SMART INFANT INCUBATOR USING IOT

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ABSTRACT

The aim of the Smart Infant Incubator project using IoT is to enhance neonatal care by integrating advanced monitoring and communication technologies. This system focuses on continuous monitoring of vital signs such as heart rate, temperature, and air quality within an incubator, ensuring that the environment remains safe and conducive to an infant's health. By incorporating sensors, a Wi-Fi module, and cloud connectivity, the project enables real-time data tracking and alerts, facilitating immediate medical response and remote monitoring capabilities. This setup not only improves the responsiveness and effectiveness of infant care but also makes sophisticated monitoring technology more accessible and cost-effective, particularly beneficial in resource-limited settings.

Keywords: Arduino, Gas Sensor, Heartbeat Sensor, DHT11 Sensor, IOT.

I. INTRODUCTION

In India, both the parents need to work and look after their infant, so more workload and stress is there in such families, especially on female counterparts. Increasing female participation in various work fields have given rise to a need where Women have to take care of their family and at the same time handle the work pressure. Subsequently, infant care has become a challenge to many families in their daily life. Mother always worries about the well-being of her baby while working. In order to tackle this, a "Baby Monitoring System" can be developed which would help the parents to track the infant's health and also obtain continuous updates of health. Besides this, the system will also notify the parents about the abnormal situation so that they can take appropriate steps accordingly. The system will help the parents to take care of their child not only when they are at home but also when they are at the office or outside their home. This system will provide peace of mind to parents when they are away from their infant as they can obtain the updates of health of baby.

Communication is done by IOT interface in which Short Messaging Service (SMS) is a fundamental part. Earlier the manual participation was required for monitoring babies which was a tedious job. With the advancement in technology, various different types of baby monitoring systems were introduced such as Sound Monitors which included the use of transmitter and receiver to transmit the voice of baby to its parents. The main drawback of this system was that the device was capable of transmitting the voice only in one direction that is from baby to its parents but not vice versa. Another system that used Video Monitors displayed the video of baby's live activities continuously to parents. The problem with the above systems was that they were inefficient to take appropriate care of the baby as they either used video or audio which was inefficient to provide the proper information and parameters of baby's health. Usually, when a young baby cries, the cause is one of the following things i.e. they are hungry, tired, not feeling well or need their diaper changed. So, we developed a prototype which can monitor the activities of the babies and/or infants along with finding one of the above causes and give this information to their parents. This proposed system focuses on the information that it receives from sensors which would be helpful to maintain health of a baby by transmitting information.

II. METHODOLOGY

The methodology for the Smart Infant Incubator project involves integrating various sensors (heartbeat, temperature & humidity, gas, and accelerometer) with an Arduino UNO to monitor real-time conditions within the incubator. Data collected by the Arduino is sent via a serial connection to a Node MCU, which then uploads this information to the Thing Speak cloud platform for remote monitoring. Alerts are generated through a buzzer and LEDs based on predefined thresholds to ensure immediate attention to critical changes. The system utilizes the Wi-Fi capabilities of the Node MCU to allow healthcare providers and parents to access real-time

data and receive alerts through a user-friendly interface, enhancing the response efficiency and overall care quality.

Method and analysis which is performed in your research work should be written in this section. A simple strategy to follow is to use keywords from your title in first few sentences.

Development Tools

Hardware:

1. Arduino UNO

2. Node MCU

3. Heartbeat Sensor

4. Temperature & Humidity Sensor

5. Gas Sensor

6. Accelerometer

7. WIFI Module

8. Buzzer

9. LED

Software:

1) Arduino IDE

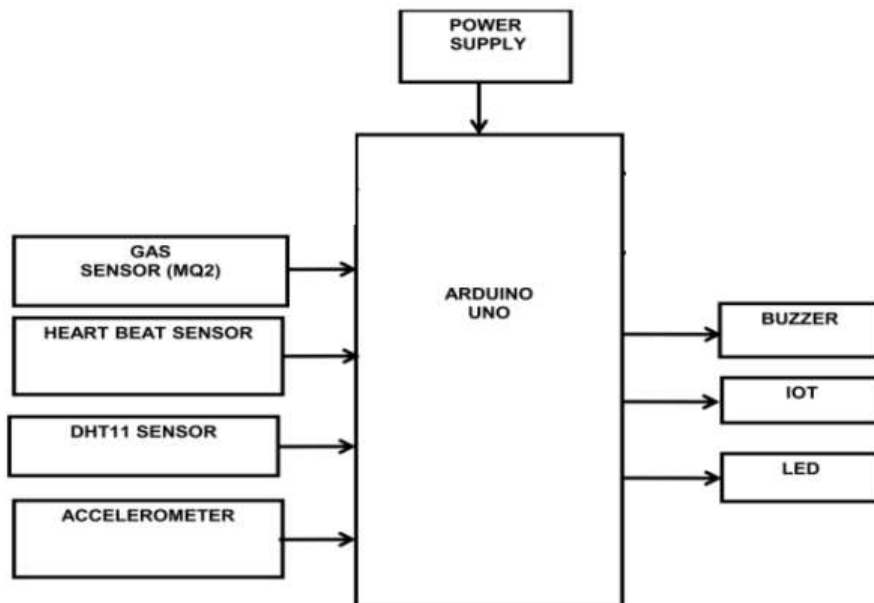2) Proteus

III.   MODELING AND ANALYSIS

Fig 1: Block Diagram

Description:

This system is mainly used to monitor the health condition automatically.

