

IoT Based Pregnant Lady Health Monitoring and Fall Detection System

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ABSTRACT: An innovative solution that uses real-time data transfer and continuous monitoring to improve the health and safety of expectant moms is the Pregnancy Women Health Monitoring System for Prenatal Care Based on IoT. This study uses a variety of sensors, such as a Dallas temperature sensor to measure body temperature, a respiratory sensor for breathing analysis, a MPU6050 sensor to track physical activity, and aMAX30100 sensor to track heart rates and oxygen level. The gathered data is shown on an LCD for instant feedback and sent to medical professionals via IOT if there are any anomalies, guaranteeing prompt action when required. The goal of this Internet of Things-based health monitoring system is to give pregnant moms a dependable way to keep themselves healthy during their pregnancy, promote better prenatal care, and enhance results for both the mother and the fetus.

KEYWORDS: Health Monitoring, Prenatal Care, MEMs Sensor, GSM, LCD, Arduino Uno, Internet of Things (IOT)

I. INTRODUCTION

Pregnant women's health and fetal moment monitoring are key components of a medical evaluation of women's health issues. Some medical facilities are monitoring pregnant patients. Make sure they're doing well right now. Any relevant measurements, including as blood pressure, weight, newborn movement, pulse, and other parameters, must be taken by the attendant. Due to their rapid evolution, the majority of sensors in cell phones are now implanted. These sensors assist the healthcare provider in automatically monitoring particular traits. The majority of maternal deaths occur in developing countries. Complications during pregnancy and delivery cause deaths among women. Most of these problems develop gradually and can be managed throughout pregnancy. Many rural areas lack awareness and education, which contributes to the high mortality rate among surviving women. They were unable to receive their regular checkups due to a shortage of hospitals. When choosing whether to forego a prenatal checkup, time and distance are also crucial factors. Regular exams will reduce the birth rate of unusual offspring and risk fetal mortality. Weight increase, gestational diabetes, hemorrhage, and blood changes caused by maternal infection and high blood sugar are among the many possible issues at this time. For example, throughout the surgery, pregnant patients should have at least two ultrasounds. Consider the growth of the fetus over the course of pregnancy. A safe birth would also be guaranteed by a comprehensive and early assessment. Most of the time, folks are unable to receive therapy immediately. Pregnant women should therefore receive timely, efficient medical care since this will help guarantee the health of their unborn children. Although we may spot some issues with ultrasound scan technology, the fetus is also exposed to heat energy, which raises the possibility of birth defects.

II. LITERATURE SERVEY

1. Health Monitoring Laboratories by Interfacing Physiological Sensors to Mobile Android Devices This paper describes, Android Java-DSP (AJDSP) as a mobile application that interfaces with sensors and enables simulation. This also helped in visualization of signal processing. In this system firstly there is creation of interface between both external sensors and on-board device sensors for monitoring the physiological parameter of human being. This paper also explored the trend of mobile sensing and adapted it towards improving digital signal processing (DSP), by building interfaces to medical sensor and external sensors. In this paper there is use of SHIMMER. It is a small wireless low power sensor International Journal of Advance Foundation and Research in Computer platform.

2. Smart Elderly Home Monitoring System with an Android Phone This paper considers or takes into account certain facts, which are heart attack and stroke as they are the major cause of hospitalization of the elder people. There is more chances of survival if the older people gets the treatment within an hour. it had also been developed. An android smart phone with accelerometer is used to detect a fall of the carrier, and this android device is known as healthcare device. The android phone is then connected to the monitoring system by using the TCP/IP protocol through Wi-Fi. Because of this system, elderly and chronically ill patients can stay independently in their own home and secure in the knowledge that they are being monitored.

3. Design and Implementation of Wearable ECG System This system describes the design and implementation part of wearable ECG with the smart phone for the real time monitoring of health. In this system smart shirt are developed with ECG sensors and can be worn by any type of patient for monitoring his or her health in real time and get required treatment or prescription. These systems are mainly developed considering elder people in mind as they live alone in their homes.

