

Design and Development of IOT based Baby Cradle

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Abstract

In modern scenario parents are so busy in their professional life, so it is quite difficult for them to take care of infants. So, there is need of some system which can help parents to monitor their child from remote location. This cradle is designed using android application which helps parents to monitor their child from their work place they can login anytime and see the activity of their child. In proposed system baby cradle is attached with a system which consist of dc motor which helps to swing the cradle, a cry detector which detects whether baby is crying or not, a wet sensor which detects the whether the mattress is wet or dry.

Keywords

IoT, Microcontroller, Wet Sensor, LCD, Motor and Android

1. Introduction

In present scenario, both the parents are too busy in their professional life due to this; it is very tough to take care of newborn babies because that's why they do not get sufficient time to take care of their babies. In modern world women have to manage home along with their office work simultaneously. The proposed cradle is designed using android application which helps parents to monitor their child from their work place they can login anytime and see the activity of their child. In proposed system baby cradle is attached with a system which consist of dc motor which helps to swing the cradle, a cry detector which detects whether baby is crying or not, a wet sensor which detects the whether the mattress is wet or dry.

The design aims at following points:

- To design a system that can detect baby cry and moisture of mattress.
- Monitoring of baby via camera and to interface the system with the web server.
- Mobile application based control of E- Cradle.

2. Related Work

Nitin Bhatnagar designed Automatic & Indigenous E Cradle. when baby cries then E Cradle swings automatically, to detects the baby crying voice microphone was used and the cradle swings accordingly till the baby stops crying .wet sensor is used to detect the wetness . The system was developed with an alarm that determines two conditions – first swing of cradle when baby doesn't stop crying within the time period of 2 minute. And second if the mattress is wet, that is the important parameter to keep the baby in hygienic [1].

Adwait B Kadu gave an approach towards designing an automatically swinging cradle system. It was integrated with a wet sensor and alarm if the baby found in wet condition which indicates that baby needs immediate attention. DC motor was interfaced to obtain the rotational motion. As per programming, the motor stated rotating in clockwise direction it pushes the baby bassinet as the free

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wheel mounted on shaft is in contact with the semicircular strip under the bassinet and then for particular time interval it rotated in anticlockwise direction [2].

Misha Goyal developed low cost indigenous electronic baby cradle. The speed of the cradle controlled with baby cries, for that purpose to detect the cry sound ,microphone was used electric signal was used to convert the cry into sound signal , in order to amplify the signals received through MIC the signal conditioning circuit was used . To found both the conditions wet and cry the alarm was implemented with the system [3].

Anritha Ebenezer Designed an automatic cradle swinging system for assisting infant care. It consisted a cry detection system which analyzes the baby cry; whenever peak cry was detected ,the signals was send to microcontroller then control signal send to the drivers and drivers derived the DC motor accordingly. Which made the cradle to swing according to sound intensity varies. If still the baby does not stop the crying within a particular instant of a time a call or message was be send to the caretaker’s mobile number via GSM [4].

Steven Bang originated an automatic baby rocker with noise sensor implemented to detect baby cry. That sensor which picks the sound signal from surrounding consists of electric MIC having pre-amplifier circuit. Signal generated from noise sensor is fed to microcontroller which was used to control the DC motor attached with rocker. Few colorful lights made up of LED were used to entertain the baby being rocked [5].

Chau-Kai-Hsieh designed a baby cry analyzer that includes an amplifier circuit to amplify a sound received. As a reply to the amplified sound signal, a pulse generator circuit with zero crossings. They are aligned with the zero crossing of the amplified sound signal that is used to generate a pulse signal. Then after pulse signal was given as the input to a signal recognition circuit. The output of signal recognition was specifying that a baby’s cry is detected [6].

Gim Wong presented an electronic device that would be connected to traditional pivotally mounted style crib. This was driven by baby cry voice picked up by the microphone giving short throw type rocking action to crib [7].

Marie R. Harper Implemented a baby crib adapted to be swing automatically by an oscillatory action of motor having the same function as would be achieved by a motor rocking a crib containing a baby. When the crib was manually tilted in one direction and then released, this provided the inertia to actuate the locking and initiate arms to operate under the biasing force of spring in synchrony with the gear. Hence, the motor loaded with spring begin to operate and the lever which is attached to crib was swinging in back and forth movement [8].

