

# SURVEY ON IOT Based Baby Monitoring System Using RaspberryPi

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## Abstract:

*This project is focused on an idea to design a Smart Cradle System using IOT which will help the Parents to monitor their child even if they are far away from home & can detect every activity of the Baby from any distant corner of the world. It is an smart, innovative & protective Cradle System to nurture an infant in an efficient way. This system considers all the minute details that are required for the care & protection of the Baby in the cradle. The design of smartness & innovation comes with the use of technologies/methodologies which include Internet of Things (IOT) (Modules like Raspberry Pi, Humidity & Temperature sensing), Cry Detecting Mechanism, Live Video Surveillance, Cloud Computing (Data Storage) & User Friendly Web application (for User Controls). In order to detect each & every activity of Baby, different Sensors/Modules are attached to the Cradle: Humidity & Temperature Sensing Module for detection of Wetness of the bed, A Camera on top of the Cradle for live video footage & Cry Detection Circuit to analyze Cry Patterns. All the data which is been taken from the sensors/modules will be stored in Cloud (ThingSpeak) & analyzed at regular intervals. A Health Algorithm is applied to these datasets to get information about the body conditions which is helpful as any regular symptoms of a disease can be identified easily.*

**Keyword:** *IoT, Baby Monitoring, Cry detection, Sound Analysis and Humidity Sensor.*

## I. INTRODUCTION

As we are very well familiar with the hurdles faced by Parents to nurture their infant and especially in case if both the Parents are working. To give 24 hours of time in such cases is next to impossible. Thus, we should develop something unique that can help Parents to have a continuous surveillance/watch on the Baby/Infant and can notify about the same. Thus, we came up with an idea to design a Smart Cradle System using IOT which will help the Parents to monitor their child even if they are far away from home & can detect every activity of the Baby from any distant corner of the world. It is an innovative, smart & protective Cradle System to nurture an infant in an efficient way. This system considers all the minute details that are required for the care &

protection of the Baby in the cradle. The design of smartness & innovation comes with the use of technologies/methodologies which include Internet Of Things (IOT) (Modules like Raspberry Pi, Arduino, Humidity & Temperature sensing), Swing Automation, Cry Detecting Mechanism, Live Video Surveillance, Cloud Computing (Data Storage) & User Friendly Android Mobile Application (for User Controls). In order to detect each & every activities of the Baby, different Sensors/Modules are attached to the Cradle: Humidity & Temperature Sensing Module for detection of Wetness of the bed, A Camera on top of the Cradle for live video footage & Cry Detection Circuit to analyse Cry Patterns which eventually triggers the swinging mechanism (if required based on the range of frequency). All the data which is been taken from the sensors/modules will be stored in Cloud (Google Firebase) & analyzed at regular intervals. A Health Algorithm is applied to these datasets to get information about the body conditions which is helpful as any regular symptoms of a disease can be identified easily. An instant mobile notification that will be generated if any abnormal activity is detected (something unusual OR crying of baby OR wetness due to Baby Urine) in the Android Mobile Application which has been Developed. It has UI controls which include the feature of controlling the swinging mechanism of the cradle (can be turned on, turned off & can maintain the speed of swing), control for the switching on the camera live footage & controls for playing the toy/projector whenever the baby cries.

## II. LITERATURE SURVEY

[1] Availability of high speed internet and wide use of mobile phones leads to gain the popularity to IoT. One such important concept of the same is the use of mobile phones by working parents to watch the activities of baby while babysitting. This paper presents the design of Smart Cradle which supports video monitoring. This cradle swings automatically on detection of crying sound of the baby. Also it activates buzzer and gives alerts on phone if –first, baby cry continues till specific time which means now cradle cannot handle baby and baby needs personal attention and second, if the mattress in the cradle is wet. This cradle has an automatic rotating toy for baby's entertainment which will reduce the baby cry possibility.

