International Journal of Innovations in Engineering and Technology (IJIET)
http://dx.doi.org/10.21172/ijiet.132.12

IOT Based Wearable Health Monitoring System for Pregnant Ladies

Pratik Prakash Gawande[1], Shivam Ashok kumar Gupta[2], Kajal Deepak Shende[3]
[1,2,3]*Electronics and Telecommunication, Dr. D. Y. Patil School of Engineering, Pune, India*

Abstract- Health Monitoring plays a vital role in hospitals for the rapid decision-making and treatment through the high-speed medical data transfer to the physicians. The medical data send to physicians over mobile and server for consulting and remote medical examinations. A practice adopted and places of interest in several strategy facts to be considered in patient observing method more operative. In this way, the patient's vibrant signs like Heart Rate, Blood Pressure, Temperature, Heart rate of fetus are caught and the values arrive into the database, then the data is uploaded on thinkspeak server. Data from thinkspeak server can be monotonized from any corner of the Earth.
Keywords- Oximetry, Blood Pressure, Heart Rate, Body Temperature, Web Portal.

I. INTRODUCTION

People in rural areas are not really concerned about their health, because of unavailability of hospitals in the nearby areas and, they need to travel long distance even for small injuries and routine check-ups. Pregnant women from rural areas don't do their regular check-ups at the early stage of pregnancy. Routine check-ups can avoid birth of handicapped children and helps in reducing fetal mortality rate to a very large extent. In wearable health monitoring system for pregnant ladies, some vital parameters of pregnant women, like temperature, heartbeat rate, blood pressure and are measured. The heartbeat sensor counts the heartbeat for specific interval of time and estimates Beats per Minute while the temperature sensor measures the temperature.

II. METHODOLGY

In our 21st century the main issue is among human is health problem it is observe that most of the health problems occurred in female body due to low biological strength. It is also observed that the female should be under intensive care during their pregnancy days. For this purpose, the device should be designed in such a manner that it monitors medical health and provide a report which can be accessed remotely from any corner of the world. Based on this methodology we are designing a system that monitors the health of pregnant ladies 24*7 with the help of various sensors and the reading of this sensors using measurements which can be used for intensive monitoring of health condition of pregnant ladies

So basically, in our project we are analysing vital health parameter such blood pressure, haemoglobin level, body temperature, heart rate, foetus heart rate based on this parameter a report will be generated which can be used for observation

The first principle that we will be using for heart rate calculation is based on a formula.

By converting the reading obtained by heart rate sensor using that formula we can obtain the reading that will provide a graph which could b easily understood by the doctor's professional. For this purpose, we are using hosting types name thinkspeek.com which provides various channels for Iot based system.

Now for blood haemoglobin level we will be using a sensor. Which works similar to heart rate sensor but has two major differences. First is it gives a light of different wavelength for oximetry purpose and the second difference is that the formula.

This is used only to calculate blood oxygen level which is directly proportional to blood haemoglobin level.

Rest of the part that is uploading that data to hosting is same as that of heart rate sensor

Now for body temperature we will be using which has high sensitivity towards the temp change and the industrial and commercial type sensors cannot be used for medical purpose. The reading generated by sensor is given to Arduino which is further uploaded to thinkspeek.com system.

In our project for blood pressure calculation we are using a IC/sensor which is sensitive to air pressure that is given at the inlet at the top of IC. The IC name is honey well differential transducer 015PDAA5. This IC is specialized for air pressure calculation for this purpose blood cough is connected to tube and a air pump is also connected to tube this generated pressure in the blood cough and the inlet of honey well IC. With the variation in this air pressure the honey well, IC produces the list of readings that can b used for blood pressure measurement

2.1 Block Diagram

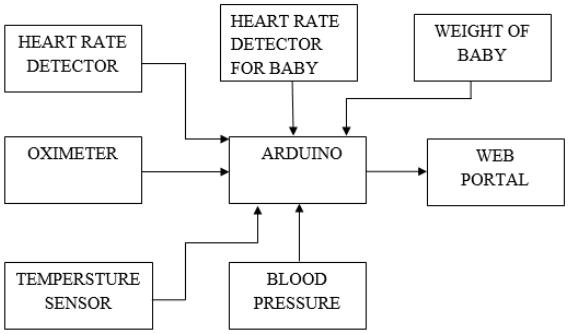

Figure no. 1

2.2 Heart Rate

The heart rate sensor / pulse sensor (SEN-11574) 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 pulse in real time.
The heart rate sensor consists of three wires which are as follows:
RED wire = +3V to +5V
BLACK wire = GND
PURPLE wire = Signal
Here red wire is used as supply for the sensor, black provides ground and the purple wire is used to transmit signal from sensor to Arduino board.

