

IoT (Internet of Things) Based Heart-Rate Observation System

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Abstract

This work focused on the Heart Beat Monitoring Module and the concepts of IoT to implement the required system to measure the heartbeat of a patient remotely without the need of a staff nurse. Some elderly person live alone and there is a need to monitor heartbeat at every moment. In this research, we measured the pulse rate of the person at every minute, transmitted the data over the internet and interfaced with the user via our Android app. This heart-beat sensor includes a computing circuit, timer circuit in order to measure pulse rate, heart beats and temperatures etc. The Internet of Things (IoT) equipped with microcontrollers and sensors can give an easy and cost-effective remote health monitoring. The software involved was the Android Application developed using Android Studio, which is the Integrated Development Environment (IDE). This app retrieved the data from the open IoT platform *thingspeak.com*. The software involved in this project was the Android Application developed using Android Studio, which is the IDE for Android Applications. This app retrieved the data from *thingspeak.com*. *ThingSpeak* is the open IoT platform with MATLAB analytics. The user can enter the channel number or the API key of the *ThingSpeak* to access the graphs and pulse readings via his phone application. The hardware of Arduino is an arduino uno circuit board with a software program. The chip of this circuit board is programmable to send programmed data first to the microcontroller and then to the specific required multiple circuits to execute required series of commands. A highly sensitive PulseSensor was used to measure the heartbeat of the patient automatically. An Arduino Uno microcontroller interfaced with a Wi-Fi module ESP8266 used to transmit pulse reading over the internet using Wi-Fi. The heartbeat was displayed on the LCD of the patient in run-time. The heartbeat in beats per minute (BPM) was plotted against time (min). A mounted pulse sensor to the patient had monitored the heartbeat and transmitted it in the form of voltage signal to the microcontroller, which converted it back into a mathematical value. The Arduino transmitted the data onto the *thingspeak.com* portal, where it was plotted on a graph and the values were stored for future assessment. The user of the app was given a *thingspeak* API and the channel number as an access code, through which physician or nurse can accessed the patient's data. IoT based heartbeat module as an android application can provide a convenient, cost effective and continuous remote measurements for heart patients. This app can reduce the burden of hospital visits or admissions for elderly patients. Our IoT based handy heartbeat module as an android application will provide a convenient, cost effective and continuous remote measurements for heart patients. This app can reduce the burden of hospital visits and admissions for elderly patients. Doctors and nurses can frequently be updated through this app for patient care. In future, health based IoT in medicine will significantly improve patient quality of life from real-time measurements.

Keywords: Arduino Uno, Heartbeat, PulseSensor, Integrated Development Environment, Internet of Things

Biographies

Dr. Saman Shahid earned her PhD in Environmental Sciences. She works as an Associate Professor and deals with the teaching of Physics, Digital Electronics, Electronics and Environmental Sciences courses in the National University of Computer & Emerging Sciences (FAST), Lahore Campus. She has 47 international/local/conference publications with impact factor greater than 39. Her areas of interest are: Electricity and Magnetism, Semi-Conductor Physics, Medical Physics, Environmental Physics, Health Physics, Bioinformatics and Biophysics.

Dr. Saima Zafar earned her PhD in the field of Wireless & Mobile Networks. She is associated with FAST-NU Lahore campus as a Professor in Electrical Engineering department. She has taught various courses like linear circuit analysis, network analysis, signals & systems, analog and digital communications, programming, data communication networks, wireless & mobile communications, advanced computer networks, research methodology etc. and has supervised a number of theses. Her research interests include design and performance analysis of network protocols, computer network modeling, solutions for wireless sensor networks and cellular networks, 6LoWPANs, data center networks, inter and intra-network communications in heterogeneous networks, telecommunication policy and Internet of Things. Her work has been presented and published in various international conferences and journals.