



AN INTELLIGENCE PREGNANT LADY SAFETY SECURITY SYSTEM

Dr. R. Latha, T.Sangeetha, S.S.Anuchandra, K.R.Yazhini, J.Jayabarathi

ECE Department, K.S.K College of engineering and technology, Ammapet, Darasuram, kumabakonam – 612702, Thanjavur (Dt).,

sangee.kargee@gmail.com, anuyazh29@gmail.com, ramanikalai29@gmail.com, susmithajayaraj97@gmail.com.

ABSTRACT

An approach a low cost, easy to maintain micro controller based health monitoring system for 24 hours continuous screening of pregnant ladies which can be employed in both large hospitals in urban areas as well as in resource limited hospitals in rural areas. The system measures physiology signals like Heart rate, Blood pressure, Temperature, Glucose rate and fetal movement and sends these extracted data to a remote server. ESP8266 Wi-Fi chip is chosen for wireless communication and sensors are used to get the physiology signals from human body. The sensor data are securely transferred between devices using MQTT protocol. These data can be viewed and analyzed by specialists, doctors and other paramedical staffs in real-time to monitor pregnant ladies state.

Keywords - Index-Sensors, Node MCU, MQTT Protocol, Cloud, Health Monitoring, Telemedicine.

INTRODUCTION

In Our Modern World, we are using lots of wearable devices but, there is no awareness about these devices in rural areas. Awareness and access to a health care center, equipped with modern maternity facilities has a significant positive impact on the health seeking behaviour and pregnancy outcome of rural women. Lack of knowledge leads to high mortality among the women living in the rural areas. Also they suffer from various health issues such as weakness and vomiting. This paper represents a health monitoring of pregnancy women that combines wearable sensors and database (Cloud) through MQTT Protocol. The Concept of this paper is measuring temperature, blood pressure, glucose rate, heart rate and fetal movement from home itself. This advanced device which can send the data of the patient and her fetal information directly to the connected hospital. If any abnormality is found in the accessed report, it will send an emergency notification and immediate action will be taken by the corresponding hospital.

LITERATURE SURVEY

A .Wearable Devices for Precision Medicine and Health state Monitoring

This paper developed for measuring temperature, heart rate, and respiration rate, blood pressure along with physical activity, sweat and emotion by using various wearable devices. Here each measurement was measured using three methods and these measurements are more accurate. Heart rate is measure by ECG, PPG and ICG, Respiration rate is measure by spirometer, RIP and Photo plethysmography, Blood pressure is measure by oscillometric and PTT, temperature is measure by IR thermopile sensor.

B. Health Monitoring System for Pregnant women

This paper describes, important parameters of pregnant women like Temperature, pulse rate and Kicking of child are restrained and the information is stored in SD card. By Using the Mobile application the information about pregnant women can be retrieved which will compare the previous and present report from the graph. This comparison chart will be displayed in the mobile.

C.IOT Based Wearable Health Monitoring System for Pregnant Ladies using CC3200

Now a days Technology plays the vital role in health monitoring system. This paper gives a solution for pregnant women. It presents a health care solution that combines web application and CC3200 Microcontroller techniques in a wearable sensor to monitor the health condition of pregnant ladies. Here IOT technology is used so that physician can monitor the patient condition from anywhere.

D.IOT Based Health Care Monitoring System for Rural Pregnant Women

This paper describes the IOT based health care monitoring system for rural pregnant women with the smart phone for real-time monitoring. In this system, some vital parameters such as temperature, heart rate and blood pressure for the women are measured by using different sensors. The measured parameters are transferred through IOT and its viewed in the mobile phone.

E.A Review of Wearable Sensors and System with Application in Rehabilitation

This paper is developed for measuring heart rate and respiration rate of older adults by using wearable sensors. Wireless communication is relied upon to transmit patient's data to a mobile and send the information to a remote centre via the internet. Emergency stations are detected via data processing implemented through put the system and alarm message is sent to an emergency service centre to provide immediate assistance to patients.

EXISTING SYSTEM

In our modern world, already we are using lots of wearable devices for measuring Heart rate, Blood pressure, Temperature, Glucose rate and fetal movement. It is compulsory for the patient to go the hospital in person to check the above information.

Drawbacks of existing system:

These devices can be used by the patients in hospital with the help of doctor or nurse. The data of patients are maintained as hard copy and it should be carried by them each and every time, when they go for checkup. This is not suitable for the patient who found difficulties to travel long distance to reach the hospital.

Proposed System:

This wearable device can be used by the pregnant ladies from home itself and no need for assistance by doctor or nurse. This device consists of ESP8266P controller and it receives input signals from the sensors. Then these sensor data will be transferred to the cloud (database) by using MQTT protocol. The data of the patients are maintained as soft copy which can be accessed by the doctor through web application. If any abnormality is found in the accessed report, this device will send an emergency notification by GSM and immediate action will be taken by the corresponding hospital.

