Automatic Baby Cradle Swing Based on Baby Cry

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Abstract—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, for this it has a cry analyzing system which detects the baby cry voice and accordingly the cradle swings till the baby stops crying. The speed of the cradle can be controlled as per the user need. Sends message to mother's mobile when baby cries for more than a stipulated time indicating that baby needs attention. This system helps parents and nurses to take care of babies without physical attention.

Keywords—*Automatic Baby Cradles, Audio sensor, Cry Analyzing System.*

I. INTRODUCTION

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.

Hospitals have neonatal and maternity units. Nurses in these units have to take care of baby and sooth 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.

- Sends message if baby cries for more than a stipulated time indicating that baby needs attention.

II. RELATED WORK

Steven Bang designed automatic baby rocker having a noise sensor to detect baby cry. Noise sensor consists of Electret MIC with a pre amplifier (2n3904 transistor). Signal from noise sensor is fed to microcontroller Arduino ATmega 328, which is used to control the DC motor. Few colorful lights made up of LED are used to entertain the baby while being rocked. Mabuchi RE-260RA DC motor with Tamiya 6 speed gear box is used to create the rocking motion of the crib with gear ratio of 505.9:1 [1] .

Yang Hu proposed an algorithm for adjusting the bassinet swaying extent by the sensor signals. The bassinet is made up of an adaptive swaying device and other sensors network. While baby is crying, the sensors network can judge the reason according to detecting parameters, giving the different signals to control circuit. At the same time, the bassinet starts to sway slightly. The swaying rhythm can be adjusted according to parameters from baby status. They used three pressure sensor located in the bassinet bottom, one at the centre and others at left and right of the bottom [2] .

Marie R. Harper invented a crib adapted to be rocked automaticaly. Once the crib is manualy 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 conjuction with the gear. Thus spring loaded motor begin to operate and the lever arm is oscillated in back and forth movement. This provides the same effect as would be achieved by the mother rocking the crib containing the baby. Oscillation of crib is stoped when the slightest resistance is incurred [3] .

Gim Wong presented an Electronic device that can be attached to conventional pivotally mounted type crib. Which is actuated by baby cry voice picked up by the microphone giving short throw type rocking action to crib. Very similar to a person rocking the crib by pushing and pulling on the foot or headboard . There is a sensitivity control so that baby voice only actuate the rocking action and a timer to controlle the duration of rocking action [4] .

Chau-Kai-Hsieh proposed a baby cry recognizer which includes an amplifier circuit for amplifying a received sound signal. In response to the amplified sound signal, a pulse generator circuit generates a pulse signal having zero crossings which are aligned with zero crossings of the amplified sound signal. The pulse signal, in turn, is inputted to a signal recognition circuit. The signal recognition circuit outputs a signal indicating that a baby's cry was detected [5].

III. BASIC PRINCIPLE

Principle behind cradle swing stays in comparing the baby cry generated sound level in dB 'x' with a preset value 'y' and it swings if 'x' greater 'y'. The amplified signal is generated from the voice input. This amplified signal is then converted into a digital signal from which sound level x is calculated

Sound level x=20 log (Vin/Vo) dB

Where,

Vin = Voltage (ADC count) when baby is crying.

V0 = Average reference voltage (ADC count) when baby is not crying.

The preset value y is set initially as part of configuration of the system. It is the least value among the samples of baby cry sound levels and it can be modified in future as and when necessary.

IV. OBJECTIVE

- Improving the mechanism of providing the motion to the bassinet.
- To help parents especially those who are busy, doesn't have maid, nursery and many more.
- To attain the noiseless working of the cradle.
- To achieve jerk free motion

V.   NEED OF PROJECT

A. Scope

The main feature of our product is to create the communication between parents and their babies when they are not together. We want the parents to be able to see their babies by phone and softly rock the cradle to comfort babies when they cry.