[2] Availability of high speed internet and wide use of mobile phones leads to gain the popularity to IoT. One such important concept of the same is the use of mobile phones by working parents to watch the activities of baby while babysitting. This paper presents the design of Smart Cradle which supports video monitoring. This cradle swings automatically on detection of crying sound of the baby. Also it activates buzzer and gives alerts on phone if –first, baby cry continues till specific time which means now cradle cannot handle baby and baby needs personal attention and second, if the mattress in the cradle is wet. This cradle has an automatic rotating toy for baby’s entertainment which will reduce the baby cry possibility.

[3] Availability of high speed internet and wide use of mobile phones leads to gain the popularity to IoT. One such important concept of the same is the use of mobile phones by working parents to watch the activities of baby while babysitting. This paper presents the design of Smart Cradle which supports video monitoring. This cradle swings automatically on detection of crying sound of the baby. Also it activates buzzer and gives alerts on phone if –first, baby cry continues till specific time which means now cradle cannot handle baby and baby needs personal attention and second, if the mattress in the cradle is wet. This cradle has an automatic rotating toy for baby’s entertainment which will reduce the baby cry possibility.

[4]This project represents a baby monitoring system for busy parents so that they can ensure the proper care and safety of their babies. This system can identify the baby’s motion and sound, especially crying and video output of baby’s present position can be displayed on a display monitor so that the mother or another responsible person can watch the baby while away from baby. This baby monitoring system is capable of identifying motion and crying condition of the baby automatically. The total control system of the hardware is made using Raspberry Pi B+ module, condenser MIC is used to detect baby’s crying, PIR motion sensor is incorporated to detect baby’s movement and Pi camera is used to capture the baby’s movement. A display is used to have video product of sleeping baby. Finally, the developed hardware is tested to analysis the capability of detecting the motion and crying sound of baby as well as the video output. This proposed system can provide an easier and convenient way for busy parents in terms of taking care of their babies.

[5]In order to improve the quality of baby's health care, the function of baby crying recognition is proposed to be added to the nursery box. The hardware core is consist of digital signal processor

(DSP) chip TMS320DM643 and multimedia audio codec chip TLC320AIC23B, which will perform well in real time to recognize baby crying. After the baby crying signal is collected by the pickups, it will be processed by the audio decoder chip and then sent it to the DSP chip. In the DSP chip, the sound signal will be preprocessed and extracted for the characteristic parameters - linear prediction coefficient (LPC) by optimized autocorrelation function algorithm. It will be recognized accurately by the method of dynamic time regular (DTW) recognition algorithm, and then the results are sent to the host computer through the serial port. It is proved that the accuracy of the baby crying state can be recognized as high as 97.1%, this study is of great importance in the field of infant care.

[6]As human beings, we begin interacting with the world by expressing our basic needs through crying. Parents strive to identify and timely address these needs before hysterical crying sets in. However, first-time parents usually fail, and this leads to frustration and feelings of helplessness. In this context, our work focuses on creating an automatic system able to distinguish between different infant needs based on crying. We extract various sets of paralinguistic features from the baby-cry audio signals and we train various rule-based or statistical classifiers. We evaluate and in-depth compare the results and obtain up to 70% accurate to the evaluation dataset.

[7]Body temperature of the baby is important element that will inform the actual health condition of a baby. Parents and caregiver occasionally do not aware of drastic increase in body temperature in a short period of time and febrile seizure may happen that could leads to epilepsy. In Malaysia, device that could monitor the infant body’s temperature is already available. However, the device could not continuously be used for a long hours and create discomfort to the babies due to its size of devices. Therefore, a small, lightweight device that continuously monitors the body temperature and comfortably used by baby is developed. It directly helps parents by alerting them whenever the baby’s body temperature increased higher than normal a degree. This system monitors the vital parameter which is the body temperature by using a wearable sensor. The information then transferred to their parents through a wireless network. The system is extended for interfacing with the mobile phones to enable remote monitoring. Architecture of the system consists of a wearable sensor for monitoring the vital parameter and a sound buzzer where all of the component be controlled by a single microcontroller, the ESPressoLite V2.0 based on ESP8266 and supplied by the lithium ion polymer battery. Even though the system is more focusing on temperature monitoring only, it can be further expanded or upgrade to monitor other vital

parameter such as heart rate, oxygen saturation, respiration rate or any other parameter.

