

FALL-SEM 2021-22
PROJECT REPORT
School of Electronics Engineering (SENSE)



IoT Fundamentals (Slot: G1)
Infant Monitoring System Using Arduino

SUBMITTED TO:
Prof. Sriharipriya K C
Associate Professor (Senior) School of Electronics Engineering

SUBMITTED BY:
Abantee Gangopadhyay – 19BEC0363
Sree Lalitha – 19BEC0530
Aswin Aby Sanu – 19BEC0386
Tanuja Swathi Seeram – 19BEC0831

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ABSTRACT

'In today's hectic world parents are busy and have no time to care for their babies. This causes troubles to the health of children. The number of working people in every family is increasing in recent times. Previously, the parent or guardian at home used to take care of babies and infants but nowadays this is not possible as all of them are working. This can affect the physical and mental health of the infants. To solve this problem, we have attempted to create an Infant Monitoring system that monitors the baby and sends alerts to the guardian's mobile in case of any abnormalities. 'We aim to create a system that will sense factors like the baby's movements, body temperature, moisture, noise etc. and will accordingly send an alert using the GSM module to the guardian's mobile numbers. Measurements of vital parameters can be done and under risk situations conveyed to the parents with an alarm triggering system to initiate the proper control actions. This system is based on the GSM network to send alert messages to the parents when any of these values exceeds the saved values.

INTRODUCTION

The world is progressing towards a future that demands a lot of skilled people in different fields from various fields. This has increased numerous job opportunities for both women and men.. Almost in every household, men and women are working from technical jobs to IT companies. Especially in these situations, it is hard to take care of the babies in the house as the parents are working and are not by the side of the baby throughout. This may affect the health of the children.

In our project we aim to try and solve this problem by creating a system that will sense factors like the baby's movements, body temperature, moisture, noise etc.. and will send alerts to the guardian's mobile numbers using the GSM module. 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 the baby. Communication is done by GSM interface in which Short Messaging Service (SMS) is a fundamental part. We developed a prototype which can monitor the activities of the babies and/or infants along with finding the cause for crying and give this information to their parents.

COMPONENTS USED

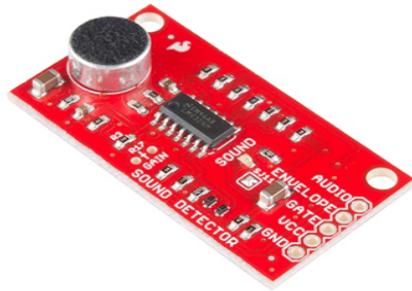
1. Arduino UNO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.



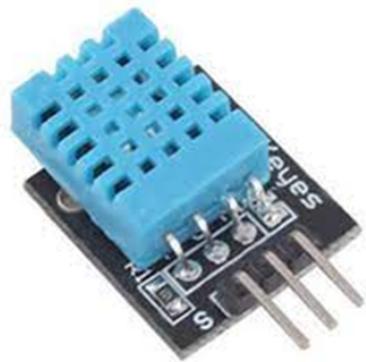
2. Noise Detection Sensor

The sound sensor is a type of module used to notice the sound. Generally, this module is used to detect the intensity of sound. The applications of this module mainly include switch, security, as well as monitoring. The accuracy of this sensor can be changed for the ease of usage.



3. DHT Sensor

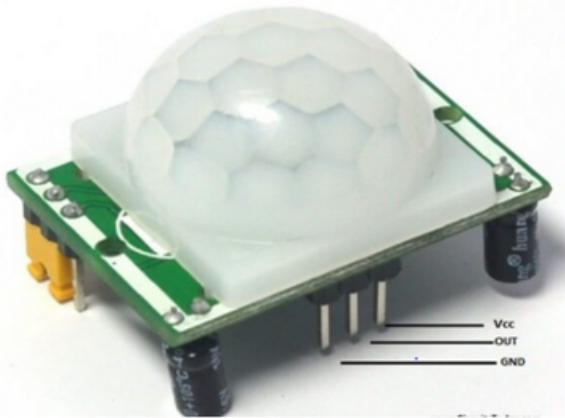
The DHT11 calculates relative humidity by measuring the electrical resistance between two electrodes. The humidity sensing component of the DHT11 is a moisture holding substrate with the electrodes applied to the surface.



