



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : G01S 5/20, 5/30, G06K 11/14, 11/18		A1	(11) International Publication Number: WO 00/28348
			(43) International Publication Date: 18 May 2000 (18.05.00)
(21) International Application Number: PCT/US99/23541			(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
(22) International Filing Date: 8 October 1999 (08.10.99)			
(30) Priority Data: 09/189,299 10 November 1998 (10.11.98) US			
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(54) Title: TRANSMITTER PEN LOCATION SYSTEM

(57) Abstract

A transmitter pen location system is provided, in which a pen is adapted to send a repeated output signal to external receivers at two or more receiver locations, wherein the location of the pointing tip of the pen is determined in relation to the writing surface of a whiteboard. In one embodiment an output element, preferably an ultrasonic transducer, transmits a time dependent output signal from a single signal transmitter pen to two or more external receivers at two or more receiver locations. The direction of arrival of the output signal to each of the receiver locations is determined, and the pointing tip of the single transmitter pen is then determined, as the intersection of direction vectors from the pen to the external receivers. In another embodiment, the transducer transmits a time dependent output signal from the transmitter pen to three or more external receivers, wherein the received signal is processed to determine the time of arrival to each of the receivers, and the location of the pointing tip of the pen is determined as the calculated distance between the receivers. In another alternate embodiment having a dual signal transmitter pen, a third receiver located at a receiver location is used to determine the time of arrival of a secondary output signal, to determine the distance between the dual signal transmitter pen and the receiver location, while two or more receivers at the receiver location are used to determine the direction of arrival of the primary time dependent output signal. Alternative embodiments allow the transmission of supplementary information from the transmitter pen to the receivers, using waveshaping of the output signal.

