

Abstract

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An Intelligent IoT-Based Wearable Health Monitoring System

Due to the increasing usage of wireless technologies and the miniaturization of electronic sensors, progress in wearable health monitoring technologies has been improved drastically. With strong potential to alter the future of healthcare services by using Internet of Things (IoT) active health monitoring sensors for omnipresent monitoring of patients and athletes through their regular daily routines. Medical applications such as remote monitoring, bio-feedback and telemedicine create an entirely new base of medical quality and cost management. The objective of this work is to develop a low cost, high quality multipurpose wearable smart system for healthcare monitoring of heart diseases patients, and fitness athletes. In this paper, we discuss the three phases of our proposed system. In the first phase, we use the Raspberry-Pi as an open source microcontroller with a HealthyPi hat acting as a medium between the Raspberry-Pi and the biomedical sensors connected to HealthyPi hat, with various parameters such as temperature, ECG, heartbeat, oximetry etc. We began our experiment using 15 test subjects with different genders age and fitness level. We, placed the proposed wearable device and collected the readings data for each test subject while resting, walking and running. The second phase is connecting our system to an open source IoT platform to represent the data through a graphical IoT dashboard to be viewed by doctors remotely, as well as implementing action rules that send alarms to patient and doctor in case of problem detection. In the third phase, we designed and tested a Fuzzy Logic system that inputs the accelerometer, gyroscope, heart rate and blood oxygen level data collected from the experiments, and provides the physical state (resting, walking running) as output, which helps in determining the health status of the patient/athlete. The obtained results of the proposed method show a successful remote health status monitoring of test subjects through the IoT dashboard in real-time, and detection of abnormalities in their health status, as well as efficient detecting the physical motion mode using the proposed fuzzy logic system design.