# Automatic Infant Cradle

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*Abstract—Parents nowadays are busy in their Professional life and cannot get enough time to for their baby. Working women have to manage both household work as well as office work, so it is difficult for them to continuously care for   baby. It is also not possible for all the parents  due to economical condition to  afford a Nanny to take care of their baby. Housewives are also having household work so not possible for them sit near the baby and sooth them when required . In hospitals there are maternity as well as neonatal units to take care of the baby by nurses and sooth them. This system is designed to help parents and nurses in infant's care. So it is an automatic intelligent cradle which can take care of babies when their parents are not around. This will happen by rocking the cradle and playing music in the voice of the mother when baby is awaken/crying. The technique used to implement includes digital image processing for segmentation and morphological operation, voice recognition and GSM module for notifying parents.*
*Keywords—Cradle, Raspberry Pi, GSM Module, Rocking, Voice Recognition*

## I. INTRODUCTION

Baby care centre or nanny are the two options available which involves lot of passion. Now a day's lot of incidents are reported in social media featuring human attack to the toddlers in a brutal way. So, there is a need for safe and secure place to take good care of the children's need with minimum human intervention.The main purpose of this project is to design an intelligent cradle which can take care of babies when parents are not around. This will happen by rocking the cradle and playing rhymes in the voice of mother when baby is awaken/crying.

Cradle starts swinging automatically when baby is awaken.

Playing audio  (includes recorded voice of the mother lullaby etc) when baby cries.

Sounds an alarm (or notify via message/call) when the baby cries for more than a specific time, which will indicate the the baby will be needing personal attention.

Thus notifying Nurse, Nanny or Mother

The aim of this project is to design an intelligence cradle which will rock the cradle when the baby is awaken or crying. Dc motor is used to swing the cradle. Digital image processing techniques are used to detect if the baby is awaken. The cradle will also have an audio player where the voice of the mother singing lullaby will be recorded. If the baby continues to cry for a longer time, notification will be sent which will indicate that the baby needs mothers attention.GSM/buzzer module will be used for intimating parents via message/call. This system can be used in hospitals/maternity unit

## II.  METHODOLOGY

The condition that the baby is awake can be checked by either of the following ways:

Gesture  Sensing:  Blinking  of  Eye-lid  is  checked

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**Journal of Innovations in Engineering & Applied Science (JIEAS)**
Volume: Issue: , July-Sept. 2017, pp. XXX – XXX

using camera and image processing.

Voice (crying) Sensing: "Voice recognition Module" is used to check for if baby cries through microphone and raspberry pi. Obtaining
these signs, signals will be given to the Micro-controller which will perform the intended works like swinging the cradle via DC Motor, playing rhymes etc using audio system and notifying the Mother or Nurse (nanny) after a stipulated time indicating baby requires personal attention.
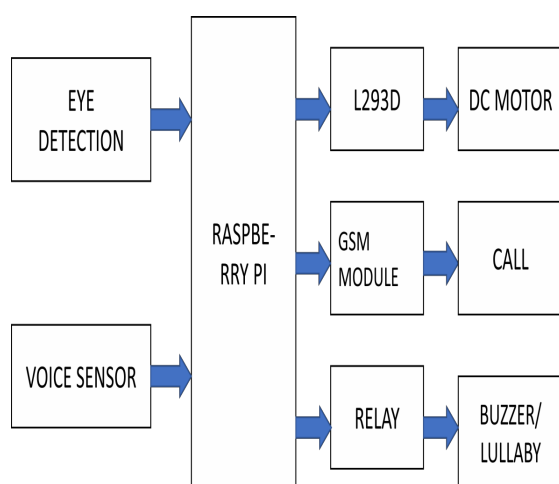
## III. BLOCK DIAGRAM



**Figure 1: Block diagram**

## IV. IMPLEMENTION FOR DETECTING THE STATE OF EYES:

The State of Eye is detected in following states:

The acquired RGB Image is converted into Y, Cb, Cr. colour space (Y-Luminance Cb Cr-Chrominance)

Detection of Face and its Extraction.

