International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 11 Issue: 05 | May 2024 www.irjet.net p-ISSN: 2395-0072

SMART PREGNANCY HEALTH MONITORING SYSTEM USING IOT

Anandakumar M [1], Bharathiraja K[2], Muhammed Ijas[3], Suhith M[4], Mrs.R. Santhoshi[5]

Student [1][2][3][4], Dept. of Biomedical Engineering, Mahendra Institute of Technology (Autonomous), Namakkal
Professor [5], Dept. of Biomedical Engineering, Mahendra Institute of Technology (Autonomous), Namakkal

---

ABSTRACT – ***The majority of people in developing nations live in rural areas, and there is no integration of medical systems for information sharing. Most pregnant women are unable to have their usual checkups at the beginning of their pregnancy, which increases the number of infant and parent deaths in both urban and rural areas. Because of this present circumstance, the ladies are confronting an enormous clinical issue. Accelerometer sensor is intended to gauge the count of kicks/force by unborn youngster and it is move into the ARDUINO UNO regulator. Various kinds of sensors are used to measure the motion of the fetus as well as important parameters like the woman's temperature, heart rate, number of kicks from the unborn child, and blood pressure. The mobile phone displays the measured parameters after they are transmitted via IOT. As a home monitoring device, this system is preferred due to its high level of sensitivity and light weight, even in the face of minor motion. Presently a-days, ultrasound filtering technique is utilized. because it will be used for a long time and costs a lot. Impediments of ultrasound check technique on fetal are not totally clear. along these lines, ultrasound filter isn't proposed persistent checking. Finally, we determined the normal and abnormal rates by employing an IoT module.***

Key Words: Pregnant women, abnormal rates, regulator and IoT

I.INTRODUCTION

Maternity care aims to ensure the health and happiness of the mother and her unborn child. During the pregnancy and into the future, the mother's wellbeing fundamentally affects the kid. Because health complications during pregnancy, such as hypertension or gestational diabetes, may resonate with corresponding health problems in the pregnant woman's later life, maternity care is essential for remote long-term health at the population level as well as for preventing acute pregnancy complications in individuals. as well as the mother's weight gain and the uterus's expansion. To assist a sound lifestyle, maternity with caring providers moreover need to give directing about alternate lifestyle and self-organization matters, for example, genuine work and rest. In any case, these are not yet methodically checked

There is a need to generally screen pregnant women's prosperity to early perceive expected disarrays and further foster prosperity limits Moreover, relentless checking of different prosperity limits enables getting fine-grained quantitative data that could give a predominant cognizance of pregnancy. The conveyance of medical services is going through a change because of mechanical progressions in ICT. Specifically, the Web of Things (IoT) is another worldview in contemporary data and correspondences innovation that utilizes an assortment of detecting, correspondence, and figuring foundations to give a high-level organization of items that can be integrated into medical care administrations whenever and from anyplace, empowering people to get far off wellbeing checking nonstop. An observing arrangement of this sort can assemble information from the client and the climate in which they live, send the information to far off servers, break down the information, and give ideas and criticism in view of the discoveries. IoT-based systems can provide pregnant women with affordable health monitoring services in everyday settings. These remote health monitoring systems, according to recent research, have the potential to enhance the health of the mother and her unborn child throughout and after pregnancy.

Many undertakings have so far been directed to give far off prosperity checking to pregnant women. In some studies, mothers are questioned about their health and well-being using subjective methods. These techniques are for the most part restricted to planned telephone meetings and Web based surveys, which might be wrong. In other studies, pregnant women's weight and blood pressure are periodically measured at home. Even though the current works in the writing use IoT-based frameworks to entertainer bit maternal checking, they are barely centered on a specific medical condition, furnished with limited detecting capabilities, and, most importantly, tried in a brief timeframe during pregnancy. Additionally, these works are limited to limited information assortment. On the other hand, versatile applications and wearable devices are used to consistently gather wellbeing boundaries during and after pregnancy. They focus on unambiguous pregnancy-related issues, such as resting unsettling influences, active work,

II. PROBLEM DEFINITION

Checking natural conditions is the central point to further develop yield of the effective harvests. Utilizing sensors like temperature, dampness, water-level, IR sensors are utilized to get data about the field and assist ranchers with taking exact choices on bits of knowledge and suggestions dependent on the gathered information. The water-level sensor, temperature sensor and mugginess sensor help to

keep up with required water-level in the cultivating. The component of this paper incorporates improvement of a framework which can screen temperature, dampness, dampness and surprisingly the development of creatures which might annihilate the yields in farming field.

III. EXISTING SYSTEM

Pregnancy is a rare condition in which women experience a variety of medical issues during the incubation period. Because they are either too specific or too narrow, conventional health monitoring systems are not flexible enough to accommodate pregnant women. Because it completely eliminates the risks of pregnancy and adverse events, as well as improving privacy, religious, legal, and societal issues, IoT guarantees safe and effective treatment for pregnant women in any climate.

