

# Design of robust infant health monitoring system through IEEE 802.15

<sup>1</sup>Katta Karthik Reddy, <sup>2</sup>Deepa Mandal, <sup>3</sup>A.Pranay Deep Yadav, <sup>4</sup>Vinod Kumar Ahuja

*Department of Electronics and Communication Engineering.*

*Hyderabad Institute of Technology and Management affiliated to JNTUH, Hyderabad, Telengana-India.*

*Email:Karthikreddykatta98@gmail.com.*

**Abstract:** In the night time, when the baby is asleep, bedwetting, waking up and crying are all the small problems which lead to illness. To solve these problems we have designed the system using different types of sensors like sound sensor, soil moisture sensor, Temperature and humidity sensor and actuators such as motor and a fan and communication device Bluetooth (HC-05). Whenever any of the above mentioned problems occurs, the guardian of the baby gets a message in their smart phone connected to the Bluetooth. The data is stored, commands are sent to the device through the Bluetooth app and the data is received by the guardian mobile phone from the device, intimating the guardian to take the baby out of the bed wetted cradle or about crib, the fan gets switched on in case of hot room temperature, the motor oscillates the cradle if the baby starts crying.

**Key Words:** Baby monitoring, bluetooth, soil moisture sensor, sound sensor.

## 1. INTRODUCTION:

There are many consequences that one might have to undergo in the absence of baby monitoring system. Upon having a closer look at the deeper insights of the problems, that both the parents and the child may have to suffer with, if not looked upon as soon as possible, we have figured out that excessive crying (also known as Colic), long continued or oft-repeated crying can produce so much cortisol, that it can damage the baby's brain. Also Colic can lead to major problems in the vocal cords.

Prolonged crying can damage the vocal cords of the baby and can cause nodules, irritation and pain. The vocal cords which are in V-shaped muscles near Adam's apple that control the voice. When these muscles get damaged, a baby's throat may become chronically hoarse and experience pain.

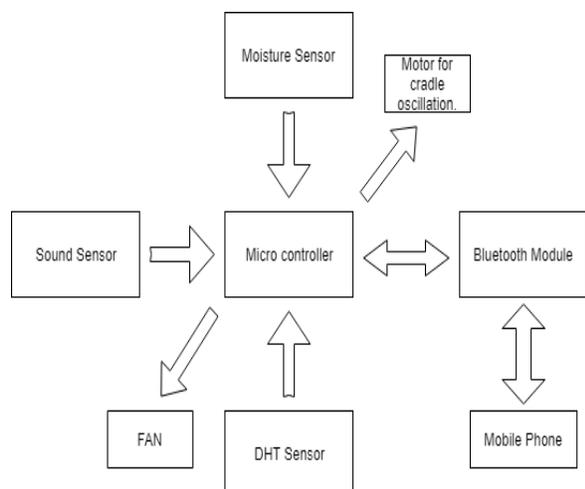
The infant's bed-wetting may also lead to problems like skin allergies and rashes which might gradually lead to major problems if not handled accurately. Also keeping humidity and climatic changes in mind, we have figured out that with climate change, there is a significant impact of ambient humidity on child health, especially for climate-sensitive infectious diseases, diarrheal diseases, respiratory system diseases, and pediatric allergic diseases. Also having a system to solve these above mentioned problems would not be enough as there needs to be a feasible mechanism for update on the above. Hence we came up with the idea of Baby Monitoring system in order to solve major problems concerning with child's health.

## 2. WORKING:

The entire device is safely incorporated into the cradle. The entire device is built upon an Arduino. When the device is on, the sensors interfaced with Arduino, get activated and wait for the detection. For each sensor detection, there is one actuator interfaced. The cradle has a 100Rpm DC motor attached to it which comes into Action when the baby starts weeping. This motor works with the help of a motor driver module named L293D. The sound sensor module is used for easy detection of sound and to detect the intensity of the sound. The microphone in this module supplies the input to an amplifier, a peak detector and a buffer. When this sensor detects the sound, it gives an output signal voltage which is given as input to the microcontroller and the DC motor which is fit on the cradle gets activated and the cradle starts oscillating.

A Soil moisture sensor is used to detect moisture content in the child's bed. (Basically this sensor is used to detect the moisture content in the soil, but, using its principle, we can also use it to detect any moisture content) When the baby bed-wets, sensor detects it and triggers the microcontroller, and hence turns on an alarm which remains so until an action is taken upon it.

Sensor module named "DHT digital temperature and humidity sensor" is a composite sensor contains a calibrated digital signal output of the temperature and humidity. A Humidity Sensor attached to the cradle puts the fan module into action when the humidity crosses a certain threshold value. When the humidity is under the threshold the fan gets turned off automatically.



**Technical Specifications of temperature and humidity sensor:**

All of these modules are interfaced with a Bluetooth module HC-05, which controls the overall functioning of the device and gives precise real time details of the same upon an application called Bluetooth SPP Pro app.

**3. BLOCK DIAGRAM:**

The above block diagram depicts the functioning of Baby Monitoring System. When the system starts, the sensors which we have interfaced will get started and wait for their detection. For each sensor detection, there is an actuator attached, which gets activated. From the above diagram (fig: 1) we can see that each sensor is communicating with the microcontroller. The microcontroller takes the output signal voltage from the sensors and activates the actuators. The Bluetooth module which we are using is for the communication between the parent and guardian. Every process which is happening in the device will be communicated with the parent or guardian mobile using Bluetooth module. The parent or the guardian can also send the commands to the device using Bluetooth SPP pro app.