4. PIR Sensor

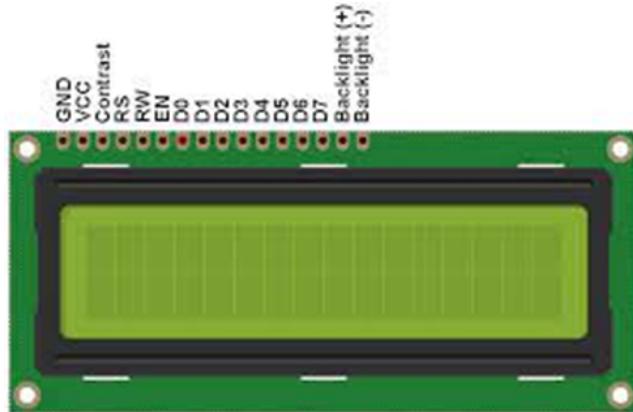
A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.

PIR Sensor - (Motion Sensor or Motion Detector)



5. LCD Display (16x2)

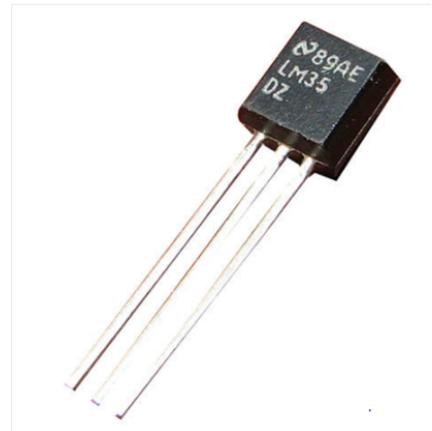
LCDs are commonly used for portable electronic games, as viewfinders for digital cameras and camcorders, in video projection systems, for electronic billboards, as monitors for computers, and in flat-panel televisions.



6. LM35 Sensor

LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in

Centigrade (Celsius). It does not require any external calibration circuitry. The sensitivity of LM35 is 10 mV/degree Celsius.



7. GSM Module

(GSM) module is designed for wireless radiation monitoring through Short Messaging Service (SMS). This module is able to receive serial data from radiation monitoring devices such as survey meter or area monitor and transmit the data as text SMS to a host server.