3.1 DISADVANTAGES

• Fever, sluggishness, or unsteadiness when going to the bathroom

• Pain or burning

•A tendency to much of the time use the bathroom

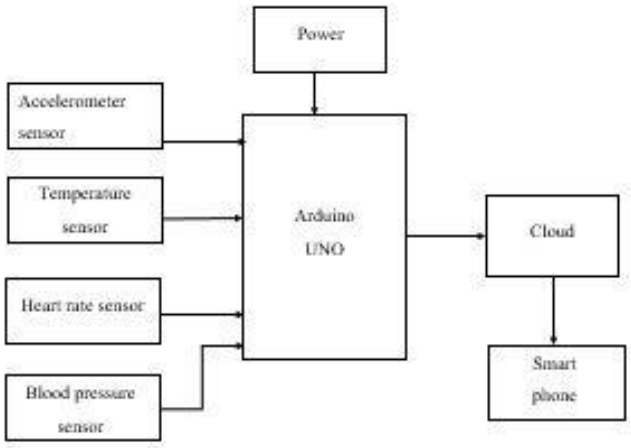
IV. PROPOSED SYSTEM

The mobile phone displays the measured parameters after they are transmitted via IOT. As a home monitoring device, this system is preferred due to its high level of sensitivity and light weight, even in the face of minor motion. Presently a-days, ultrasound filtering technique is utilized. because it will be used for a long time and costs a lot. Impediments of ultrasound check technique on fetal are not totally clear. Therefore, ultrasound scan is not recommended for ongoing monitoring

4.1 ADVANTAGES OF PROPOSED SYSTEM

- Providing more opportunities for communication, thereby strengthening the patient-provider relationship and improving patient satisfaction and loyalty.
- fewer childbirth complications and less postpartum depression

V. SYSTEM ARCHITECTURE



SYSTEM ARCHITECTURE

5.1 HEART RATE

The beat sensor/heart beat sensor (SEN-11574) cuts onto a fingertip or ear ligament and fittings straightforwardly into Arduino with some jumper joins. The beat sensor contains three wires which are according to the accompanying: Red wire = +3V to +5V; Black wire equals GND; Signal = purple wire. Here red wire is used as a stock for the sensor, dark is given to the ground and consequently the purple wire is used to send signals from the sensor to the Arduino board. Our project makes use of heart rate sensors, which collect data and store it in an information base for use in various patient registrations in the future. This sensor assists in noticing the beat with pacing of pregnant women.

5.2 BODY TEMPERATURE

The temperature sensor is primarily used to measure the mother's body temperature. It can really take a look at temperature more conclusively than utilizing a thermistor. During pregnancy, it is common for a woman's inside heat level to change. The lady's body creates more intensity during pregnancy because of expanded processing, expanded degrees of chemicals like progesterone, and expanded excess work on the lady's body because of expanded load as the pregnancy advances, like readiness, fetal enhancements, and side-effects. The LM35 measures a temperature degree of -

55 to 150 degrees Celsius. The body's intensity energy is changed over into a static structure by the temperature sensor, which is utilized to gauge it. A pregnant woman's middle inward intensity level will regularly rise to around 37.8°C when it is regularly 37°C.

5.3 MONITORING VITAL SIGNS

Imperative boundaries that are expressed above will be determined persistently or need-based, contingent upon the boundary. The information will be transferred to cloud data set (Firebase). Firebase is used for this because it can send data to mobile applications so that users can see it in a way they can understand.

