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61/609,325 11 March 2012 (11.03.2012) US(71) Applicant: **NEONODE INC.** [US/US]; 2350 Mission College Blvd., Suite 190, Santa Clara, CA 95054 (US).(72) Inventors: **HOLMGREN, Stefan**; Vespergrand 24, S-192 72 Sollentuna (SE). **SPARF, Lars**; Rödarsgränd 14, S-162 45 Vällingby (SE). **BEHDASHT, Remo**; 161-163 Burns Bay Road Lane Cove, Suite 2, New South Wales 2006 (AU). **ERIKSSON, Thomas**; Storängsstigen 15C, S-182 74 Stocksund (SE). **ELYAN, Michael, Lawrence**; 77 St Georges Crescent, Drummoyne 2047 (AU). **SHAIN, Joseph**; 27-B Pinker Street, 76308 Rehovot (IL). **JANSSON, Anders**; Hasselnötsvägen 25, S-138 34 Älta (SE). **PETTERSSON, Robert**; Folkparksvägen 164, S-126 39Hägersten (SE). **KARLSSON, John**; Tingvallavägen 16A, S-195 32 Märsta (SE).(74) Agent: **BERGER, Marc, A.**; Soquel Group LLC, P.O. Box 691, Soquel, CA 95073 (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, IS, JP, KE, KG, KM, 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, 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, ML, MR, NE, SN, TD, TG).

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(54) Title: OPTICAL TOUCH SCREEN USING TOTAL INTERNAL REFLECTION

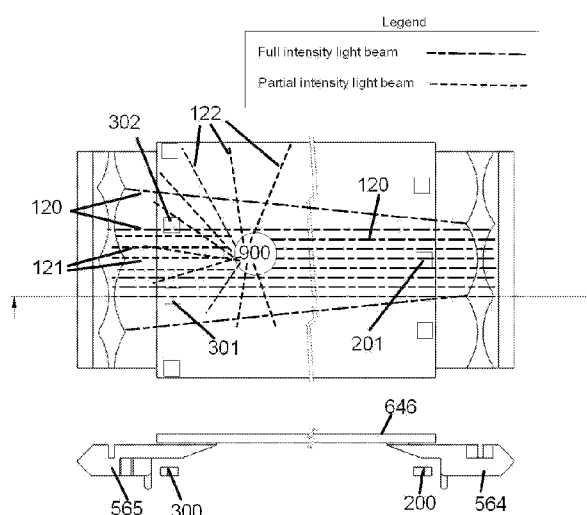


FIG. 117

(57) Abstract: A touch screen, including a layer of light-transmissive material having an upper surface that is exposed for touch by one or more objects, a plurality of light emitters underneath the upper surface, a first lens assembly for directing light beams emitted by the light emitters into the layer at an angle such that the light beams, when entering the layer, remain confined to the layer by total internal reflection when the light beams are not absorbed by any of the objects touching the upper surface, a plurality of light detectors for detecting light beams and for generating outputs indicating the amounts of light detected, a second lens assembly for directing light beams at a surface of the layer towards the light detectors, and a calculating unit for determining respective one or more locations of the one or more objects touching the upper surface, based on outputs of the light detectors.



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