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Health Monitoring and Analysis for Pregnant Women in Rural Areas

M Greeshma[1], D Nandini[2], G Anil Kumar[3], D V Harshitha[4], CH Jahnavi[5]

[1]*Assistant Professor, Department of Electronics and Communication, Sir C R Reddy College of Engineering, Vatluru, Eluru, Andhra Pradesh – 534007.*

[2, 3, 4, 5]*Under Graduate Scholars, Department of Electronics and Communication, Sir C R Reddy College of Engineering, Vatluru, Eluru, Andhra Pradesh – 534007.*

Abstract- The majority of people reside in rural areas in underdeveloped nations, where medical systems are not integrated to share information. Primarily, the inability of pregnant women to do their routine examinations at the beginning of pregnancy, which leads to a higher rate of infant and parental mortality in both urban and rural areas.The women are dealing with serious medical concerns as a result of their predicament. the sensor for acceleration, which is transferred to the RASBERRY PI-3B, is intended to count the kicks or force that an unborn kid makes. The main reason why infant and parental death rates are greater in both urban and rural locations during pregnancy is because pregnant women are unable to perform their regular prenatal exams. The women are dealing with serious medical concerns as a result of their predicament. Lastly, we calculated the normal and abnormal rates and these results are transferred to the patient mobile by using GSM.

Keywords: RASBERRY PI MODULE, IOT, GSM.

I. INTRODUCTION

A vital medical assessment of women's health issues focuses on pregnant women's health and monitoring foetal moment. Some hospitals are keeping an eye on pregnant patients. Ensure they are in good health at this time. The attendant is required to take any necessary measurements, including blood pressure, weight, infant movement, pulse, and other parameters. The bulk of the sensors in cell phones are now implanted since they evolve quickly. These sensors help the medical professional keep track of specific characteristics automatically [2]. According to this study, a smartphone app might automatically monitor a pregnant woman's wellbeing and foetal motion.

Most maternal fatalities take place in underdeveloped nations (developing). Women die as a result of pregnancy and delivery complications. The majority of these issues grow gradually and may be treated throughout pregnancy [2]. The high mortality rate among living women in rural regions is caused by a lack of education and awareness in many of these places.

Lack of hospitals prevented them from getting their routine check-ups. Time and distance are other important considerations when deciding whether to skip a prenatal visit[5]. Frequent Exams will help to decrease risk foetal mortality and the birth rate of atypical offspring. There are a number of potential problems during this period, including weight gain, gestational diabetes, bleeding, and blood variations brought on by maternal infection and high blood sugar.

For instance, pregnant patients should undergo a minimum of two ultrasounds throughout the procedure[8].

Think about the foetus' growth during the pregnancy cycle. Also, a thorough and early examination would ensure a safe delivery. Most of the time, people cannot get therapy right away. Thus, it is important to give pregnant women prompt, effective medical attention, since this will help ensure that their children are delivered healthy. While using ultrasound scan technology, we are able to see some problems, the unborn child is also exposed to heat energy, which increases the risk of birth abnormalities.

It is also more pricey, therefore we suggested a system made up of a number of sensors, including a heartbeat sensor, a temperature sensor, and an accelerometer sensor to count the foetus' kicks. With the aid of the Raspberry PI and IOT technologies, we can gather data from these sensors and transmit it in bulk to a mobile app. GSM sends an alarm message if any abnormal values are detected[2].

II. LITERATURE SURVEY

The primary causes of maternal fatalities during pregnancy and postpartum in the majority of underdeveloped nations are three significant delays[3]. These include recognising potentially fatal situations or warning signals and deciding whether to visit a hospital.

Delay in both getting to the medical institution and obtaining proper and sufficient care there. Low awareness of warning signals causes delays in obtaining obstetric treatment, which increases maternal mortality and morbidity globally. The concept of birth readiness is founded on the idea that being prepared for labour minimises delays in receiving expert mother care, particularly during childbirth.

In low-resource settings, there is little preparation for childbirth and its difficulties, according to research. The majority of maternal fatalities are caused by problems during, immediately during, and immediately after delivery. The majority of these issues arise during pregnancy and, with prompt and appropriate management, may be avoided or addressed. Interventions should be directed at all pregnant women who visit prenatal care services and throughout childbirth in order to reduce and terminate poor pregnancy outcomes worldwide. Prenatal care should be provided using supported and efficient technology to provide thorough monitoring and timely communication when concerns or difficulties are found[4].

