometry as a function of the data (S2) that identify the displacement of the vehicle (1a). A plurality of visual patterns (P) are applied to the vehicle (1a). During a learning phase (1100), a processor (3a) receives a map (300) of the environment and, for each camera (2), an image (306) acquired by the respective camera (2). Next, the processor (3a) generates data (308) that enable association of a pixel of a floor/ground (310) in the image (306) to respective co-ordinates in the map (300). During a localization phase (1200), the processor (3a) repeats (1206, 1210) a sequence of steps for at least one of the surveillance cameras (2). In particular, the processor (3a) receives (1250)

[Continued on next page]

TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, 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, ME, 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).

Published:

- *with international search report (Art. 21(3))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

an obfuscated image (312) from the camera (2) and checks whether the obfuscated image (312) presents one or more of the visual patterns (P) applied to the vehicle (1a). In the case where the obfuscated image (312) presents one or more of the visual patterns (P), the processor (3a) calculates (1252) the position of an odometry centre (OC) in the obfuscated image (312) as a function of the positions and optionally of the dimensions of the visual patterns (P) appearing in the obfuscated image (312). Next, the processor (3a) determines (1254) a position (POS) of the odometry centre (OC) in the map (300) by mapping the position in the obfuscated image (312) into co-ordinates in the map (300), using the data (308) that enable association of a pixel of a floor/ground (310) in the image (306) to respective co-ordinates in the map (300). Finally, the processor (3a) sends (1212) the position (POS) of the odometry centre (OC) in the map (300) to the vehicle (1a), and the vehicle (1a) sets the estimated position (POS') of the odometry centre (OC) at the position (POS) received.