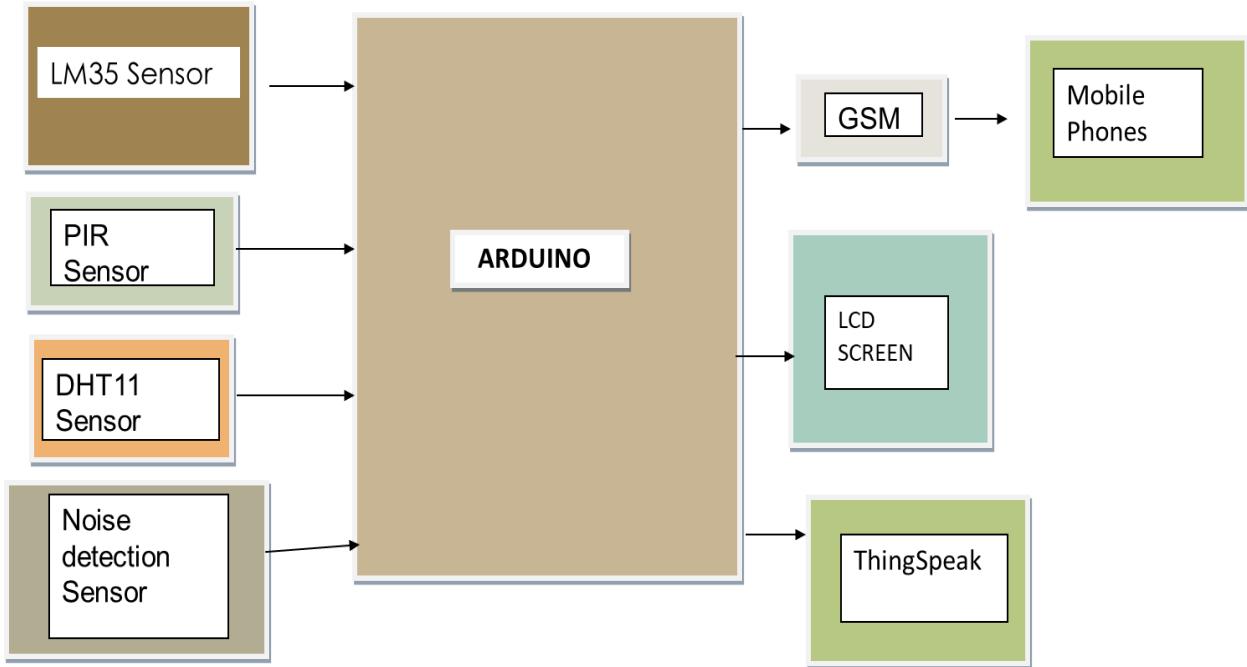


LITERATURE REVIEW

S.No.	Paper Title	Year of Publishing	Technique Used
1.	Review on baby monitoring system	2010	This system recognizes the crying voice of baby and send SMS or to make a call to baby's parent with the help of GSM module
2.	Intelligent baby monitoring system and bluetooth controlled cradle	2018	Bluetooth innovation is used to control the movement of a cradle through android application
3.	Baby monitoring system using image processing and IoT	2019	The system is based on an internet enabled single board computer called Raspberry Pi 3 B+. Image processing is proposed in this paper. This system sends the message to parents through mail when abnormal condition occurs