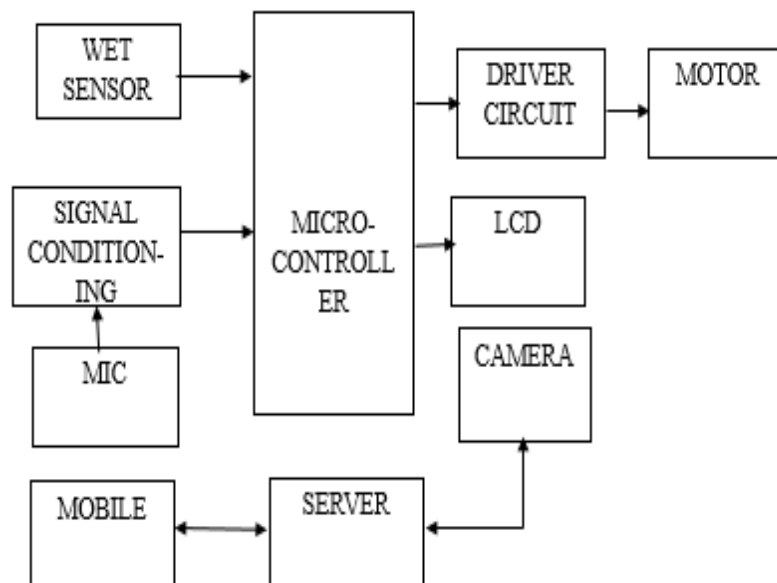


Figure 1: Block Diagram

3. Block Description

3.1 Microcontroller

It acts as a processing unit for the system. This will pick the signals from the sensors and process them to take appropriate action. Microcontroller will be interrupted for immediate actions like in case of wet detected or baby cry. Microcontroller controls the motor with the help of driver circuit and provides smooth swing.

3.2 Wet Sensor

This will play an important role as far as baby comfort is concerned. It will send the signal in the form of current when the mattress is wet due to pee and inform the controller about the wet detection. In this sensor conducting tracks are designed with a small gap between two neighboring tracks. Conducting pee will short these tracks and the resistance of the sensor will reduce to nearly zero.

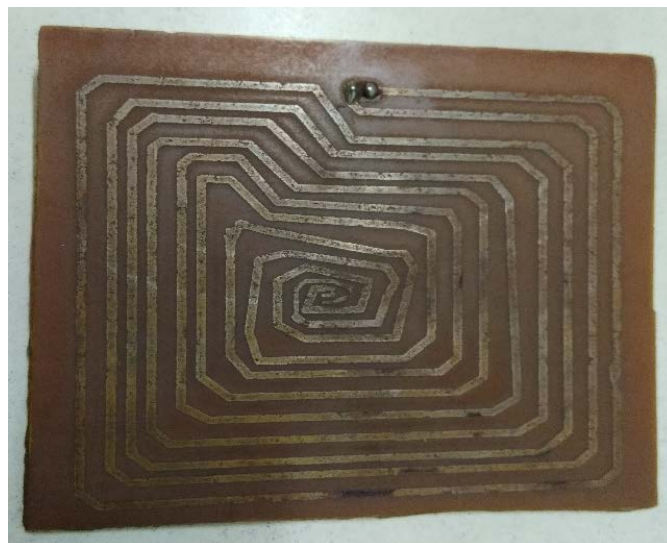


Figure 2: Wet Sensor

3.3 MIC

MIC is a sound sensor used to capture the baby cry in real time. When baby starts crying sensor will detect it and send signal to the microcontroller. Microcontroller convert this sound signal into electrical signal and after that this signal is passed to the amplifier.

3.4 Signal Conditioning

The signal from MIC will be compared and conditioned to differentiate the baby cry from other noises. Also, this unit will be used to match all the frequency of signals with the system requirements.

3.5 Motor

The motor is attached to the cradle to swing the cradle automatically.

3.6 Driver Circuit

This will allow microcontroller to drive the motor by matching the current requirements of the motor.