In this Proposed system Arduino microcontroller is used as heart of the system, we use the heartbeat sensor to monitor the heart beat or pulse rate of the baby, DHT11 Sensor is used to monitor the temperature inside the incubator. It automatically maintains the incubator temperature using light.

Gas sensor is used to detect the any harmful gas that may damage the baby health.

Accelerometer sensor is used to check the baby body position (axis). Any Abnormal Condition and any values that are being monitored went beyond threshold, automatically alarm will be issued using buzzer, sending Message through node MCU to Parents, and doctors.

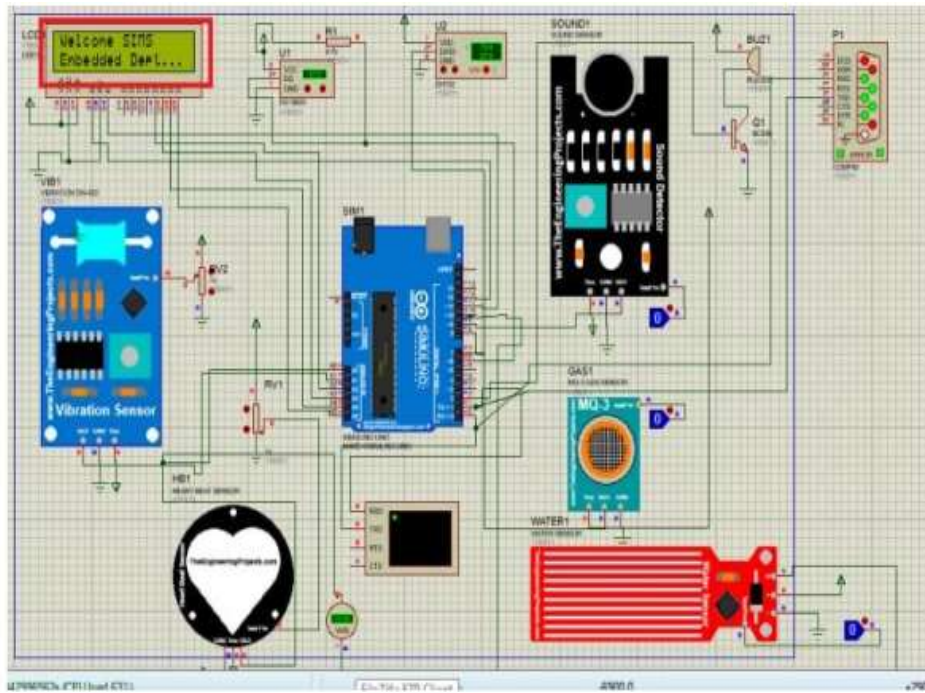All the information is sent to IOT webpage.

Circuit Diagram:

Fig 2: Circuit Diagram
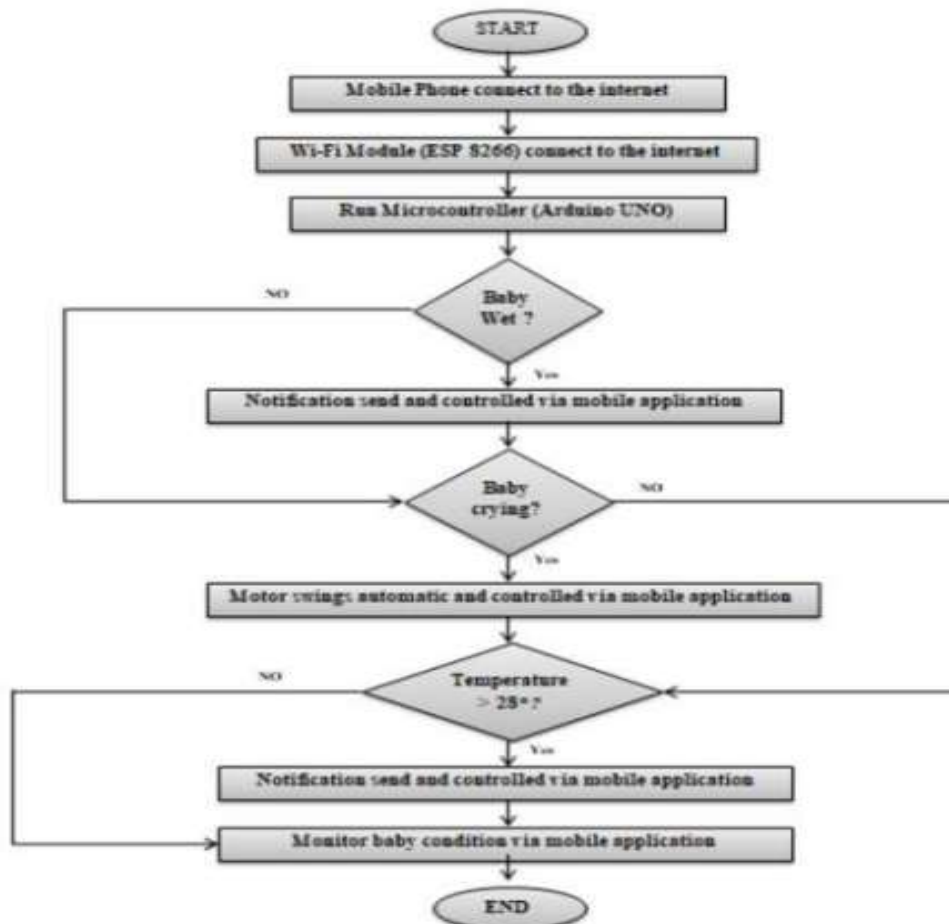
Flow Chart:

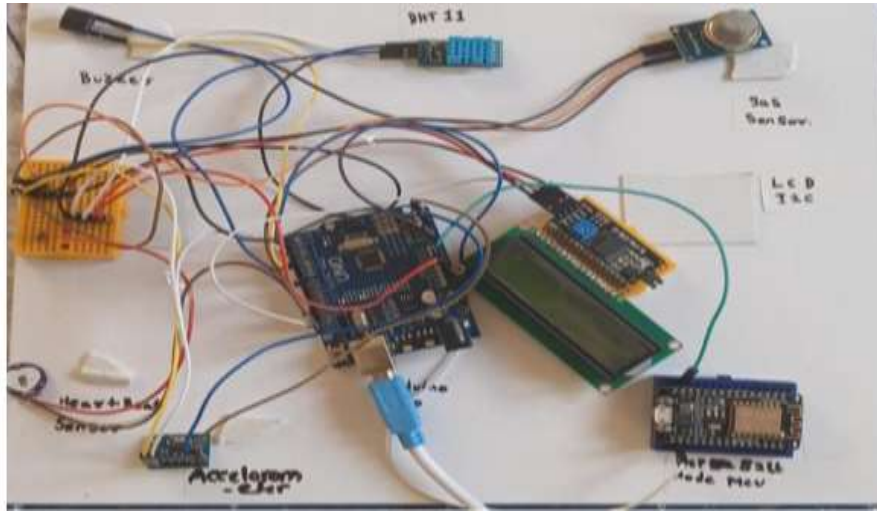**Fig. 3:** Flowchart

IV. RESULTS AND DISCUSSION

Fig 4: Result

V. FUTURE SCOPE

- For future work we can add camera for live monitoring
- In future, we can add baby sentiment analysis algorithm too

VI. CONCLUSION

The proposed system involves the use of Arduino integrated to various sensor units such as pulse, gas, temperature, and humidity sensors. The readings of the sensor are continuously monitored with help of IoT and can be controlled, thereby providing efficient and safe working of an incubator.

VII. REFERENCES

[1] Al- Saffar, Ahmad J , Abbas, Esam , Fardoun .A, Ismail. H ,Mustafa A , Sabzali and, (2008) 'wireless transmission of health parameters in baby incubator, IEEE Transactions on modern technology Vol. 23,Issue 5, pp. 115-121.

[2] Chanin Bunlaksananusorn, Vuthchhay Eng, and Unnat Pinsopon 'Start up incubators and the role of social capital', IEEE Transactions on Biomedical Engineering, Vol.3, Issue 2, pp. 265-271.

[3] Jaiganesh, R. "Smart Grid System for Water Pumping and Domestic Application using Arduino Controller." International Journal of Engineering Research & Technology (IJERT) 5.13 (2017): 583 588 (2017)

[4] Jaiganesh, R. Grocery Theft and Monitoring Using IoT for Stack Management application" International Journal of Engineering Research & Technology (IJERT) 4.08 (2018): 583 588 (2018).

[5] George Cajazeiras Silveira, Fernando Lessa Tofoli, Luiz Daniel Santos Bezerra and René Pastor Torrico Bascopé (2009) 'Internet of things', IEEE Transactions on Internet of things Vol. 60, Issue 5, pp. 1861–1871.