B. Benefits

The benefits of our product are listed as three main aspects:

- Providing valuable free time for new parents.
- Reducing stress on baby with instant notification and care.
- User-friendly to the baby

C. Materials

- Arduino uno
- Sound sensor (KY-038)
- GSM Module (SIM 900a)
- Servo motor
- Cradle(model)
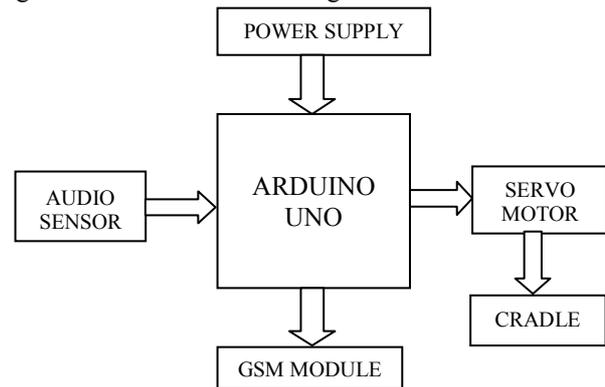
VI. BLOCK DIAGRAM

Fig 1 shows the basic block diagram.

Fig 1: Block diagram of E-Baby Cradle

The main designing blocks of system are as follows:-

A. Audio Sensor

When baby cries in the cradle, microphone detects it and converts the sound signal into electrical signal. The electrical signal is then fed into amplifier. Condenser microphone is used to detect the baby cry. This has two plates and one of these plates is made of very light material that acts as a diaphragm. The diaphragm vibrates when struck by sound waves, changing the distance between the two plates and therefore changing the capacitance and producing electrical signal.

B. Arduino Uno

Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. This contains all the required support needed for microcontroller.

C. GSM Module

A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system.

D. Motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.

E. Baby Bassinet

Baby bassinet is the infant bed as shown in Fig 2. This is connected to a motor which sways the baby bassinet based on the power it receives from the circuit.
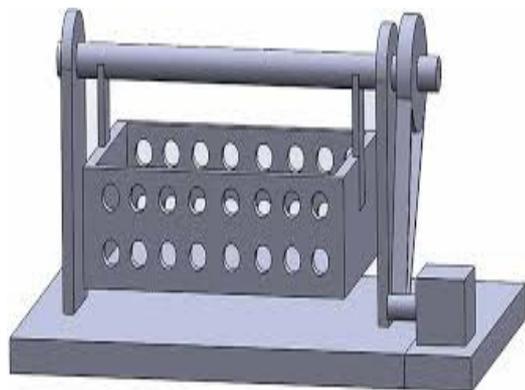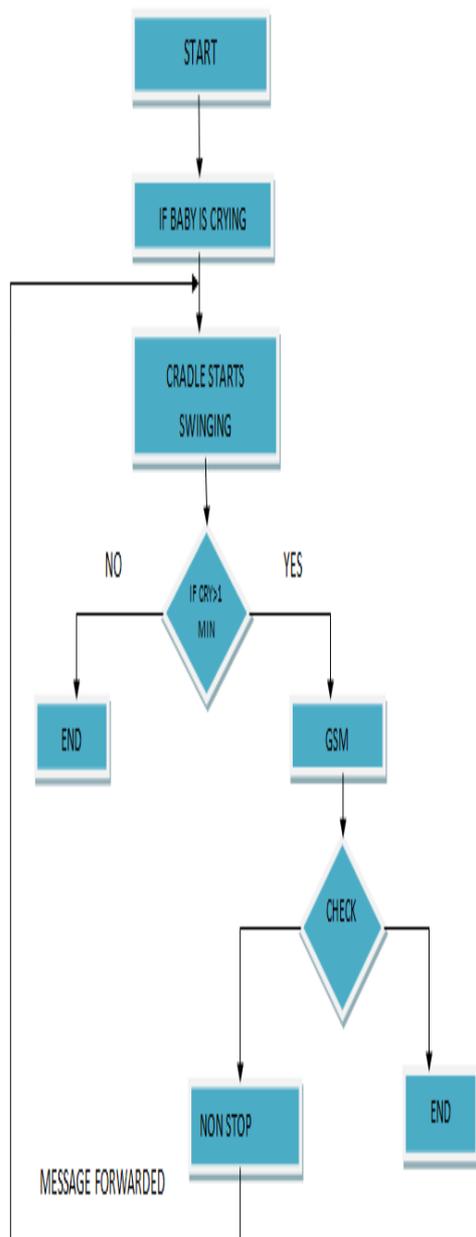
Fig 2: Prototye of cradle