The computerised database was equipped with an interactive message alarm system. The application was created in January 2018 and then transferred to a server before being connected to a mobile gateway with improved capacity to manage numerous and concurrent SMS issues from the system. Text messages were automatically created and despatched using specialised software. The registration nurses, with the assistance of the system administrator, obtained the data needed for the interactive messaging programme during the initial visit, including the gestational age and mobile phone number. The SMS components were designed to offer straightforward health education on obstetric and new-born danger indications as well as information on individual birth preparation and complication readiness. The message will sent to parents[9]. Participants were allowed to transmit and receive health education messages via the two-way conversation. A pregnant lady might send a text message using the system and connect with a doctor or nurse using the interactive messaging. The notification was returned to the pregnant ladies once the health care responded via the system. Pregnant women who received the SMS texts with health information did not pay a penny. This[7] system's analysis of the detailed survey on the health monitoring of pregnant women. They provide a variety of information on IOT technologies. IOT technology was employed in this study to monitor pregnant women's health in outlying areas. Microprocessors are used to sense data from sensors, such as heartbeat, temperature, and blood pressure, and the output of the sensors is displayed on a smart phone via an IOT interface. This approach is suggested to track the development of the foetus inside the mother's womb. Through this, they scan with ultrasonic technology.[6,7] This method is very cost-effective, however there is a chance that the foetus might develop a health problem due to the ultrasonic wave. This research examined pregnant women's online behaviours.

[10] This study recommended a wearable device for expectant mothers. It uses a microprocessor to collect crucial data, including the woman's temperature, pulse, and heart rate, and then sends an alert to the doctor from a nearby medical facility.

III.   MATERIALS AND METHODS

A heartbeat sensor, a temperature sensor, and an accelerometer sensor to track the foetus' kicks are among the instruments that make up this system. With the aid of the Raspberry PI and IOT technologies, we can gather data from these sensors and transmit it in bulk to a mobile app. If any abnormal values are found, GSM will send an alarm message.
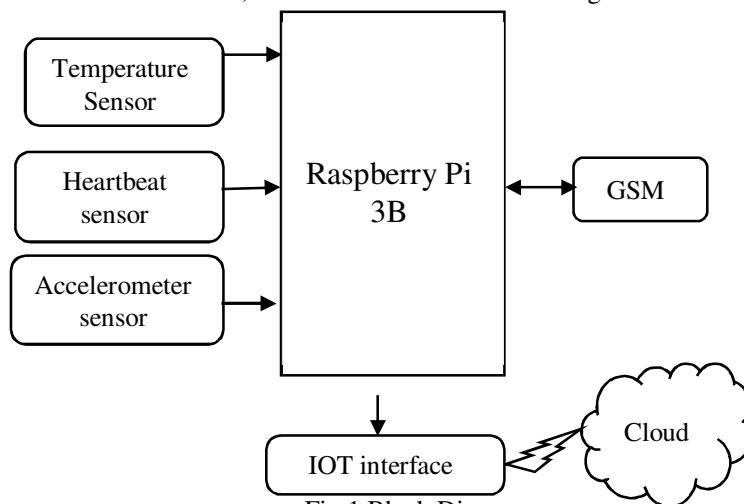

Fig.1 Block Diagram

There are many different components that can be used in designing a health care monitoring system and they are given below:

- Raspberry pi 3B
- DHT11 Temperature and Humidity Sensor
- Heartrate Sensor
- Accelerometer Senso
- GSM

1) Raspberry Pi 3B

Fig .2

This system using raspberry pi is a system which has both hardware and software involved in it to get the desired output. A software requirement for this system is operating system for windows OS, Linux OS, Python. Raspberry pi is a device   used in this project which sends the software program from our laptop to this device and device is connected with the breadboard to get the output.

2) DHT11 Temperature and Humidity Sensor

Fig .3

The mother's body temperature is mostly measured through temperature sensors. It has the ability to measure temperatures more accurately than a thermistor. A woman's body temperature fluctuates a lot while she is pregnant. Due to the woman's body's The woman's body produces more heat during pregnancy due to her increased metabolism, higher levels of hormones like progesterone, increased workload brought on by the foetus's weight gain, and the processing of the foetus's nutrients and waste products. The temperature range of the DHT11 is 0 to 50 Celsius.

3) Heartbeat Sensor

Fig .4

Blood pressure levels increase as a result of the 30- to 50% increase in heart rate during pregnancy. Heart rate swiftly rises from 70 beats per minute (bpm), which is normal, to 80, then 90.

Consequently, a heartbeat sensor is used to track heart rate.

It is a piece of technology that helps track the mother's heartbeat. Operating voltages for the MAX30100 are 1.8V and 3.3V.

4) Accelerometer Sensor

Fig .5

The accelerometer (adxl335) sensor may detect acceleration on orthogonal axes starting from one, two, or three. This sensor is positioned on the mother's abdomen. This sensor uses the pressure from the baby's kicks as an analogue input for the three (X, Y, and Z) axes. A digital change followed that.

Three analogue axes, X, Y, and Z. Then it underwent a digital transformation.