4. Working

This system consists of cry sensor, wet sensor and application for smart phone. The proposed system is attached to the cradle. When baby cries or wets mattress, sensor detect and send the signal to the microcontroller. Motor driver is attached to the controller after getting signal from controller it starts swinging the cradle. Simultaneously microcontroller also send signal to the server, and server enables webcam. After that webcam clicks the picture of baby. These pictures are uploaded on the server and stored in database. On the other hand, an android application is developed and installed on parent's mobile phone. With the help of this android application parents can login and see the pictures of baby from anywhere anytime.

5. Result and Discussion

MIC is used to detect whether baby is crying or not and wet sensor is used to detect the wet condition. If baby cries or wet the mattress, cry sensor and wet sensor detects it send the signal to the microcontroller after processing signal microcontroller send the signal to the server.



Figure 3: Wet Detection



Figure 4: Wet sensor showing wet condition

In this system webcam is used. When cry or wet is detected microcontroller gives instruction to the server.

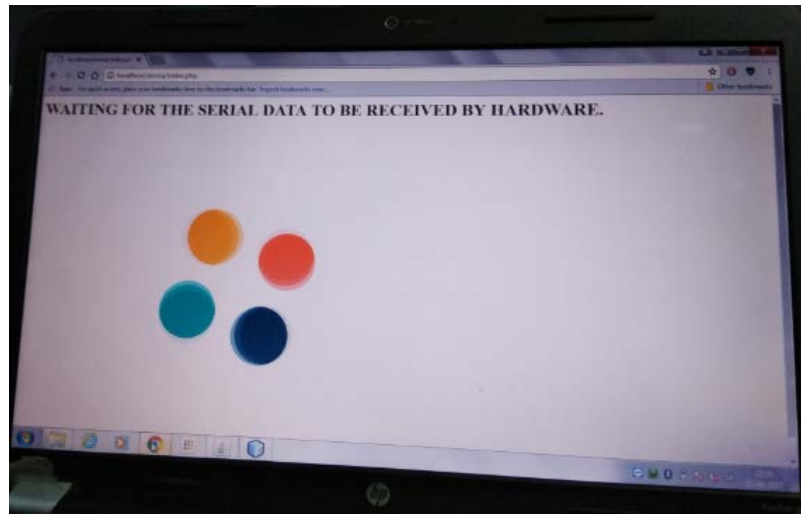


Figure 5: Server waiting for input from hardware

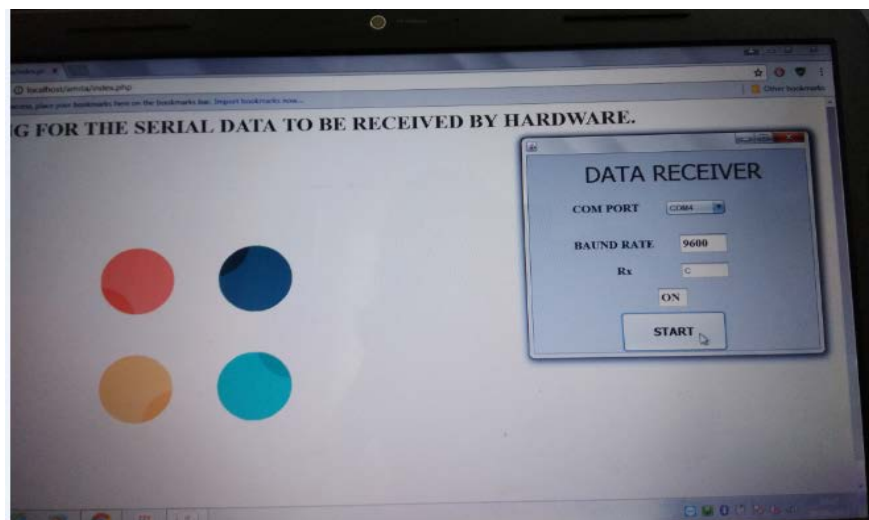


Figure 6: Showing data is received at COM4

When server receives input it enables webcam, and camera start clicking pictures of baby. After clicking pictures they are uploaded and stored in the database which can be seen by parents using android application which is installed on their mobile phone.

6. Android Application

An android application is developed and installed on parent's mobile phone. Parents can login and see the pictures of baby. By selecting date parents will be able to see the pictures of previous days also.