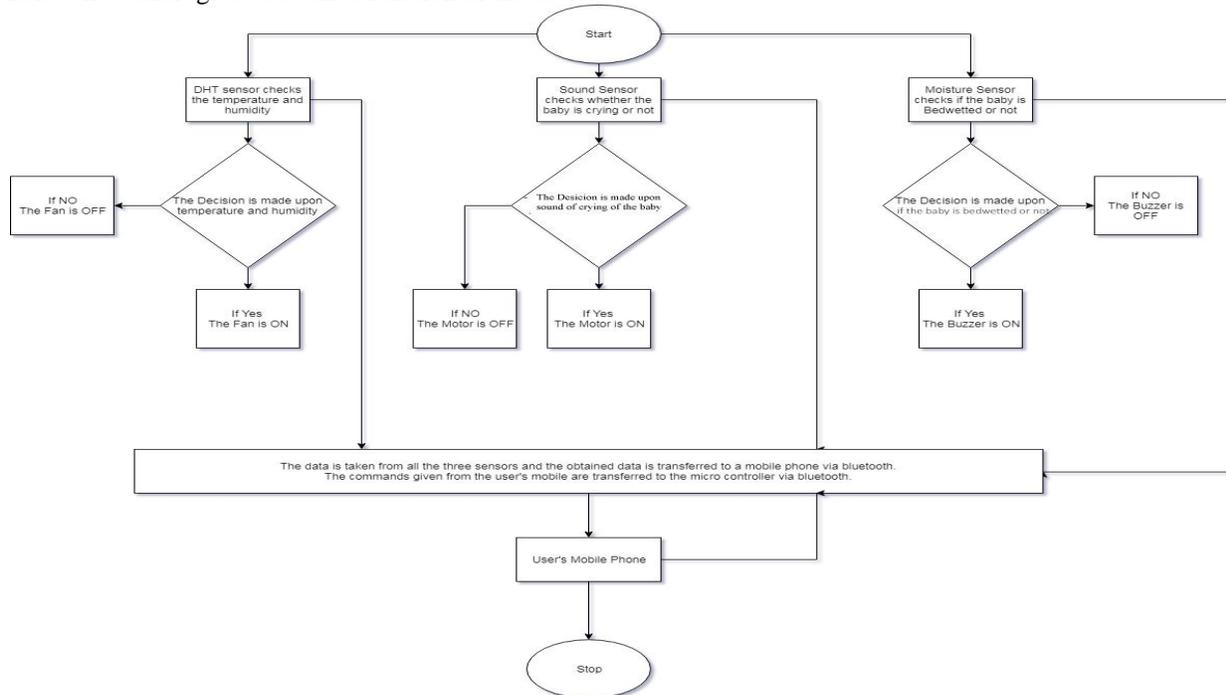
**4. MODEL PROTOTYPE:**



| Item   | Measurement Range   | Humidity   | Temperature | Package                |
|--------|---------------------|------------|-------------|------------------------|
| DHT 11 | 20_90%RH<br>0-50 °C | ±5 %<br>RH | ±2°C        | 4 Pin<br>Single<br>Row |

**5. ALGORITHM:**

Below flow chart gives a detailed function of the device.



**6. CONCLUSION:**

In this work, a low cost feasible mechanism using various sensors and modules is discussed, designed and developed to work in real-time environment in the health care sector. The functionality of this model is tested in real time environment and is found to be assertive. This device enables parents to work and along with taking care of the child's needs without their physical presence, with the help of a real time data update every second. This device can be used not

only to monitor a child but can also be used in various health care sectors, in order to monitor a patient's wellbeing, by interfacing few more sensors.

**REFERENCE:**

[1] Gao, Jinghong, et al. "Impact of ambient humidity on child health: a systematic review." *PLoS one* 9.12 (2014): e112508.

[2] Cotta, Anisha, Naik Trupti Devidas, and Varda Kalidas Naik Ekoskar. "Wireless Communication Using HC-05 Bluetooth Module Interfaced With Arduino." *International Journal of Science, Engineering and Technology Research (IJSETR)* 5.4 (2016).

[3] Temperature and Humidity Sensor DTH: Low cost Solutions for Temperature and Humidity monitoring and control System using Touch Screen Technology – Mr.Ashish sharma, Mr.Gaurav Tiwari, Mr.Duvijay Singh

[4] Soil Moisture Sensor :Radman, Vuk, and Milutin Radonjić. "Arduino-based System for Soil Moisture Measurement." *Proc. 22nd Conference on Information Technologies IT 17*. 2017.

[5] S. Brangui, M. El Kihal and Y. Salih-Alj, "An enhanced noise cancelling system for a comprehensive monitoring and control of baby environments", 2015 International Conference on Electrical and Information Technologies (ICEIT), pp. 404-409, 2015.

[6] P. Dive and P. Kulkarni, "Design of Embedded Device for Incubator for the Monitoring of Infants", *International Journal of Advanced Research in Computer Science and Software Engineering*, vol. 3, no. 11, pp. 541-546, 2013.