2.3 Oximetry

Pulse oximetry which uses MAX30100 is a non-invasive method for monitoring a person's oxygen saturation (SO2). Though its reading of SpO2 (peripheral oxygen saturation) is not always identical to the more desirable reading of SaO2 (arterial oxygen saturation) from arterial blood gas analysis, the two are correlated well enough that the safe, convenient, non-invasive, inexpensive pulse oximetry method is valuable for measuring oxygen saturation in clinical use.
In its most common (transmissive) application mode, a sensor device is placed on a thin part of the patient's body, usually a fingertip or earlobe, or in the case of an infant, across a foot. The device passes two wavelengths of light through the body part to a photodetector. It measures the changing absorbance at each of the wavelengths, allowing it to determine the absorbance due to the pulsing arterial blood alone, excluding venous blood, skin, bone, muscle, fat, and (in most cases) nail polish.

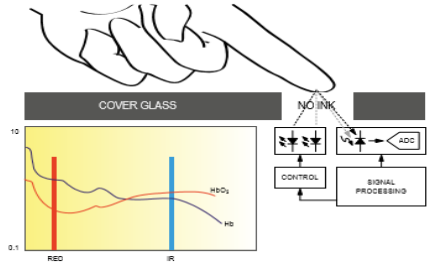

Figure no. 2 Working of oximetry sensor

2.4 Body Temperature

Temperature sensor represents measurement of body temperature of pregnant lady. Here we have used MAX30205 Human Body Temperature Sensor which accurately measures temperature and provides over temperature alarm/interrupt/shutdown output. The MAX30205 converts temperature measurements to digital form using a high-resolution, sigma-delta, analog-to-digital converter (ADC). One-Shot and Shutdown Modes help to reduce power usage.

2.5 Blood Pressure

In this module we will need Honeywell Differential Transducer 015PDAA5 for pressure calculation. Along with this we will need air pump, high pass, low pass filter, Amplifier and blood cuff. The amplifier used is an inverting amplifier TL072.This blood pressure monitor measures the mean arterial pressure (MAP) and approximates the systolic and diastolic pressures. It requires the use of a pressure transducer, an Arduino Uno, and coding to control the valve and air pump. order to determine the mean arterial pressure. It then roughly approximates the diastolic and systolic pressures based on the mathematically relationship between mean arterial pressure, diastolic, and systolic pressures.

2.6 Heart Rate of Fetus

The heart rate of fetus can be calculated in two ways internally and externally. In internal heart rate detection of fetus a wire in internally connected to scalp of fetus. While in external detection of heart rate of fetus a device known as Doppler device is used. This method uses a device to listen to and record your baby's heartbeat through your belly (abdomen). One type of monitor is a Doppler ultrasound device. It's often used during prenatal visits to count the baby's heart rate. It may also be used to check the fetal heart rate during labour. Fetal heart rate monitoring measures the heart rate and rhythm of your baby (fetus). This lets your healthcare provider see how your baby is doing. The average fetal heart rate is between 110 and 160 beats per minute. It can vary by 5 to 25 beats per minute. The fetal heart rate may change as your baby responds to conditions in your uterus. An abnormal fetal heart rate may mean that your baby is not getting enough oxygen or that there are other problems.

2.7 Web Portal

In this project we are using word press for hosting purpose. The design login details are maintained separately for access. We are using Esp 8266 wifi module for internet connectivity. We have to provide the address of website in the code used for Esp8266.Along with that we have to provide user id and password of website. In this we have to mention the website the wifi hotspot name, password, and domain name of website, login details of the website. By using such configuration, we can upload the data stored by the sensors to the website.

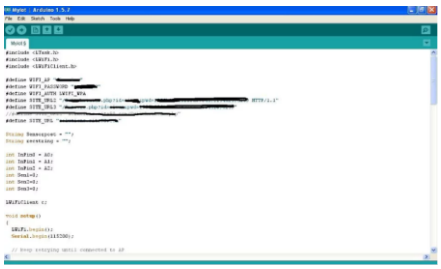

Figure no. 3 Web Portal

2.8 ESP Wifi Module

The ESP8266 WiFi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost-effective board with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime.

