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A COST EFFECTIVE REAL TIME IMPLEMENTATION OF SMART BRACELET USING MEMS ACCELEROMETER FOR MONITORING PHYSIOLOGICAL ACTIVITY OF STAY-ALONE ELDERLY PERSONS

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ABSTRACT

This paper deals with a development of cost effective portable system for determination of basic physiological movements using wearable MEMS tri-axial accelerometer in elderly impaired patents. In this application model, we have derived a simple algorithm without the help of any trained classifier for identifying three most vital physiological states of human being like resting, walking and running. Once the data is fetched from the accelerometer, the maximum frequency component is extracted by performing 2^7-point Fast Fourier Transform (FFT). In order to recognize the state, a microcontroller based application is loaded inside the wearable system which compares the fed data with three distinct range of frequencies to classify the current physiological state of the person wearing it. The algorithm is defined in such a way that it can easily calculate the pedometer information provided the subject is in unrest condition. The wearable device applies six-point based sensor data calibration to eliminate discrepancies in senor output due to zero-G and installation errors. Thus, accelerometer based activity detection not only reduces the hardware complexity but also proves cost effective as it has minimized power consumption (<13.5mW) by associated circuitry covering small size (3.9mm*4.0mm*4.1mm) that enables mobility.

Keywords: Activity detection; MPU6050; MEMS accelerometer; Mobile application; Wearable device; Six-point calibration; Arduino; 2^7-point FFT; Zero-G error; Installation error