

# Automatic Cradle and Monitoring System for Infant Care

Tushar P. Patekar

Student, EXTC Department, DES's COET Dhamangaon Rly, India.

Pooja S. Dawale

Student, EXTC Department, DES's COET Dhamangaon Rly, India.

Pooja A. Jaiswal

Assistant Professor, EXTC Department, DES's COET Dhamangaon Rly, India.

**Abstract** – This paper presents a brand new approach in coming up with associate automatic swinging cradle system. Proposed system helps the oldsters and nurses in taking care of their kid while not physical attention. There is a need to develop a new low cost indigenous electronic cradle because the existing cradles are imported and costly. This paper presents the design and implementation of a new indigenous low cost baby cradle that swings automatically when baby cries. The speed of the cradle can be controlled as per the user's need. This system helps parents and nurses to take care of babies without physical attention. In the present days we see both the husband and the wife are working .So it becomes quite difficult to take care of their infant. Many a times there are no grandparents in the house; the mother alone has to manage with the household activities. The system architecture consists of sensors for monitoring vital parameters, dc motor for cradle movement, cloud where data is stored and a sound buzzer all controlled by a single Arduino Mega microcontroller core.

**Index Terms** – Cloud, Cradle, Information Storage, Microprocessor, Sensors.

## 1. INTRODUCTION

Generally, the baby cradle is used for to make sleep and soothe to baby. For example guardian have to take care of their child till as they asleep. However, conventional cradle does not electronically equipped such like battery or adapter to automate the cradle automatically. In Addition to that, these kind of conventional cradle is used in villages areas or non-developed cities due to its low prices. But the problem of this kind of designated cradle is that you need manpower to take care of your child and your child may not be safe and feel comfortable in the conventional cradle. Thus, we need automatic cradle to take care of child which uses the battery or power source.

A cradle is a baby's bed or cot, typically one mounted on rockers. In the present scenario where both the parents are busy in their professional life, it has become very difficult for them to get sufficient time to take care of their infants. Sometimes it is not affordable for them to hire a care taker.

This results in admitting their child to child homes during their job timings. It is found that most of the times baby stops cry and sleeps well when they are in a cradle. In today's life style, it is very difficult for parents and care takers to sit nearby their child and sooth them whenever they cry or sleep. Thus, the designed system would help the parents in the child care without physical attention. Automatic cradle is a device that provides an aid to swing the baby cradle automatically. Once the crib is manually tilted in one direction and released, this permits the inertia to actuate the locking and actuating arms to operate under the biasing force of spring in conjunction with the gear. Thus, the spring loaded motor begin to operate and the lever which is attached to crib is oscillated in back and forth movement. Parents in the present world are busy in their professional life, so they do not get sufficient time to take care of their babies. It may be expensive for the household to afford a nanny. Today's woman has to manage home along with their office work simultaneously. After long working hours, they have to take care of the home along with the baby. They may not get enough time to swing the cradle manually and sooth the baby. Moreover, in today's life style, it is very difficult even for the housewives to sit nearby their infants and sooth them whenever they cry.



Fig.1 Manual Wood Cradle

Hospitals have neonatal and maternity units. Nurses in these units have to take care of baby and soothe them whenever they cry.

The system is designed to help parents and nurses in infants care. The design aims at following points:

- Cradle starts swinging automatically when baby cry and swings till the baby stops crying.
- Sounds an alarm when mattress gets wet.
- Sounds an alarm if baby cries for more than a stipulated time indicating that baby needs attention.

## 2. RELATED WORK

### 2.1 Arduino UNO

Arduino is a single board smaller scale microcontroller expected to make the use of intuitive protests or situations more available. The equipment comprise of an open source equipment board outlined around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. Current models highlight a USB interface, six simple inputs pins, and additionally 14 advanced I/O pins which permits a client to connect different augmentation sheets. Arduino Uno can sense the environment by using the sensor, sensor receive the signal from environment and send to the input part of Arduino, Arduino give the output from the output part as the programming burn in the microcontroller. Arduino accept a programming software called sketch. An Arduino can program infinite time. If a new program burn in the Arduino then previous program will automatically vanish. We can use multiple of sensor at a time and all the instruction should be in one program.



Fig.2 Arduino Microcontroller

### 2.2 Surface temprature sensor

The surface temprature sensor is used for measurement of body skin temprature. The surface temprature sensor has exposed thermister that results in an extremely quick time. This design allows only for air and water use.



Fig.3 Surface temprature sensor

### 2.3 Wet sensor(Designed on PCB Board)

To make a wet sensor we used a simple voltage divider to detect the resisistance and if the resisistance below a certain limit we will let the serial monitor print that there is moisture detected. To devlope a PCB for wet sensing first of all we dropped on HDR conncceter on the new file and send it to the ultiboard and there we draw the sensor layout like this.