Advantages:

- The patients need not to be travel to long distance.
- An immediate action will be taken.
- Low maintenance cost and no need to carry multiple devices.
- Simple and easy to handle.

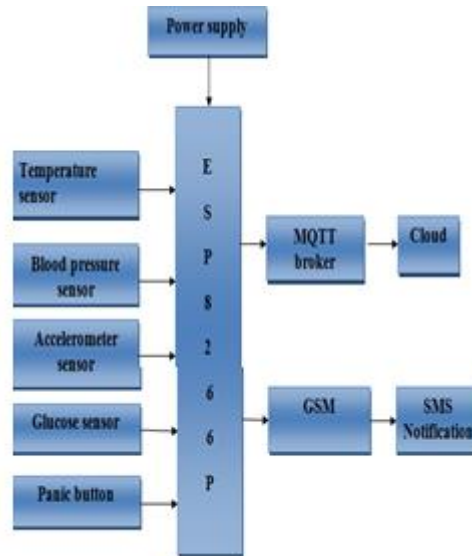
Hardware Used:

- ESP8266P Controller
- DS18B20 temperature sensor
- Blood pressure sensor
- Glucose sensor
- Panic button
- GSM900A module
- Power supply

○ **Software Used:**

- Arduino IDE 1.6.9
- MQTT Box

SYSTEM DESIGN AND IMPLEMENTATION



In the block diagram, working principle of an intelligence pregnant lady safety security system is explained. The sensing part will sense the temperature, blood pressure, heart rate, glucose rate and fetal movement of the patient and it sends the data of the patient to the microcontroller(ESP8266P).By using MQTT Protocol, these data will be transferred to the database(cloud) and continuously monitor by the corresponding physician.

NODE MCU (ESP8266P):

Node MCU is a microcontroller and it is a low cost Wi-Fi enabled module. It can be configured to connect to the internet of things (IOT) and similar technology. It is a firmware on ESP8266P.Firmware is an operating system (OS) that is used to functions of various hardware devices and systems. It's basically a System on Chip (SOC).SOC means all components are integrated on a single chip. It has 16 GPIO pins, one ADC pin, 4 SPI pins that means serial peripheral interface, 4 UART pins. It can be programmed using *Arduino IDE* software.



FEATURES OF NODE MCU

- It is an open source controller that the program code can be easily modified by the user (or) developer.
- Simple and Smart.
- Wi-Fi networking (can be used as access point or station, host a web server) connect to internet to fetch or upload data.
- Memory Size is Large when compared to other controller.
- It has more number of input and output pins.so, we can interface more number of devices with this controller.

TEMPERATURE SENSOR

Temperature sensor is a device to measure the body temperature through an electrical signal. The measurement of this sensor is about the hotness or coolness of human body. Temperature sensors are also vital in many other applications such as consumer and industrial electronics. There are four types of Temperature sensor that are most commonly used in real time. These are Thermocouples, Resistance Temperature Detector (RTD), Thermistor and semiconductor based integrated circuits. Here SWE are using DS18B20 Temperature sensor that is semiconductor based sensor. DS18B20 is a small sensor with a built in 12bit ADC. It can be easily connected to an any microcontrollers.it is a one wire device that consist of only one data line for communication with controller. For this sensor no external components are required. It has 0.5 ° C accuracy from -10d° C to +85°C.Here we are using two types of library to access the data from this sensor. These are one wire library and Dallas temperature library.

BLOOD PRESSURE

Blood Pressure is the pressure of circulating blood on the walls of blood vessels. It is usually referred as the pressure in large arteries of the systemic circulation. It is expressed in terms of the systolic pressure and diastolic pressure. Systole pressure occurs when the heart muscle contracts and diastole pressure occurs when the heart muscle relaxes. These measurements are given as millimetres of mercury (mm HG).The blood pressure measurements are categorise into normal blood pressure, hypertension and hypotension. When the Blood pressure is too low then it is called hypotension and when the blood pressure is too high then it is hypertension. The abnormal range of blood pressure can lead to serious problem like heart attack, stroke (or) kidney disease. There are two main types of Blood pressure sensors are available, these are aneroid and digital .Aneroid monitors needs manual dexterity to operate this device. But the digital monitors are available as fully automatic versions and more accurate.so, here we using digital monitors to measure the blood pressure. This sensor measures systolic and diastolic and heart rate. The response time is faster in this sensor that is 1 ms and typical accuracy is ± 1 mm HG.This sensor has 2 pins that are transmitter out,+5V supply and GND pin. Here TX-OUT pin connected to RX-D pin of ESP8266P.