4.	Baby monitoring system using wireless camera	2017	This system is based on the GSM network to send alert messages to the parents. This

			system is attached with a video camera which is operated with the instructions from the microcontroller and is used to capture the video when the motion sensor detects the baby's movements continuously.
5.	Monitoring and controlling a baby cradle with adaptive features	2020	Live footage of the baby and updates on body temperature and moisture content is shown using a webcam, temperature sensor, humidity sensor and sound sensor. All these are connected to Arduino UNO

BLOCK DIAGRAM

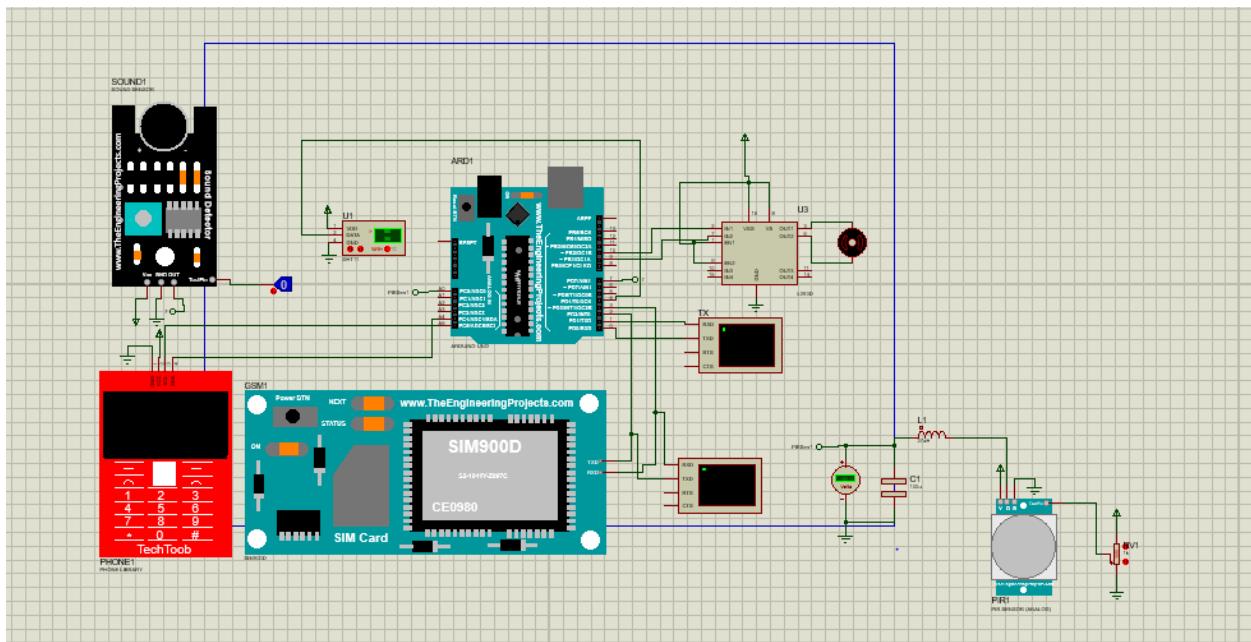
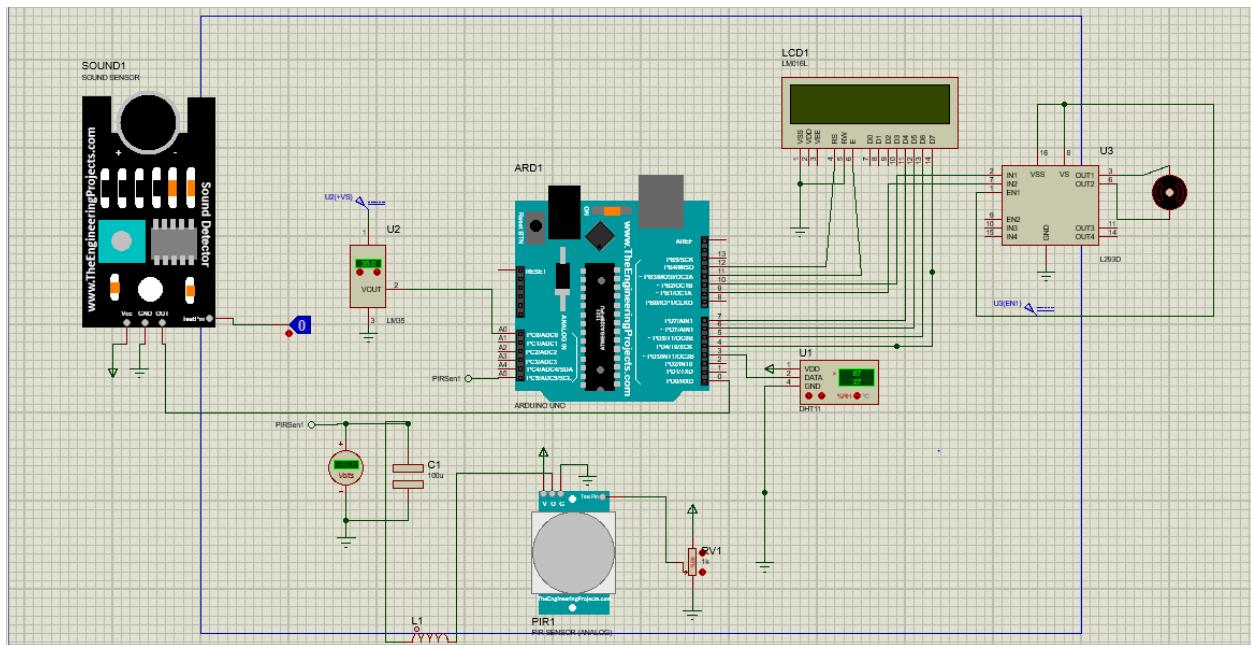