1. Printed the layout in PDF format on a glossy paper.
2. Took a copper bottom PCB board and put the printed circuit on it and ironed the paper so that circuit could printed on the PCB.
3. Then putted PCB in ferric chloride solution and shook for about an hour or more untill all the copper on the board was gone except the print.
4. Then removed the carbon of the print by washing it with a scrub and only a layout of copper has left
5. Then applied soldering flux on the copper layout and lined it with soldering.
6. After that connector was fixed and soldered and the PCB for moisture detection has completed.



Fig.4 PCB for wet sensing

## 3. PORPOSED MODELLING

The architecture of the system consist of both hardware and software. Block diagram is shown in figure 1.The code is written in embedded C++ and is burnt into the

microcontroller. The main designing blocks of system are as follows:-

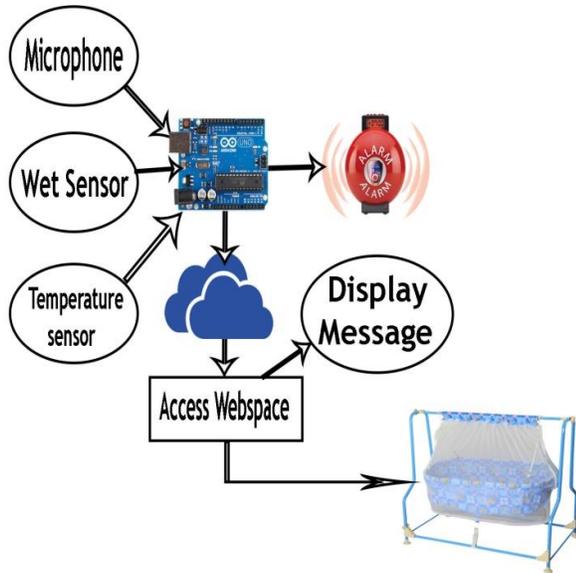


Fig.5 Architecture System

**3.1 Cradle movement when baby cries.**

Microphone captures the baby cry sound and the generated sound level in dB x is compared with a preset value y and if x is greater than y, it indicates that the baby is crying. If it is sensed that baby is crying, parent can see this information through a button on webpage which shows baby is crying message ,and parent can swing the cradle just by clicking “on” button and stop swinging by clicking ”off” button after seeing the message that baby is fine. Baby’s sound data is stored on cloud so that parent can access the data from anywhere. Cradle movement is controlled by dc which will provide back and forth motion.Motor’s clockwise and anticlockwise movement moves the cradle on the either side and in this way the system will keep working.

**3.2 Wet sensing**

To determine the moisture condition i.e. urine detection, two pairs of copper electrodes are placed under the cloth on which baby is sleeping. The signal obtained is given to microcontroller. When urine is present switch is closed transistor turns on. When urine is absent switch is open, transistor turns off. Thus, if mattress gets wet, Alarm is buzzed to alert parents.

**3.3. Environment temperature sensing**

Environment temperature sensor operates at 5 V and can measure temperature upto 125 C which is sufficient for the

targeted environment temperature range. If the temperature is too high, parents can monitor through webpage and switch on the fan or AC when required.

**4. RESULTS AND DISCUSSIONS**

Here three samples of sound levels of baby cry voice sound level are taken i.e. 25dB, 30dB and 20dB. Least value 21dB among the three sound levels is set as preset value. Even when the baby is quiet there is an input due to environmental noise ranging 0dB-5dB which is less than the preset value 20dB and therefore baby cry is not detected. When baby starts crying, an input due to baby cry voice and environmental noise is detected in range 25dB-35dB which is greater than the preset value 21dB and therefore baby cry is recognized and shown on webpage and thus the cradle can be swung. This is shown in Fig 3 and Fig 4. When baby stops crying, cradle can be stopped slowly so that baby totally goes to sleep. Wet sensor detects wetness effectively and alarm is initiated. Figure 4 shows message when wetness is detected.