III. FLOW CHART

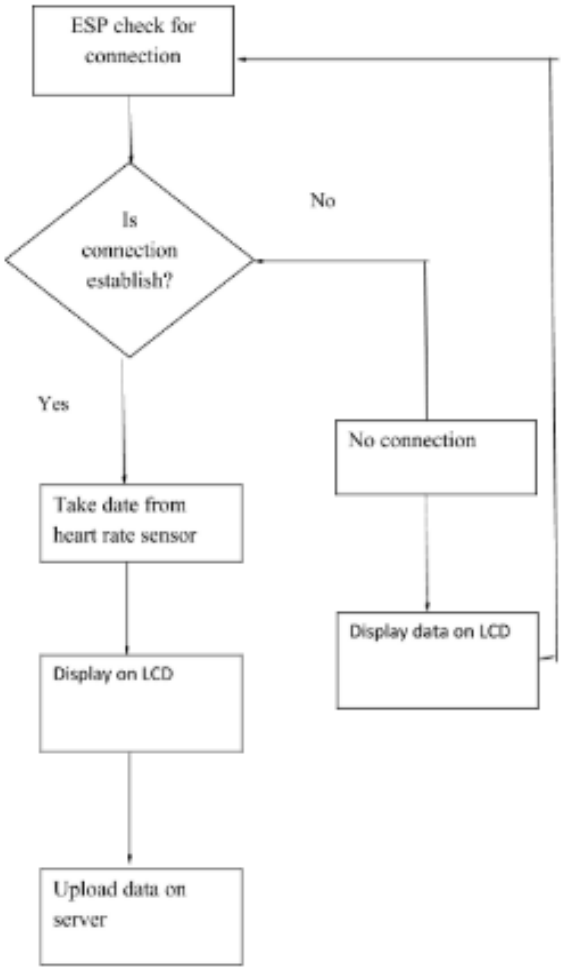

Figure no. 4 Flow Diagram

IV. RESULTS

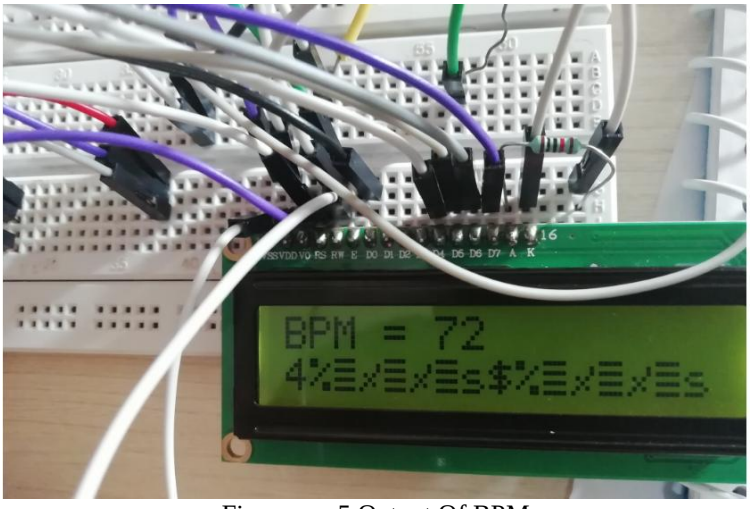

Figure no. 5 Output Of BPM

V. CONCLUSION

In this project we have implemented health monitoring system in which we have used heart rate sensor, oximetry sensor, blood pressure sensor temperature sensor and for connectivity to internet we have used esp8266 module. The Esp module continuously tries to establish a connection over internet. Once connection is established, the data from heart rate sensor, blood pressure, temperature sensor are processed by Arduino board and then the data is uploaded on thinkspeak server. The data from thinkspeak server can be monotonized from any corner of the Earth. On the current progress of our project we have interfaced heart rate sensor with Arduino board and have created web-portal on "thinkspeak.com". The output of the heart rate sensor is shown on 16x2 LCD display.

Currently available system is not compact and wearable. Hence, it occupies more space and measurement capacity is not that good. But the system we proposed will collect and transfer information to doctor at the earliest because of IOT the product is compatible with internet and due to its compact nature, it is wearable. So, it is easy for doctor to analyse the health condition of patient continuously over internet. It helps pregnant ladies to avoid miscarriage and the doctors are able to suggest healthy diet to the women from their place itself through IOT.

VI. ACKNOWLEDGMENT

This is to acknowledge our guide Dr Saniya Ansari under whose guidance, our group was able to move forward in the direction of analysis of parameters for pregnant lady and building a wearable model for health monitoring.

VII. REFERENCES

[1] Vaishnavi Aswar, Pratiksha Takawane, Umakant Jadhav, Pratik Bondre, Asst. Prof. Archana Kadam, " A Model of an Automatic Blood Pressure Monitoring and Triggering System for Hospital", Vol. 6, Issue 9, September 2017.

[2] Devi. L M.Rekha M.E, "Pregnant Women Healthcare Monitoring System Based On Iot",April 2018.

[3] C. K. Das, M. W. Alam and M. I. Hoque, "A Wireless Heartbeat and Temperature Monitoring System for Remote Patients", 1-3 May 2014.

[4] Godavarthi Rajesh M.K. Srilekha, "Advanced Healthcare Monitoring System Using Cc3200 Microcontroller", Volume 115 No. 8 2017, 419-424

[5] A.C.Sumathi, P.Shayestha, M.Umira, S.Vinothini, "Health Monitoring System for Pregnant Women", Volume 7 Issue 4 July to August 2017.

[6] Mohamed Fezari, Mounir Bousbia-Salah, and Mouldi Bedda Department of electronics, University of Badji Mokhtar, Annaba, "Microcontroller Based Heart Rate Monitor". 2012