WORKING

1. The necessary connections are first made.
2. Through the code, all the conditions and threshold values for the sensors are entered individually.
3. If the temperature is found to be more than 37°C(indicating that the baby might have a fever), the message is printed on the LCD and an alert message is sent to the guardian's phone with the help of the GSM module and a phone library.
4. Similarly for humidity, noise and motion sensor. For motion sensor we also have a motor attached which corresponds to a cradle. If the baby is found to be crying then the motor will start rotating indicating that the cradle is being swung to soothe the baby.
5. The same circuit has been replicated in Tinkercad along with a Wi-fi Module in order to connect it with ThingSpeak.

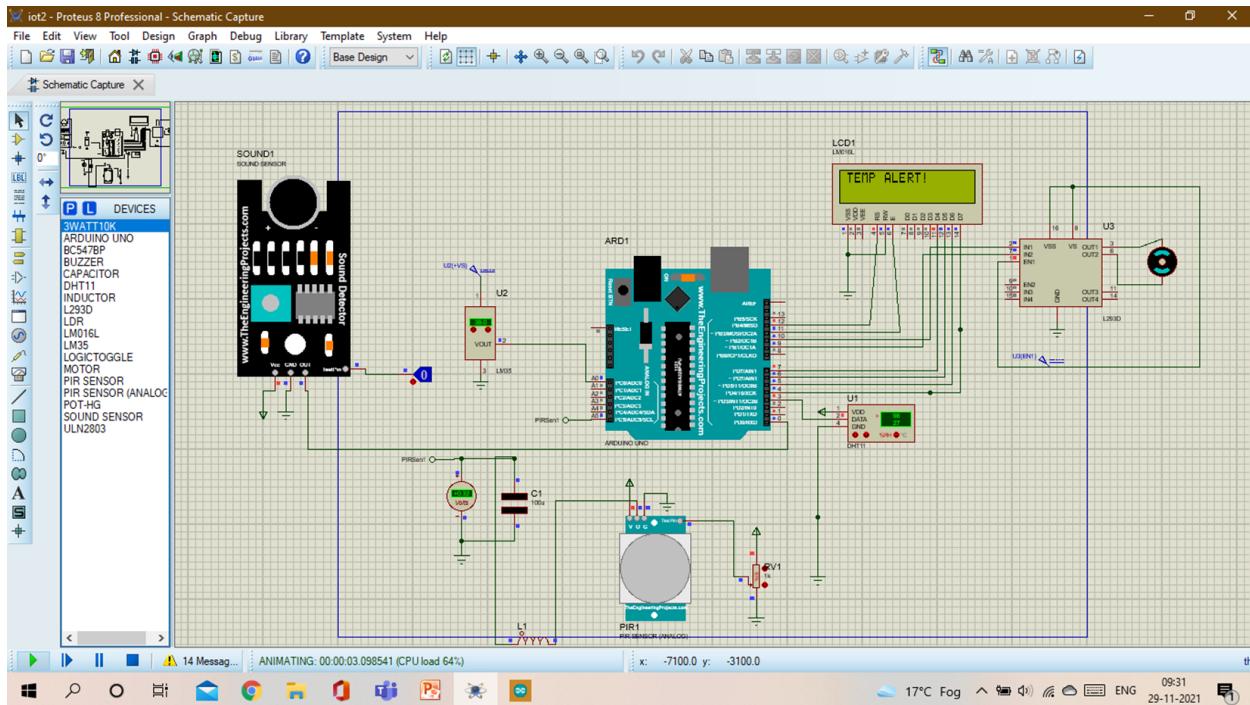
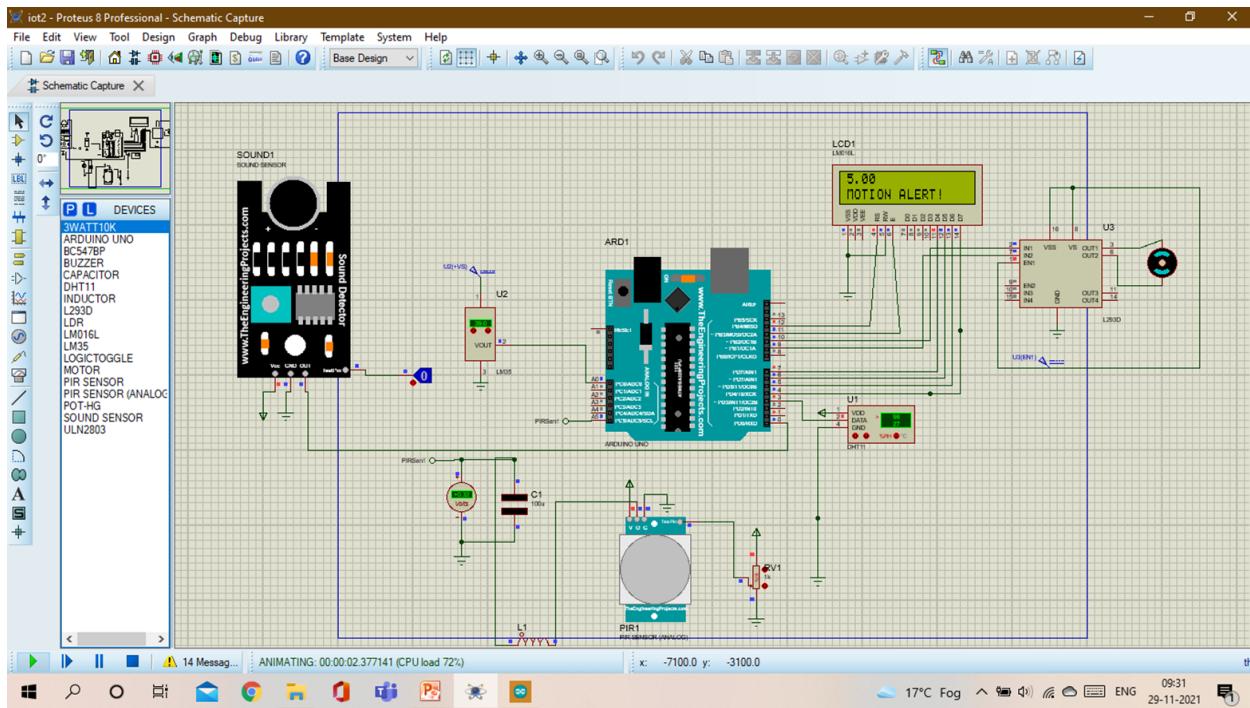
6. Using ThingSpeak, we can monitor the infant and the different sensor values real time.

