



(43) International Publication Date
17 March 2016 (17.03.2016)

(10) International Publication Number
WO 2016/040487 A2

- (51) **International Patent Classification:**
G06T 7/00 (2006.01) *G06K 9/56* (2006.01)
- (21) **International Application Number:**
PCT/US2015/049195
- (22) **International Filing Date:**
9 September 2015 (09.09.2015)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
14/480,802 9 September 2014 (09.09.2014) US
- (71) **Applicant:** EYEVERIFY [US/US]; 1712 Main, Fifth Floor, Kansas City, MO 64108 (US).
- (72) **Inventor:** HIRVONEN, David; 82 South 4th Street, #3c, Brooklyn, NY 11249 (US).
- (74) **Agents:** WADEKAR, Suhrid, A. et al.; Goodwin Procter LLP, Exchange Place, Boston, MA 02109 (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, 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, 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, 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:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) **Title:** SYSTEMS AND METHODS FOR LIVENESS ANALYSIS

(57) **Abstract:** In a system for determining liveness of an image presented for authentication, a reference signal is rendered on a display, and a reflection of the rendered signal from a target is analyzed to determine liveness thereof. The analysis includes spatially and/or temporally band pass filtering the reflected signal, and determining RGB values for each frame in the reflected signal and/or each pixel in one or more frames of the reflected signal. Frame level and/or pixel-by-pixel correlations between the determined RGB values and the rendered signal are computed, and a determination of whether an image presented is live or fake is made using either or both correlations.



WO 2016/040487 A2