5.4 MOVEMENT OF FETUS

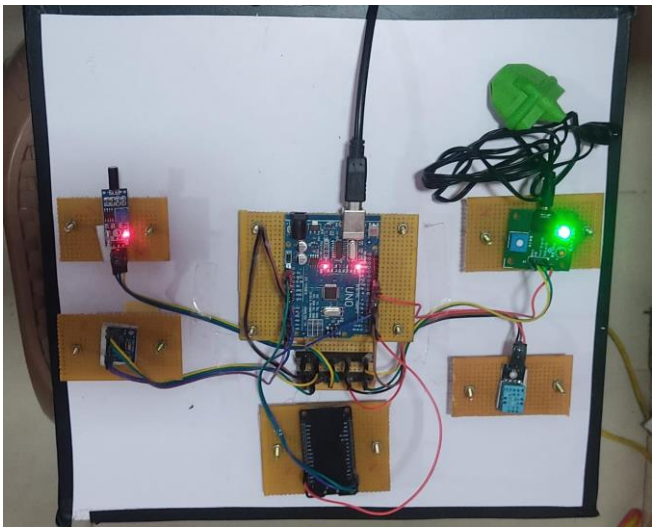
While heading to making an exact and exact gadget, the choice of the sensors plays an significant job. To identify the developments of the embryo, we have utilized an accelerometer sensor. It tends to be utilized to quantify speed increase in one, two, and three-pivot which is symmetrical. Kicking, which is the baby's development, can be recognized by these accelerometers. It will be present or held in the external region of the mother's stomach region. In the uterus, the hatchling's development is an indication of prosperity of the child. Placental insufficiency's vascular state plays a significant role in this [16]. It is seen that there is a fetal development for delayed periods during the third trimester [17]. Data gave to pregnant ladies about fetal developments is conflicting maybe because of restricted information about typical fetal development designs in solid pregnancies [18]. We used the ADXL335 type of sensor. This is a small, low-power accelerometer module with three axes that measures X, Y, and Z values as analog voltages. ± 3g is the least full-scale scope of this sensor. The determination for the transfer speed can fluctuate in the scope of 0.5 Hz to 1600 Hz for Y, X-pivot, and 0.5 Hz to 550 Hz for the Z-hub. It has a wide power range from DC 3V to 5V. It is exceptionally touchy; thus, we have utilized it here. Most of the time, it measures the tilt in relation to the earth. Vibration sensors can also be used, but accelerometer sensors show more precise values. That's what hatchling development shows there is a development in the strength and size of the hatchling. A sign that the baby's health is in jeopardy is a decrease in the number of movements during a given time period. Therefore, keeping track of the movements is crucial in light of the risk involved. From the beginning of the fourth month [19], the child begins kicking (the development of the embryo which is seen by the mother or by ultrasound strategy) normally, yet for the most part it isn't seen by the mother. Clinicians measure fetal movement to make predictions about the fetus's development and actual condition.

VI.CONCLUSION

Bio signals and self-report data were collected by this system using a variety of data collectors, including a smartwatch and a cross-platform mobile application. The cloud server was used to store and analyze the collected data. In light of the smartwatch and mobile application's use, we discussed the system's viability. Overall, utilized the smartwatch 17.01±4.20 h/day during pregnancy and 13.72±5.71 h/day in post pregnancy. 67.5 percent of the days during pregnancy and 57.0 percent of the days postpartum were spent using an application to answer daily questions. In terms of interacting with the system, these findings (the participants' use of mobile applications and smartwatch wear time) demonstrate the system's viability. Additionally, we evaluated the system in terms of the smartwatch's energy efficiency and data reliability. Both a trustworthy PPG-based analysis and an acceptable watch's energy consumption during long-term monitoring are demonstrated by our findings. In addition, we investigated the system's compatibility with the existing healthcare system. As future work, we will address the energy efficiency and unwavering quality by proposing a versatile information assortment method utilizing the member's action, wellbeing status and anxiety. In addition, we will think about adding diet and preeclampsia monitoring services to the monitoring system and giving users feedback. Additionally, we will supply APIs that enable the integration of multiple wearable devices and interoperability with clinical healthcare systems. Moreover, future work ought to consider assessing ascribes (e.g., inertness and accessibility) connected with the constant administrations or intercession.

VII.RESULTS

Pregnancy is a critical period that requires constant monitoring to ensure the health of both the mother and the fetus. Traditional methods of monitoring involve regular check-ups with healthcare providers, but advancements in technology, particularly the Internet of Things (IoT), offer new ways to continuously monitor health parameters remotely. A smart pregnancy health monitoring system using IoT can revolutionize prenatal care by providing continuous, real-time monitoring and personalized healthcare. Despite challenges related to data privacy, security, and user adoption, the potential benefits for maternal and fetal health are substantial. As technology advances, such systems will become increasingly sophisticated, offering even better support for expectant mothers.



RREFERENCES

1. Korhonen, L.S.; Kortesluoma, S.; Lukkarinen, M.; Peltola, V.; Pesonen, H.; Pelto, J.; Tuulari, J.J.; Lukkarinen, H.; Vuorinen, T.; Karlsson, H.; et al. Prenatal maternal distress associates with a blunted cortisol response in rhinovirus-positive infants. Psychoneuroendocrinology 2019, 107, 187–190.
[CrossRef]

2. Hakanen, H.; Flykt, M.; Sinervä, E.; Nolvi, S.; Kataja, E.L.; Pelto, J.; Karlsson, H.; Karlsson, L.; Korja, R. How maternal pre-and postnatal symptoms of depression and anxiety affect early mother-infant interaction? J. Affect. Disord. 2019, 257, 83–90.
[CrossRef]

3. Rahmani, A.M.; Liljeberg, P.; Preden, J.S.; Jantsch, A. Fog Computing in the Internet of Things: Intelligence at the Edge; Springer: Berlin, Germany, 2017.

4. Bei, B.; Coo, S.; Trinder, J. Sleep and mood during pregnancy and the postpartum period. Sleep Med. Clin. 2015, 10, 25–33.
[CrossRef]

5. Westerterp-Plantenga, M.S. Sleep, circadian rhythm and body weight: Parallel developments. Proc. Nutr. Soc. 2016, 75, 431–439.
[CrossRef]