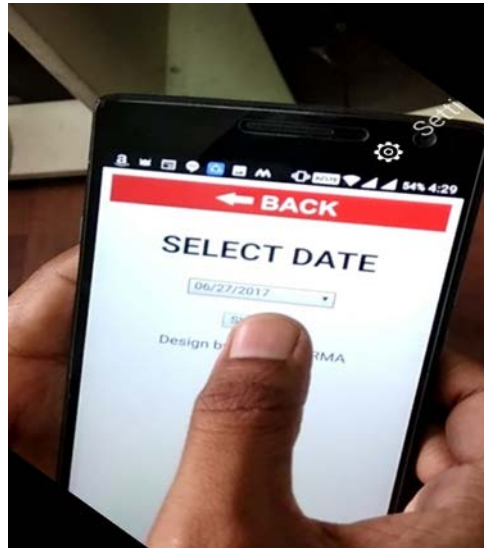


Figure 7: Date Selection page

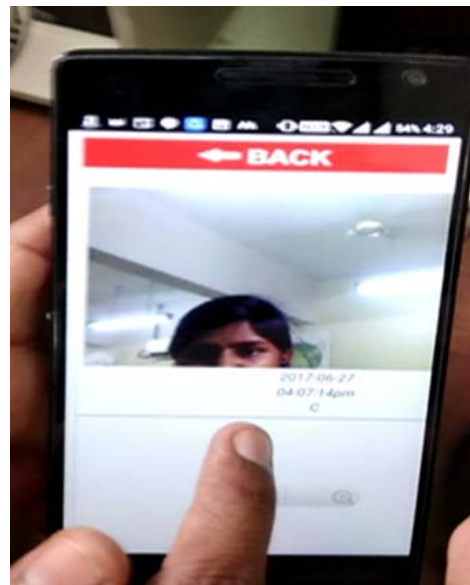


Figure 8: Image Display page

After login and selecting date pic can be seen with date and time.

7. Conclusion and Future Scope

Thus, proposed system will be very helpful to the working parents as well as it will be also beneficial for the hospitals and creches. With the help of this system parents can get the information about the baby from remote location.

In future, many advancements can be performed. A voice recorder can be attached to the cradle in which mother's voice can be record which can be played when baby cries. Many toys can also be attached to entertain baby.

8. References

- [1] L Nitin Bhatnagar, Kshitij Shinghal, Amit Saxena, Niket Tiwari, Shubham Bhatnagar, Shushant Kumar, "Design of Automatic & Indigenous E Cradle", Imperial Journal of Interdisciplinary Research, 2016.
- [2] Adwait B Kadu, Pranav C Dhoble, Jagrut A Ghate, Nilesh B Bhure, Vaidehi A Jhunankar, Prof. P M Sirsat, "Design, Fabrication and Analysis of Automated Cradle", International Journal of Mechanical Engineering and Robotics Research, 2014.
- [3] Misha Goyal, Dilip Kumar, "Automatic E-Baby Cradle Swing Based On Baby Cry", IJCA, June, 2013.
- [4] Anritha Ebenezer; Anupreethi. S, "Automatic Cradle Movement for Infant Care" Undergraduate Academic Research Journal (UARJ), ISSN : 2278 – 1129, Vol.-1, Issue-1, 2012.
- [5] Mustafa Burunkaya and I`nan Gu` ler, "Remote Control of Microcontroller-Based Infant Stimulating System", Journal of Medical Systems, 2000.
- [6] Steven Bang; Richard Lam; Natallia LoCicero , "Rock Me Baby: The Automatic Baby Rocker" Project for, San Jose State University, Department of Mechanical and Aerospace Engineering, May 17, 2011.
- [7] Chau-Kai-Hsieh; Chiung Lin; Taiwan, "Baby Cry Recognizer" US 5668780, Date of Patent Sep. 16,1997.
- [8] Gim Wong, "Automatic baby crib rocker" US 3952343, Date of Patent: Apr. 27, 1976.
- [9] Marie R. Harper; La Mirada; Maxine R. Blea, "Automatically rocking baby cradle", US 3769641, Date of Patent: Nov. 6,1973.