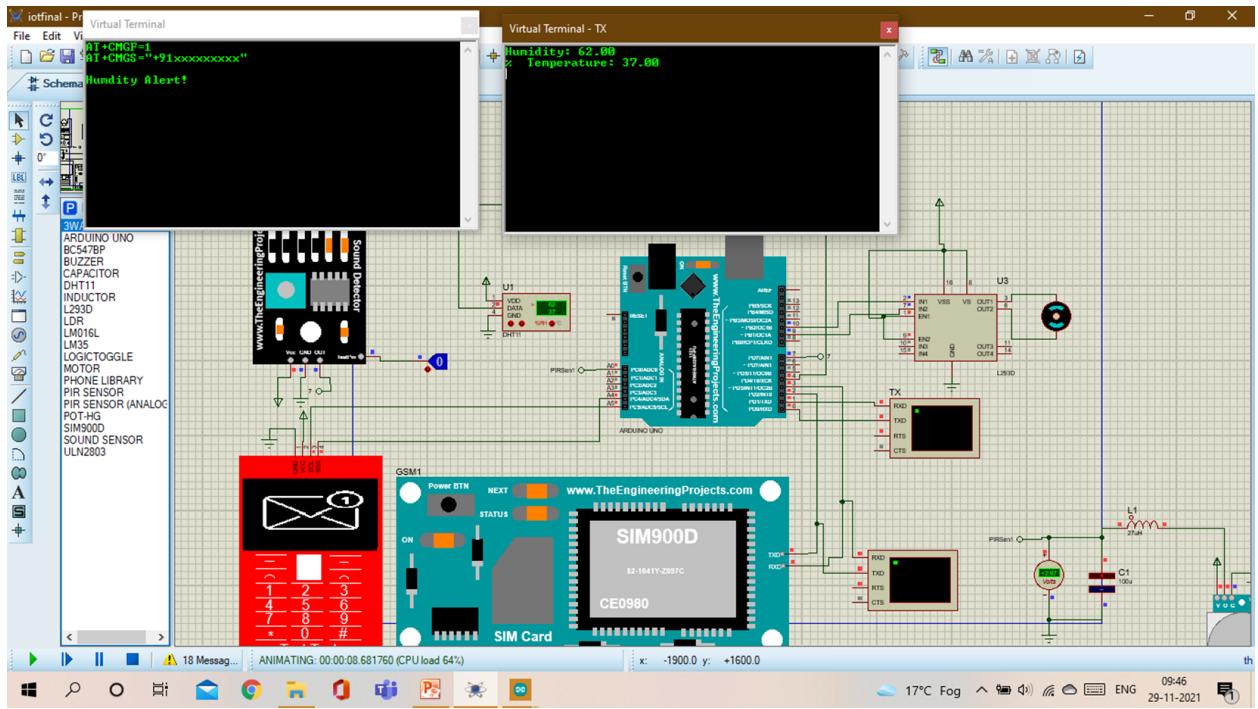
CIRCUIT DIAGRAM



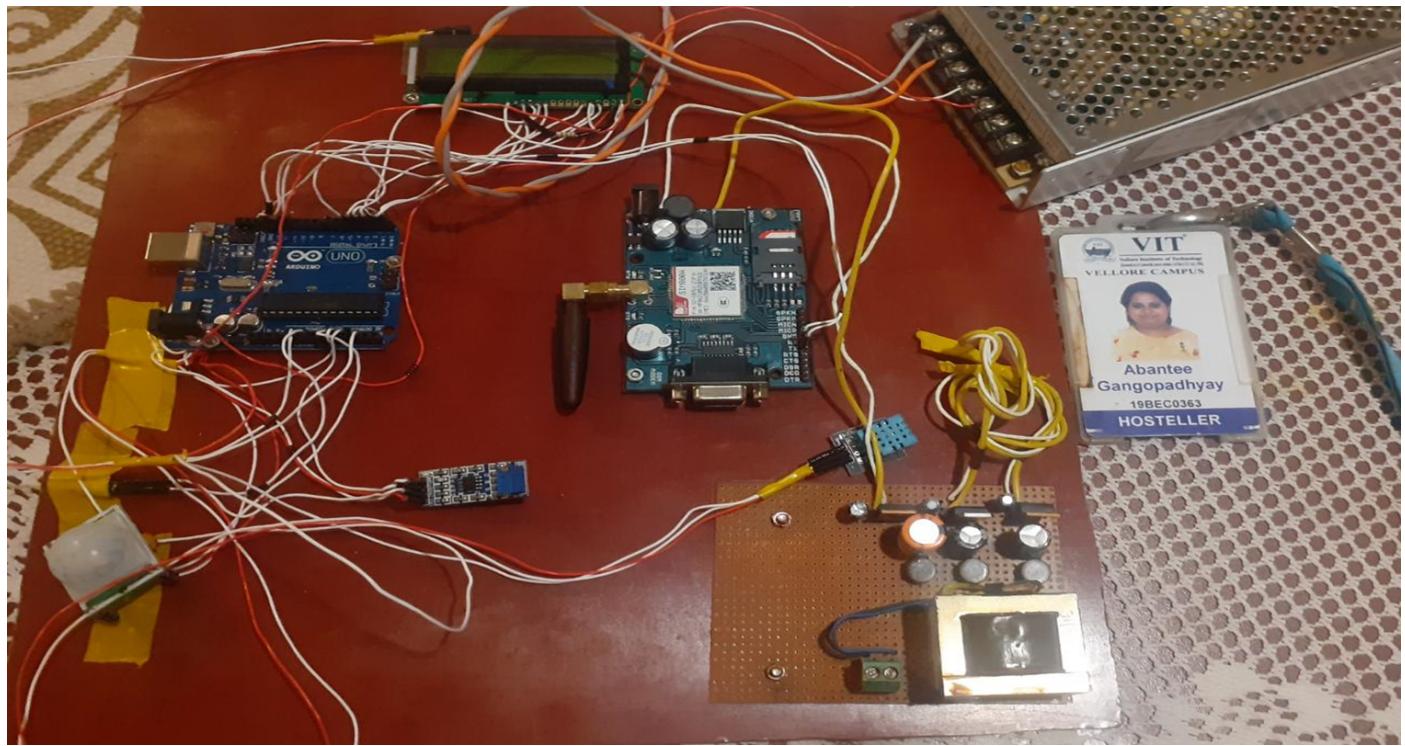
SIMULATIONS

Proteus:





Hardware Arrangements