VII. ALGORITHM

VIII. ADVANTAGES

- Easy for Parents to monitor their baby.
- It can be used with all kind of baby.
- It save electricity and time because the device will stop after a period of time.
- The microcontroller is programmable.
- Its helps in keeping the baby in hygienic condition.
- This system helps parents and nurses to take care of baby without physical attension.
- Since, working is on very low voltage, Hence it does not act as a danger to the baby.

IX. SOUND LEVELS

Samples	Baby Boy (dB)	Baby Girl (dB)
Sample 1	23	33
Sample 2	21	30
Sample 3	25	36

X. RESULTS
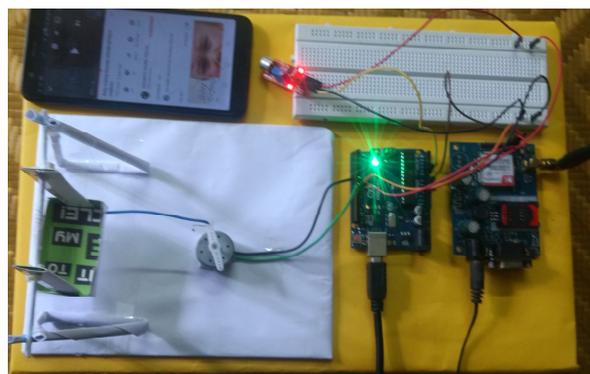
The individual devices were assembled and was observed to be working efficiently at the time of baby's cry detected by the sound sensor and swing the cradle automatically. The developed device was able to send SMS to the users as shown in Fig 3. Here one baby boy of 7 months old and another baby girl of 6 months old are considered for the analyses of their cry voices. Three samples of each of the baby cry voice are taken at different instant of time. The voices are recorded in .amr format and then the sound level generated from these voice signals is analyzed. From analysis it is identified that each baby's cry voice sound level varies. Thus accordingly the system is to be configured first time by setting the preset value. This system is so user friendly that user can preset the value himself. Table below shows the different sound levels. Here absolute values are taken.

XI. CONCLUSION

Looking after babies is hard problem worldwide. Babies are society future. This system emphasizes the importance of child care. The above designed system is economical and user friendly and very useful for working parents and nurses. They can manage their work efficiently. Parents can monitor their baby live via

3G.With the development of technology day to day work has been eased for parents along with baby care. Otherwise, mother's lap would be best cradle for baby.

XII. FUTURE SCOPE

- Automatic baby cradle can be used at hospitals.

- Useful to nanny also for caring babies.

- Convenient & affordable to working parents

- This mechanism is less power consuming so it is acceptable and affordable .

- we can add more features to make more efficient and user-friendly

XIII. ACKNOWLEDGEMENT

REFERENCES

[1] 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.

[2] Yang Hu; Weihua Gui; , "Adaptive Sway Control for Baby Bassinet Based on Artificial Metabolic Algorithm" School of Information Science and Engineering, Central South University, China.

[3] Marie R. Harper; La Mirada; Maxine R. Blea; , "Automatically rocking baby cradle", US 3769641, Date of Patent: Nov. 6,1973.

[4] Gim Wong, "Automatic baby crib rocker" US 3952343, Date of Patent: Apr. 27,1976.

[5] Chau-Kai-Hsieh; Chiung Lin; Taiwan; , "Baby Cry Recognizer" US 5668780, Date of Patent Sep. 16,1997.

[6] Anritha Ebenezer; Anupreethi. S; "Automatic Cradle movement for Infant care"Undergraduate Acadamic Research Journal(UARJ),ISSN:2278-1129,Vol.-1,Issue-1,2012.