4. Remote patient monitoring system This paper provides the image based system which acquires the ECG signal via digital camera; this information is performed on the tool like MATLAB and data sending through the internet network and stored in database. Then the original image is then availed to the doctor via Android mobiles. The purpose of this system is the vital signs and parameters from the ICU monitoring system and makes this data to be available to the doctor who may not be in the hospital and in the country. In case of any abnormality, the doctor is alerted by sending a notification from C2DM server to his mobile. The drawback of this paper is that, due to the slow internet connection the data will not be send to the doctor which is located remotely. The image is captured through the camera, which must be HD which cost a lot.

III. RELATED WORK

Proposed system

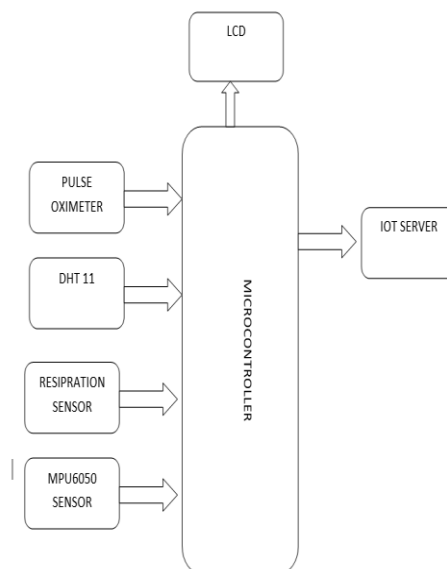
This research inspects the monitoring of pregnant women and children using the Internet of Things in the modern healthcare system. The main focus is to ensure the safety of pregnant women and their children. Through our current project, we put forward a system that can firmly influence the standard of living for pregnant women and children positively. Our IoT-based device can monitor temperature & humidity, stress, and fetal heart rate. We can also use this device to monitor a child's health parameters. The microcontroller collects all the data of these parameters with the help of sensors and sends these data to the ThingSpeak server via Wi-Fi module ESP8266 and further analyzes it. This system is fully automated to be able to notify the user and an emergency contact in case of emergency whenever any sensor threshold value crosses. Our second device, which incorporates fall detection along with the monitoring of the pregnant woman's heart rate and SpO₂, is integrated with a vaccination reminder system that will notify the user about the immunization dates and the vaccine to be provided on a particular day. Through the different sensors incorporated in the devices, we can get all the specific health-related parameters of the pregnant woman and her child. The motive is to unobtrusively obtain crucial information about the health status of pregnant women and their children.

Existing system

Maternal and child deaths due to pregnancy related complications are still a huge concern and more prevalent in developing countries. Early detection of complications can help avoid many of the reported cases. Due to factors like long distances to nearby health facilities, lack of knowledge and poverty, majority of expectant mothers in rural developing nations are still adamant in prioritizing their health during this very sensitive period. This thesis research project was aimed at designing and prototyping a system intended to help reduce and improve maternal health in rural areas of developing nations by providing a rather easy way to monitor the health of expectant mothers remotely and to also provides vital information in form of periodic tips with automatic alerts and tracking in case of missed clinical appointments. A survey was conducted so as to investigate the capabilities of the existing systems, identify the challenges with the systems and find out the awareness and readiness integration of internet of things in pregnancy monitoring. For data collection questionnaires were selectively distributed to expectant mothers and health facility officers. Selected health system managers were interviewed and existing documentation analyzed. From the analysis of collected data, the results show that current systems are ineffective and there is a need for Internet of things-based solutions. An architecture for context awareness and an IoT based system are therefore proposed so as to improve pregnancy monitoring in Africa and thus a reduction in fatalities and complications. The system uses a pulse sensor, temperature sensor and GPS module to collect data with an Arduino as the microcontroller. The collected data is then

sent to the cloud using GSM module. From the cloud data is stored, processed and analyzed then sent to the health worker. In case of any health complication or an appointment is missed the health officials are alerted on real-time. The use of this system will ensure a timely response in case of an emergency thus lead to better health and a contribution towards the sustainable development goals.

