



US007833161B2

(12) **United States Patent**
Ghosh et al.

(10) **Patent No.:** **US 7,833,161 B2**
(45) **Date of Patent:** **Nov. 16, 2010**

(54) **BONE DENSITOMETER AND A METHOD THEREOF**

(75) Inventors: **Rajdeep Ghosh**, Karnataka (IN);
Somashekar Umadi, Karnataka (IN);
Raj Agarwal, Karnataka (IN);
Nagarajan Ravindran, Karnataka (IN);
Mosale Nagesh Rao Sowmya, Karnataka (IN)

(73) Assignee: **Larsen & Toubro Limited** (IN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 705 days.

(21) Appl. No.: **11/503,017**

(22) Filed: **Aug. 11, 2006**

(65) **Prior Publication Data**

US 2007/0078341 A1 Apr. 5, 2007

(30) **Foreign Application Priority Data**

Oct. 3, 2005 (IN) 1401/CHE/2005

(51) **Int. Cl.**
A61B 8/00 (2006.01)

(52) **U.S. Cl.** **600/449**; 600/442; 600/437;
600/438

(58) **Field of Classification Search** 600/437,
600/438, 442, 449

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,603,325 A * 2/1997 Mazess et al. 600/442

6,585,649 B1 *	7/2003	Mendlein et al.	600/438
2002/0007119 A1 *	1/2002	Pelissier	600/443
2002/0103435 A1 *	8/2002	Mault	600/439
2005/0215908 A1 *	9/2005	Chew et al.	600/459
2006/0122475 A1 *	6/2006	Balberg et al.	600/323

* cited by examiner

Primary Examiner—Long V Le

Assistant Examiner—Nigel Fontenot

(74) *Attorney, Agent, or Firm*—Donald R. Boys; Central Coast Patent Agency, Inc.

(57) **ABSTRACT**

The present invention provides a system for improving the accuracy of the measurement of the osteoporosis condition of the human body parts especially bones using more than three parameters, viz., the broadband ultrasonic attenuation (BUA) quantity, the velocity of ultrasound (SOS) in the bone, the broadband ultrasonic back scattering (BUB) intensity, and the Width of received maximum (WORM) values are calculated from received ultrasound signals.

The accuracy of each measured diagnostic parameter is improved by measuring the tissue thickness and the squish amount in the coupling pad instead of assuming constant thickness for the tissue. The several operating modes of the device are controlled and the frequency and the timing of the emitted ultrasounds signals are adjusted by using a field programmable gate array. The error generated in the measurement of the bone mineral density due to the variation in the anatomy and the size of the foot, is removed by using a removable footpad. The present invention provides a mechanism to replace the gel pads easily. The generation of cross infection is prevented by using the disposable and replaceable coupling pads.

19 Claims, 8 Drawing Sheets