Video Link:

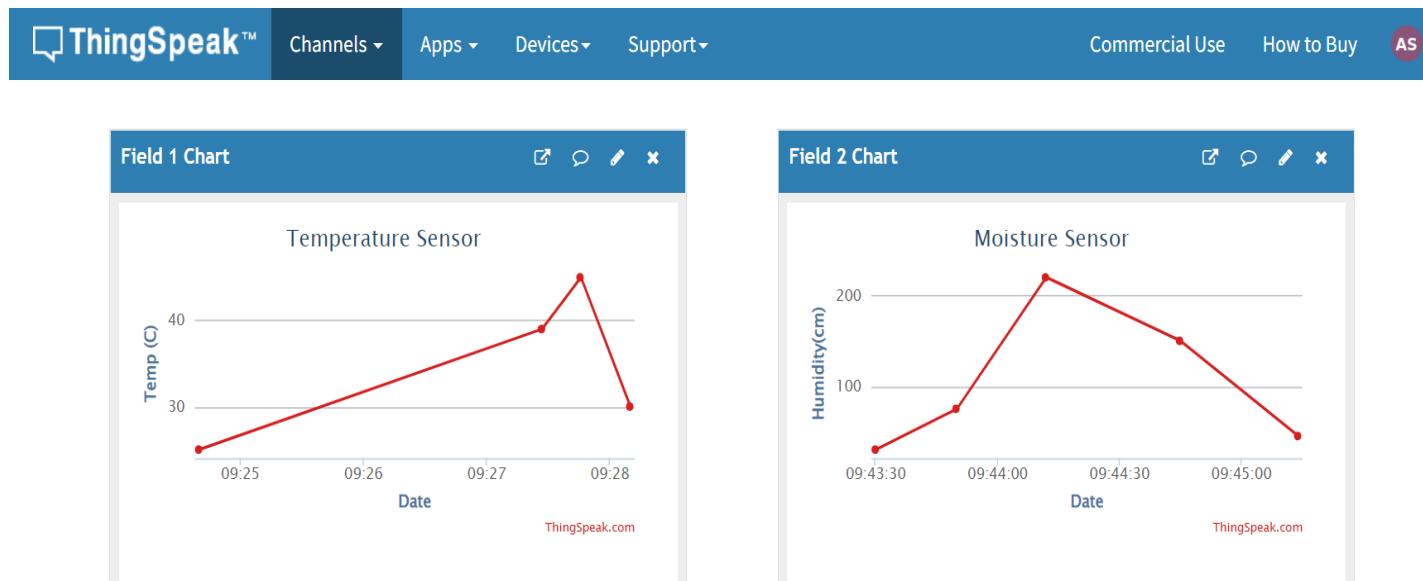
https://drive.google.com/file/d/11nfbprq-Ls6h7O_atqN1Ykz2p7M4x6IT/view?usp=sharing