Detection of Eye from Extracted Face.

Region of interest.

Detection of the state of Eye.

## FACE DETECTION:

Depending Upon the threshold values of the Y, Cb and Cr,the face is identified and segmented.

## EYE LOCALISATION

Region of interest technique is applied to the extracted image of face to locate the eyes.

Morphological operations are applied on the transformed image to mark the region of interest(ROI).

## V. EYE STATE DETECTION

Based on the fact that pupil and iris area has less gray values than the other two white areas, the mean($\mu$) and standard deviation($\sigma$) is calculated. The Standard value for the open eye is as follows: Mean($\mu$)>0.2 and Standard deviation($\sigma$)<0.02.

The State of Eye is detected in following three states:

➢ **FACEDETECTION:**

➢ **EYE LOCALISATION**

➢ **EYE STATE DETECTION**

OpenCV uses classifiers to test the images based upon features. These features are extracted by training the classifier with a large set of positive as well as negative images. Positive images are those that actually contain the object that we need to detect.

Once the classifier training finishes, we extract the features from it. The OpenCV face detection algorithm uses the concept of Cascade of Classifiers concept . Because of the fact that the face in the image takes up only a small region, and most of the image region is non-face region, this concept saves up a lot of processing.

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## Journal of Innovations in Engineering & Applied Science (JIEAS)
Volume:  Issue: , July-Sept. 2017, pp. XXX – XXX

Instead of applying the large set of all features on a window, it is done in stages. If the window fails the first stage, we stop testing it for the next stage. If the window passes all the stage tests, it is identified as a face in OpenCV face detection.

## VI. COMPONENTS:

### 1) RASPBERRY PI:

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer
monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

### 2) RASPBERRY PI CAMERA:

The Raspberry Pi Camera Module is a 5MP CMOS camera with a fixed focus lens that is capable of capturing still images as well as high definition video. Stills are captured at a resolution of 2592 x 1944, while video is supported at 1080p at 30 FPS, 720p at 60 FPS and 640x480 at 60 or 90 FPS. The camera is supported in the latest version of Raspbian, Raspberry Pi's preferred operating system.

### 3) L293D MOTOR DRIVER:

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on
either direction. L293D is a 16-pin IC which can control a set of two DC motors
simultaneously in any direction. It means that you can control two DC motor with a single

L293D IC.

### 4) DC MOTOR

A DC motor converts direct current electrical energy into mechanical energy.

### 5) SOUND SENSOR

The main part in the module is a microphone and LM393 level convertor chip.

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## VII. FLOWCHART :

www.jieas.org  ISSN:

**Journal of Innovations in Engineering & Applied Science (JIEAS)**
Volume:  Issue: , July-Sept. 2017, pp. XXX – XXX

**Figure 2: Flowchart**

**Figure 5: Cradle Model**



**VIII. RESULT:** The state of eye is detected as following

**Figure:3 Eyes Open**
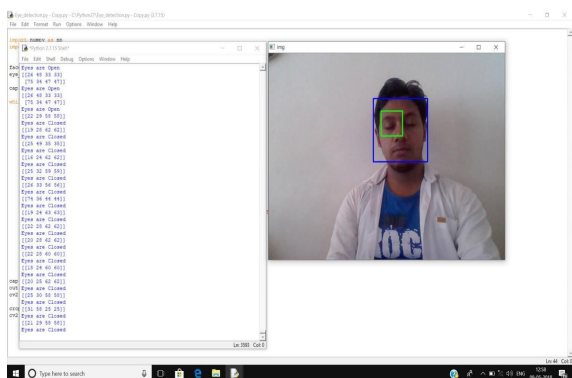
**Figure 6: Hardware**



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**IX. CONCLUSION**

In present day, an intelligent baby cradle is important. This device can be used to reduce the workload of parents by rocking the cradle when parents are not around and intimating them when personal attention is required. It is capable of detecting eye movement/cry of the baby and rock the cradle. This is done by using digital image processing techniques with the help of OpenCV software. I-cradle will help parents and infant to sleep peacefully during night time

**Figure:4 Eyes Close**

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