### III. PROPOSED SYSTEM

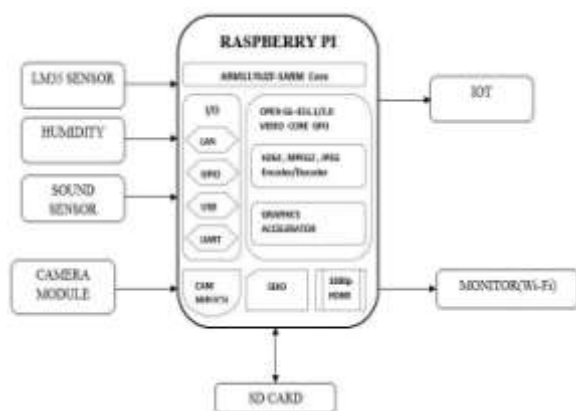


Figure:1

In this proposed system, both sensors and forecasting cloud is used, so that resulting data having high accuracy about the children condition, also we are using surveillance of the children using camera from a Wide Area Network (WAN) which can be viewed in the Web Application and also can control the situation from a remote area anywhere from the world. In this project MCP3008 is used, so connect 3.3v pin from raspberry to all sensors. Similarly MCP3008 and all sensor's ground pins should be grounded. Now connect sensor's output pins to each channels of MCP3008 (ex: LM-35 to channel 0, HUMIDITY to channel 1 and SOUND sensor to channel 2 of MCP3008). Connect USB camera with raspberry pi. Connect power supply for Raspberry pi. Plug the HDMI cable in Raspberry pi from the monitor using VGA to HDMI converter cable. Connect USB Mouse and USB keyboard to the Raspberry pi.

### IV. CONCLUSION

According to the system it analyses children activities with video Enhancement instant web app notification for monitoring of the baby. Atomization of system with real – time database system in the cloud, accurate sensors make the monitoring of the baby easy.

### REFERENCES

- [1] "IoT Based Smart Cradle System with an Android App for Baby Monitoring", 2017 International Conference on Computing, Communication, Control and Automation (ICCUBEA).
- [2] "Video-based IoT baby monitor for SIDS prevention" in 2017 IEEE Global Humanitarian Technology Conference (GHTC)
- [3] "Sudden Unexpected Infant Death and Sudden Infant Death Syndrome", Centers for Disease Control and Prevention. Centers for Disease Control and Prevention 17 Apr. 2017, May 2017

- [4] R. Palaskar S. Pandey A. Telang A. Wagh R. Kagalkar "An Automatic Monitoring and Swing the Baby Cradle for Infant Care" International Journal of Advanced Research in Computer and Communication Engineering vol. 4 no. 12 pp. 187-189 2015.
- [5] "Difference between Raspberry Pi and Arduino" Hardware Fun 2016 [online] Available: <http://hardwarefun.com/tutorials/difference-between-raspberry-pi-and-arduino>.
- [6] E. Ziganshin M. Numerov S. Vygolov "UWB Baby Monitor" 2010 5th International Conference on Ultrawideband and Ultrashort Impulse Signals pp. 159-161 2010.
- [7] A. Industries "Raspberry Pi Model B+ 512MB RAM ID: 1914 - \$29.95: Adafruit Industries Unique & fun DIY electronics and kits" Adafruit.com 2016 [online] Available: <https://www.adafruit.com/product/1914>.
- [8] A. Industries "Raspberry Pi Camera Board ID: 1367 - \$19.95: Adafruit Industries Unique & fun DIY electronics and kits" Adafruit.com 2016 [online] Available: <https://www.adafruit.com/product/1367>.
- [9] "Camera Module - Raspberry Pi" Raspberry Pi 2016 [online] Available: <https://www.raspberrypi.org/products/camera-module/>.