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IoT based Healthcare Kiosk

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ABSTRACT

A lot of research has been carried out in the field of healthcare monitoring. In recent years, development of patient monitoring system has been emerged as an area of research. In this article, a patient monitoring system is proposed. The proposed system framework integrated web services with multiple sensors controlled by Arduino Uno. We proposed a model which monitors various health parameters like heart rate (BPM), body Temperature, blood pressure (mmHg), height and weight of an individual. The collected data through the system is then transferred over the internet to a smartphone application as well as standalone computers. The doctor can then prescribed the medication based on the data results shown by system. The designed prototype will reduce the burden on patients to visit the doctor every time for monitoring of these health parameters.

Keywords: WSN, Heart Rate (BPM), Blood Pressure sensor, Temperature sensor, BPM Algorithm, Arduino Uno.

1. INTRODUCTION

Health care systems are highly complex. People in need for continuous health care are increasing day by day. Medical sta_ faces with more and more challenges. This raises serious questions in the domain of medical which must be answered in the best possible ways. Problem solving must include detailed analysis of the current state so as to form functional system which resolves the satisfying number of issues which are to be faced in future. In medical WSNs can o_er this kind of solution. The primary aim of our system is to gather the information of individual health parameters based on WSN and to provide physicians with a clear data and readings which can be used monitor the diagnosis of health parameters through mobile communication. This can be utilized for individual investigation to help with rolling out conduct improvements, and to share with parental _gures for early detection and treatment. The primary aim of our system is to gather the information of individual health parameters based on WSN and to provide physicians with a clear data and readings which can be used monitor the diagnosis of health parameters through mobile communication. This can be utilized for individual investigation to help with rolling out conduct improvements, and to share with parental figures for early detection and treatment. In the meantime such systems are successful and monetary methods for observing ailments.

2. SYSTEM OVERVIEW

The proposed system provides better solution over traditional methods. It increases the quality of service as well as the accuracy. The application of this system is not limited to hospitals, it may extend as a portable health monitoring device for older people (who lives alone) as well as monitoring vital parameters.

Proposed System presents a distributed set of sensors which will mimic the work of individual elements by sensing the data captured by them. Proposed system highlights use of different wireless sensors to demonstrate how to check various health parameters of the

user using various sensors like Pulse Sensor, Blood Pressure Sensor, Temperature Sensor and ultrasonic sensor which we will use to monitor the person. All the sensors are connected to a Arduino uno board. Arduino Uno board.

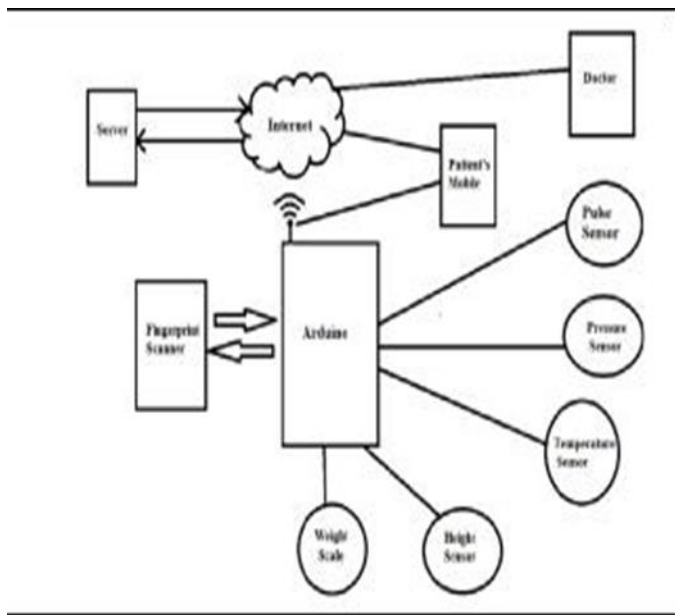


Figure1. System Diagram

- **Arduino Uno**

Our proposed system utilized Arduino Uno version R3 as a control unit that incorporated with e- health shield. The Arduino Uno as appeared in figure 3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be utilized as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB association, a force jack, an ICSP header, and a reset button [15]. It includes everything expected to bolster the microcontroller; basically interface it to a PC with a USB link or power it with an AC-to-DC connector or battery. The Arduino empowers electronic procedure in multidisciplinary projects to be more open. The Arduino connectors permit to CPU board to be associated a wide assortment of tradable extra modules known as shields [15].



Fig 2.Arduino Uno Board

The Arduino Uno has various facilities for communicating with a computer, another Arduino, or different microcontrollers. The ATmega328 gives UART TTL (5V) serial connection which is accessible on digital pins 0 and 1 of the board. There are numerous determinations of the Arduino Uno, for example, flash memory 32 KB of which 0.5 KB utilized by boot loader, clock speed 16 MHZ, length 68.6 mm width 53.4 and weight 25g.

- **Temperature Sensor**

For measuring temperature of human body we used DS18B20 sensor. This is the latest DS18B20 1-Wire digital temperature sensor from Maxim IC. Reports degrees C with 9 to 12-bit precision, -55C to 125C (+/- 0.5C). Each sensor has a unique 64-Bit Serial number etched into it - allows for a huge number of sensors to be used on one data bus. This is a wonderful part that is the corner stone of many data-logging and temperature control projects.

- **Heart Rate Sensor**

The sensor name is SEN-11574. Pulse Sensor is a well-designed plug-and-play heart-rate sensor for Arduino. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heartrate data into their projects. The sensor clips onto a fingertip or earlobe and plugs right into Arduino with some jumper cables. It also

includes an open-source monitoring app that graphs your pulse in real time.

- **Height and Weight Sensor**

For measurement of height and weight we used HC-SR04 ultrasonic sensor and HX711 load cell sensor respectively. The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. From 2cm to 400 cm or 1" to 13 feet. Its operation is not affected by sunlight or black material like Sharp rangefinders are (although acoustically soft materials like cloth can be difficult to detect). It comes complete with ultrasonic transmitter and receiver module.

This module uses 24 high precision A/D converter chip HX711. It is a specially designed for the high precision electronic scale design, with two analog input channel, the internal integration of 128 times the programmable gain amplifier. The input circuit can be configured to provide a bridge type pressure bridge (such as pressure, weighing sensor mode), is of high precision, low cost is an ideal sampling front-end module

- **Blood Pressure Sensor**

This medical sensor has been designed in order to help researchers, developers and engineer measure data for experimentation and test purpose. It is a low cost and open source solution as opposed to expensive and proprietary medical device.

3. ALGORITHMS

- **BPM Algorithm:**

- 1: Fill the data from sensor is an array for T seconds.
- 2: Find minimum value and maximum in that array suppose A and B.
- 3: Map values in array A to some negative value x and B equivalent positive value +x and all middle value directly proportional.
- 4: Increment counter C for every time the value in array changes from negative to positive.
- 5: $BPM = (C/T) * 60$.

4. CONCLUSION

The calculation of medical health parameters using Wireless Sensor Networks is not a new idea, but rather this paper concentrates on calculating various parameters like Heartbeats, Body temperature, Height, Weight and Blood Pressure Monitoring altogether in a Kiosk which poses to the user as a single system when interfaced with android smart phone application providing higher usability both to doctors as well as patients. The system will eliminate the problems observed in the manual and conventional machine based monitoring system as the real time data monitoring demand increases because of rise of health issues which will vary person to person. With the right information at the right time, the sensor based medical system can help medical patient to easily track and monitor their health record.

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