IV. BLOCK DIAGRAM



V. RESULT AND DISCUSSION

Women safety is vital important and it is need of the hour. In spite of several legal and moral steps are adopted worldwide, safety for women is not ensured at any methods .Many wearable devices and mobile applications are available to aid or help the women to safeguard themselves without the human intervention. In addition to above health monitoring of pregnant women during later stages is essential. Hence, a prototype is designed to ensure the protection of pregnant women. The proposed system shows a flexible and interoperable combination of a device and application that will accessorize and empower the citizens and serve as a multifunctional device. The purpose of this project is to present a novel method for monitoring the fetal body with maternal characteristics such as movement (kicks) and heart rate by employing an accelerometer sensor and a heart rate pulse sensor. In this project Arduino micro controller interfaced with various sensors, is used to sense the movements and other vital health parameters. Because of it's relationship with various fetal health issues, monitoring fetal movement (FM) is considered a significant aspect of fetal well-beingevaluation. When abnormality is been detected, the current location is been obtained using GPS Sensor and an alert mail is sent to the care taker and medical center. The designed prototype provides a cost effective solution and efficient in performance which can be used to monitor the health of pregnant women for safety issue.

VI. CONCLUSION

Maternal and new-born well-being is a concern for underdeveloped as well as developing countries. Pregnancy problems, such as miscarriage, stillbirth and premature birth, increase the risk of maternal and new- born death. Pregnancy problems can be reduced by making lifestyle changes and focused health monitoring under supervision of trained, well equipped health care professionals during and after pregnancy. Approximately more than 40% population reside in rural areas, where medical systems are not integrated to facilitate information exchange. In the first trimester of pregnancy, most pregnant women in these countries are unable to get their normal checks, which results in a greater death rate for both the new-born and mothers in these areas. Also, it is not possible to monitor health vitals of pregnant women in the absence of physicians all the time during pregnancy due to several reasons like global availability of physicians, labs etc. To address these issues, the authors propose a solution in the form of a device which consists of

various sensors like Temperature sensor, Heartbeat rate sensor, Blood Pressure sensor, Sweat sensor to measure sugar levels, oximeter to measure oxygen level, weight machine to measure weight, Accelerometer sensor and other devices like Arduino, GSM module etc. which can be further converted into compact device for accessing vital statistics of pregnant women to integrate it and to transfer the captured readings to the Thing speak cloud so that the analytics can be monitored by physicians with the help of mobile or web application etc. There are also concerns about the long-term implications of prolong ultrasonic exposure on the fetus, its affordability and accessibility. Ultrasound scans can detect some issues, but they can also expose the baby to heat, which can cause birth defects. High mortality rates in rural areas due to lack of knowledge and awareness are a problem. In order to ensure the birth of healthy children, timely qualitative medical attention is required. It is very important to monitor various vital statistics during pregnancy like blood pressure, blood sugar, weight, vaginal bleeding, body temperature, blood oxygen saturation levels, heartbeat of fetus, fetal kick count etc. and even behaviour to track stress and anxiety.

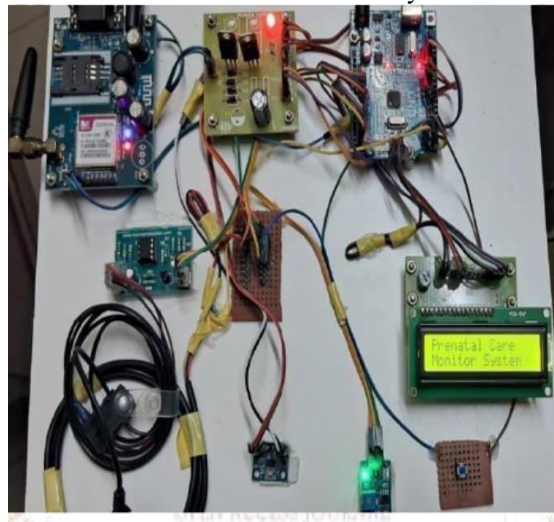


Figure 11: Heart Beat Sensor connected to a microcontroller with an LCD display

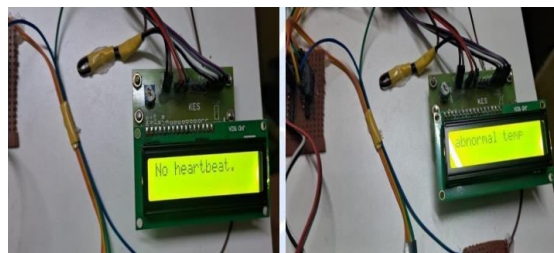


Figure 12: Health monitoring system with No Heartbeat and Abnormal Temperature

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