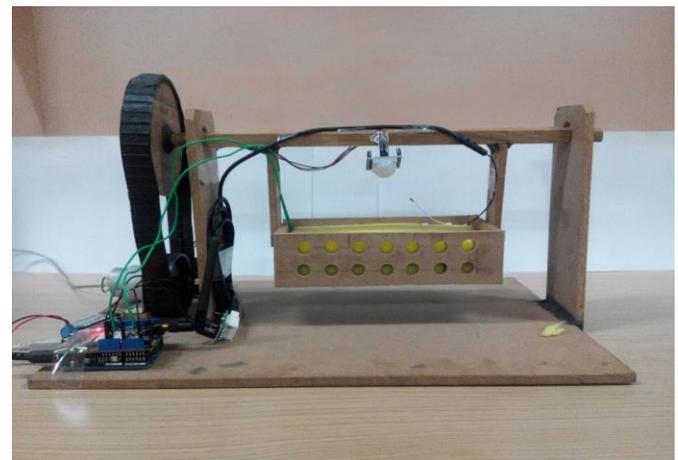


Fig.6 System Working

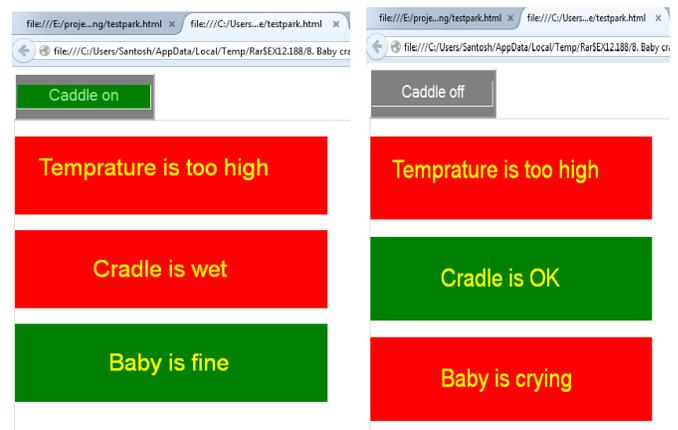


Fig.7 System output shows high temperature with wetness detection & Baby Crying Message

## 5. CONCLUSION

Thus this system reduces the work of working parents as well as in hospitals where there are large number of babies. This cradle system comforts the baby in all the possible ways. Diseases like pneumonia, rashes etc. are avoided. Virtual environment that the mother is present is created so that the feels safe and comfortable and stops to cry. Baby Monitoring System is an inexpensive and simple to use, which can improve the quality of infant-parent communication. Thus, the designed system would be of great use to the working parents to take care of them in their busy schedules and hospitals for taking care of infants. Parents can monitor their baby live via webpage.

## REFERENCES

- [1] J.E. Garcia, R.A. Torres, "Telehealth mobile system ", IEEE Conference publication on Pan American Health Care Exchanges, May 4,2013.
- [2] Nitin P. Jain, Preeti N. Jain, and Trupti P. Agarkar, "An Embedded, GSM based, Multi parameter, Real-time Patient Monitoring System and Control", IEEE Conference publication in World Congress on Information and Communication Technologies, Nov 2, 2013.
- [3] Ashraf A Tahat, "Body Temperature and Electrocardiogram Monitoring Using SMS-Based Telemedicine System", IEEE international conference on Wireless pervasive computing (ISWPC), 13 Feb 2009.
- [4] Jia-Ren Chang Chien, "Design of a Home Care Instrument Based on Embedded System",IEEE international conference on industrial technology(ICIT), 24 April 2008.
- [5] ElhamSaadatian, ShrutiPriyaIyer, Chen Lihui, Owen Noel Newton Fernando, Nii Hideaki, Adrian David Cheok, AjithPerakumMadurapperuma,Gopala Krishna kone Ponnampalam, and Zubair Amin, "Low Cost Infant Monitoring and Communication System",IEEE international conference publication ,Science and Engineering Research , 5-6 Dec. 2011.
- [6] Baker Mohammad, HazemElgabra, ReemAshour, and Hani Saleh, "Portable Wireless Biomedical Temperature Monitoring System", IEEE international conference publication on innovations in information technology (IIT), 19 March 2013.
- [7] N. M. Z. Hashim, "Development of Optimal Photosensors Based Heart Pulse Detector",International Journal of Engineering and Technology (IJET) Aug-Sep2013.s
- [8] NurIlyaniRamli, Mansour Youseffi, and Peter Widdop, "Design and Fabrication of a low cost heart monitor using reflectance Photoplethysmogram", World Academy of science, Engineering and Technology 08 2011, pages 417 to 418.
- [9] CarstenLinti, HansjurgenHorter, Peter Osterreicher,and Heinrich Planck, "Sensory baby vest for the monitoring of infant", International workshop on Wearable and Implantable Body Sensor Networks, BSN 2006,3-5 April 2006.
- [10] Sharief F. Babiker, LienaElrayah Abdel-Khair, and Samah M. Elbasheer, "Microcontroller Based Heart Rate Monitor using Fingertip Sensors", UofKEJ Vol. 1 Issue 2 pp. 47-51 (October 2011).
- [11] Prof. K. Padmanabhan, "Microcontroller-Based Heart-Rate Meter", electronics for you, www.efymag.com.
- [12] S.Deepika, V.Saravanan, "An Implementation of Embedded Multi Parameter Monitoring System for Biomedical Engineering", International Journal of Scientific & Engineering Research, Volume 4, Issue 5, May-2013.
- [13] Sowmyasudhan S, Manjunath S, "A Wireless Based Real-time Patient Monitoring System", International Journal of Scientific & Engineering Research, Volume 2, Issue 11, November-2011.