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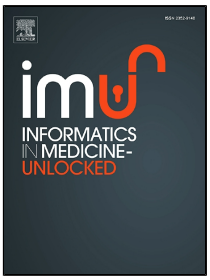

Development of a Novel Telecare System, Integrated with Plantar Pressure Measurement System
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A.H.T.E. De Silva, W.H.P. Sampath, N.H.L. Sameera, Y.W.R. Amarasinghe, A. Mitani

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Development of a Novel Telecare System, Integrated with Plantar Pressure Measurement System

A.H.T.E. De Silva[a, †], W.H.P. Sampath[a], N.H.L. Sameera[a], Y.W.R.Amarasinghe[a], A. Mitani[b]

[a] Department of Mechanical Engineering, University of Moratuwa, Katubedda 10400, Sri Lanka

[b] Department of Design, Sapporo City University, Hokkaido 005-0864, Japan

Abstract

In this study, a remote caretaking system has been developed by utilizing the plantar pressure measurement feature. This system can be used by medical professionals for patients who require real-time telemonitoring of their gait patterns, activities, and postures. The system consists of a waist belt and accompanying instrumented shoes. The pair of shoes are embedded with tactile sensors, signal conditioning circuitry and Bluetooth communication. The waist belt consists of a Bluetooth module, an accelerometer, GPS module, micro-controller development board and a GPRS module. The complete system has the capability to obtain measurements of the plantar pressures, to detect a predefined posture or activity, calculate gait parameters, find locational information, and to detect falling accidents of the wearer. The system of waist belt and instrumented shoes provides Body Area Network (BAN) features, and establishes a small-scaled network that operates in the peripheral proximity of the human body, using Bluetooth communication. The data acquired by the waist belt is continuously transmitted via a GPRS link to a remote open-source Internet of Things (IOT) platform as data packets which consist of plantar pressure data, identified posture data, and GPS coordinates. The telemonitoring process of the patient is enhanced by the IOT dashboard and the Android application in this system, whereby the real-time data of the posture or activity and locational information can be monitored. To improve convenience, an Android-based mobile application and a web based telemonitoring platform have been implemented, wherein the location, gait information, predefined posture or activity, and falling accidents of the patient can be monitored. Moreover, real-time data is stored in the IOT, with the data stored in the IOT available for post-processing at medical research facilities.

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[†] Corresponding author

Email addresses: ahteranga@gmail.com (A.H.T.E. De Silva), peshan@ieee.org (W.H.P. Sampath), nupehewagels@gmail.com (N.H.L. Sameera), ranama@mech.mrt.ac.lk (Y.W.R. Amarasinghe), a.mitani@scu.ac.jp (A. Mitani)

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