ACCELEROMETER

Here we are using ADXL345 accelerometer for measuring feta movement.ADXL345 is a triple axis(x, y, and z) accelerometer and it works on the principle of piezoelectric effect. It has 8 pins and easily connect with ESP8266P.Fetus movement is monitoring is one way to identify the fetal wellbeing and one very popular movement that is used to gauge fetal health is a fetal kick. So, this sensor gives the measurement of fetal movement based on the kick. Here we are using two types of libraries to access the data from ADXL345 sensor. These are Adafruit ADXL345 library and Adafruit unified sensor library.

GLUCOSE SENSOR

Glucose sensor is a simple sugar and approximately 4 grams of glucose are present in the blood of 150 for human. Glucose is the primary source of energy and it can be transported from the intestines (or) liver to other tissues in the body via the blood stream. Glucose levels are usually lowest in the morning, before the first meal

of the day and rise after meals for an hour. The high level of is referred to as Hyperglycaemia and low level is referred as hypoglycaemia. Here we are using glucose biosensor for measuring glucose level.

MQTT PROTOCOL

MQTT means Message Quality Telemetry Transport. It is used to Transfer the sensors data from controller to database. The first version of this protocol was implemented in the year of 1799. The latest version of this protocol is 5.0 MQTT is a good choice for wireless network due to Bandwidth and unreliable connection. The architecture of MQTT protocol consists of subscriber and publisher. Here the Publisher is a controller and Subscriber is a cloud server. It is a faster response protocol when compared to other protocol. It can carry large amount of data up to 256Mb. Transmission of data is noise secure. The main advantages of this protocol are scalability which means capability of system is good. It is light weight and simple message protocol.

CLOUD

Cloud is the database that is designed to store and process the data through internet. Here the cloud is running in the hospital and data about the patient will be stored in this cloud. Now a days the companies are migrating their information operations to the cloud due to minimize the pressure and solve their problem of transferring large amount of data. Cloud consists of three types. They are Private cloud, Public cloud and Hybrid cloud. Private cloud is used to store a confidential (or) secret data. Because this is highly secured when compared with other type of clouds. The data only accessed by the specified organization. Public cloud is like a private cloud but the data can be shared with other organization. Hybrid cloud is a combination of public cloud and private cloud. It performs both operation of public and private cloud. It is low cost and highly secured and flexible database.

GSM-SIM900A

GSM is a Global System for Mobile Communication. This system was designed in Europe to provide good voice and speech Quality. It is second generation cellular standard. It operates at either 900MHZ (or) 1800 MHz frequency band. GSM is used in most of the countries and it requires a SIM card to activate for communication with the network. It consists of three subsystems. They are Network subsystem, Radio subsystem and Operation and maintenance subsystem. Network subsystem is used to perform call processing and subscriber related functions. Radio subsystem consists of base station and transceiver station. Operation and maintenance subsystem is used for dynamic monitoring and controlling of networks. Storage of data and software. Its stores the data for minimum one year. The main advantages of this SIM900A module are uninterrupted phone calls at high speed. Here we are using this module for sending Alert Message during any emergency situation of patient.

CONCLUSION

This paper will about the pregnant lady health monitoring and comes out with an innovative idea for security and protection for pregnant ladies and more research is possible with introducing smart technology where objects form a network. This will help to solve them technologically with compact equipment and ideas. Using screaming alarms and also alerting the emergency contacts by sending the message is helpful for pregnant ladies security. This system can overcome the fear of every pregnant lady.

REFERENCES

- [1] S. C. Mukhopadhyay, "wearable sensors for human activity monitoring: A review," *IEEE Sensors J.*, vol. pp.1321-1330, 2015
- [2] S. Patel et al., "A review of wearable sensors and systems with application in rehabilitation," *J. Neuroeng. Rehabil.* vol.9. p. 21, 2012
- [3] A. J. Bandodkar and J. Wang, "Non-Invasive wearable electrochemical sensors: a review," *Trends Biotechnol.*, vol. 32, pp.363-371, 2015.
- [4] H. H. Asada et al., "Mobile monitoring with wearable photoplethysmographic biosensors," *IEEE Eng. Med. Biol. Mag.*, vol., 22, pp. 28-40, 2003.

- [5] J. Paniot et al., "Ambient and wearable sensor fusion for activity recognition in healthcare monitoring systems," in IFMBE Proc. BSN, 2007, PP. 208-212.
- [6] C. C. Poon et al., "A novel biometrics method to secure wireless body area sensor networks for telemedicine and m-health," IEEE Commun. Mag., vol. 44, pp. 73-81, 2006.
- [7] Y.-D. Lee and W.-Y. Chung, "Wireless sensor network based wearable smart shirt for ubiquitous health and activity monitoring," Sensors Actuators B:Chem., vol. 140, pp. 390-395, 2009.