Link for code:

<https://drive.google.com/file/d/1EETYlzOASS16acPES-uRs17vagJJT-Tb/view?usp=sharing>

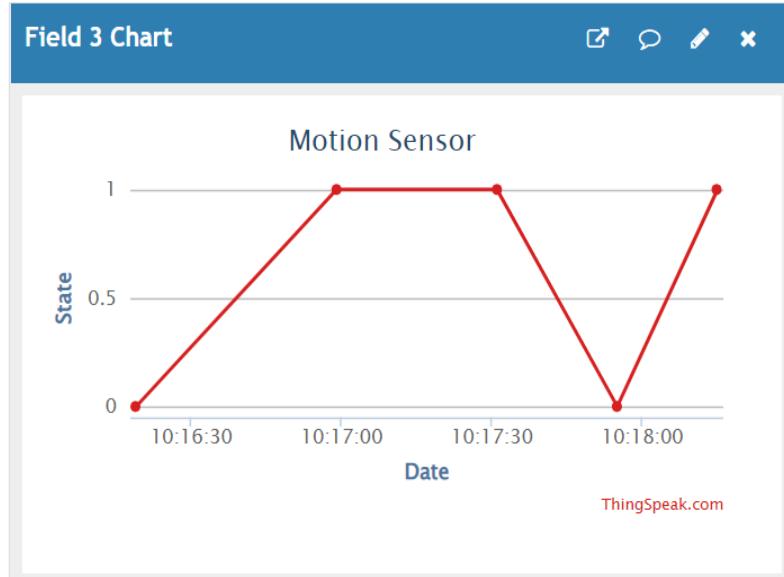
https://drive.google.com/file/d/1BaMRuiF-U_UQ1Nhoti_G_Kh1f4OWLnKS/view?usp=sharing

ThingSpeak:



(a) Temperature sensor

(b) Moisture Sensor



(c) Motion Sensor

CONCLUSION

Proposed Infant Monitoring System is an in-expensive and simple to use, which can improve the quality of infant-parent communication. This system expressly provides the parents with a feeling of assurance. The constant capturing of multiple biological parameters of the baby and analysis of the overall health helps mothers to understand the internal status of the baby. GSM technology is used which allows users to communicate for longer distances. This is a convenient system to monitor the baby's health condition from any distance.

The design model is easy to implement and very customizable according to the user requirement. The integration of various sensors with Arduino will provide a better way for the monitoring of the baby. The concept of camera interfacing to arduino and which is controlled by arduino itself helps in monitoring of babies.

The sensors used here namely, Noise Detection Sensor, DHT Sensor, PIR Sensor, LM35 Sensor are also used to simulate a circuit in TinkerCad software. Sensor values obtained are sent to the cloud with the help of a ThingSpeak Channel. This channel displays all information regarding sensor data in a graphical form.

Reference Papers

- https://www.researchgate.net/publication/319117670_Arduino_Based_Infant_Monitoring_System
- https://ijcrt.org/papers/IJCRT_184780.pdf
- <https://ijret.org/volumes/2016v05/i05/IJRET20160505062.pdf>
- http://www.ijfrcsce.org/download/conferences/NCIRCST_2018/NCIRCST_Track/1523081219_07-04-2018.pdf
- <https://ijarcce.com/wp-content/uploads/2019/04/IJARCCE.2019.8402.pdf>
- http://www.ijarse.com/images/fullpdf/1524396416_AIET1050ijarse.pdf