5) Gsm Module

Fig.6

A GSM Module delivers GSM mobile phone technology-based wireless data connection to a network. GSM modems are used by mobile phones and other devices to connect to mobile phone networks. For the network to recognise their device, they utilise SIM. In this system, if any abnormal values are found, GSM will send an alarm message.
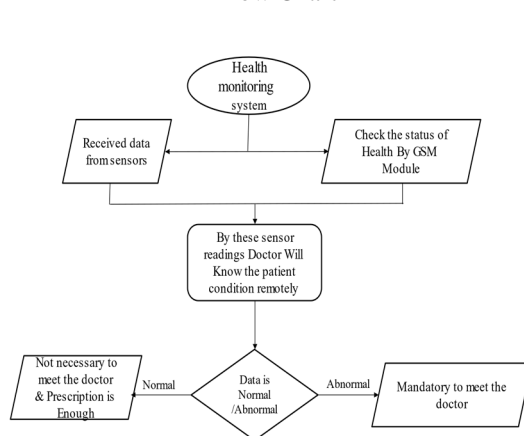
Flow Chart

Fig.7

In this proposed system, First of all collect all the data from the different sensors and all these data is processed by the Raspberry Pi and the results will be displayed on the screen and then if the received data is abnormal GSM will sends an alarm message to the patient's mobile phone. The doctor will know the patient condition remotely . In case of any abnormalities it is mandatory to meet the doctor. And utilising an IOT interface, all of the data will be saved in the cloud.
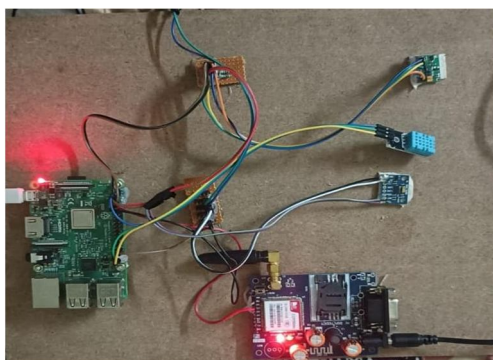
IV.   RESULTS

Fig.8 Hardware Setup

The project described above function as intended. It continuously measures the foetal movement, temperature, heart rate, and pulse rate. GSM will send an alarm message if any abnormal values in temperature, heart rate, or foetal movement are detected.
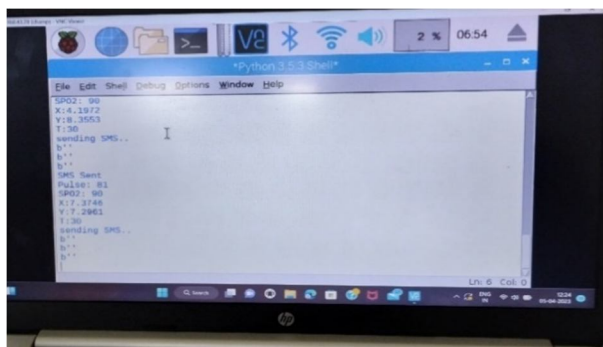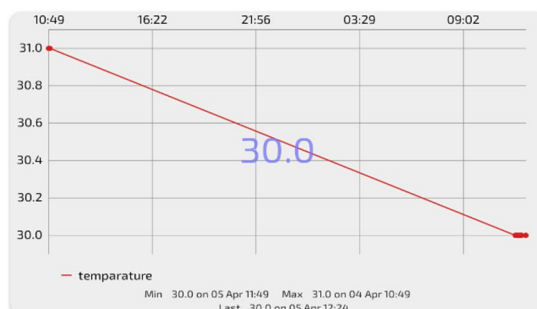

Fig.8

Fig .9a Heart Beat
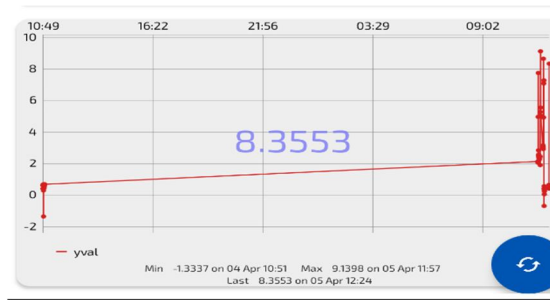

Fig.9b Temperature

Fig.9c X-value

Fig.9d Y-value

From the above fig 9 represents the graphical representation of women's heartbeat, temperature and movement of the fetal by using different types of sensors.
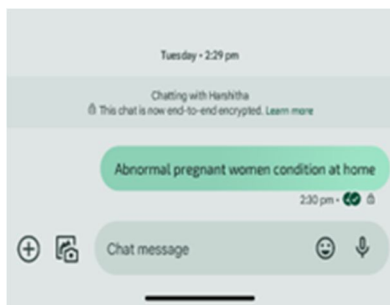

Fig.10

In case of any abnormal value may occur in temperature or in hear beat or in fetal movement GSM will sends an alert message like "Abnormal pregnant women condition at home" as shown in fig.10

V. CONCLUSION

Nowadays, there are a number of problems that might arise during pregnancy. Most rural areas have lower prevalence rates of routine check-ups. High mortality rates and maternal deaths are causes of this. This system idea makes use of a variety of sensors to monitor the foetus's temperature, heart rate, and amount of kicks or movements in order to determine its overall health. This method is quite efficient and works effectively in the present. The doctor from the local hospital can monitor these values using a smart phone, and the mother can check them using a smart phone app. (Things view).

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