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# A Survey Review of IoT based Baby Monitoring System using Raspberry PI

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A B S T R A C T

This project focuses on the idea of designing a smart crib system with IOT, which can help parents to monitor their children even they are far from the house and can detect all the baby's activities from any remote corner of the world. It is a smart, innovative and protective crib system to raise a baby efficiently.

This system takes into account all the smallest details needed for the care and protection of the baby in the crib. Intelligence and innovative design go hand in hand with the use of technologies/methods including Internet of Things (IOT) (modules like Raspberry Pi, humidity and temperature detection), wine detection mechanism, live video surveillance, cloud computing (data storage) and user-friendly web application (for user controls). To detect each and every activity of the baby, different sensors/modules are connected to the bed: temperature and humidity detection module to detect the humidity of the bed, a camera on the top of the bed for live video sequences and crying detection circuitry to analyze wine patterns.

All data taken from the sensors/modules is stored in the cloud (Thing Speak) and analyzed at regular intervals. A health algorithm is applied to these datasets to provide insight into the state of the body, which is useful as all the regular symptoms of a disease can be easily identified.

Keywords: Convolutional Neural Networks, IoT Sensors, Raspberry PI, Baby Monitoring System.

## 1. Introduction

Because we all know the hurdles that folks face once raising their baby, particularly when each parent work. it's nearly not possible to offer twenty-four hours in such cases. Therefore, we want to develop one thing distinctive which will facilitate parents to endlessly monitor/monitor and inform regarding the baby/child. therefore, we tend to had the thought to develop a wise crib system with IOT, which may help parents monitor their children even after they are aloof from home and may find all baby' activities from any remote corner of the world. it's an innovative, intelligent and protecting crib system to boost a baby efficiently.

This system takes into consideration all the small print of minutes needed for the care and protection of the baby within the crib. Intelligence and innovation style go hand in hand with the employment of technologies/methods together with net of Things (IOT) (modules love Raspberry Pi, Arduino, temperature and wetness finding), oscillation automation, wine detection mechanism, in vivo video surveillance, cloud computing (data storage) and straightforward robot mobile app to work (for user control).

To detect each single activity of the Baby, totally different sensors/modules are connected to the crib: temperature and wetness finding module to detect the humidity of the bed, a camera on prime of the crib for live video streams and cry detection electronic equipment for analysis of screaming patterns that eventually activate the rocking mechanism (if necessary, supported the frequency range). All information taken from the sensors/modules are hold on within the cloud (Google Firebase) and analyzed at regular intervals. A health rule is applied to those datasets to realize insight into the state of the body, that is beneficial as all regular symptoms of a disease may be simply known an instant mobile notification generated when associate uncommon activity (something unusual OR baby crying OR status because of baby urine) is detected within the robot mobile application developed by. it's computer program controls that embody the perform to regulate the rocking mechanism of the cradle (can be turned on and off and maintain rocking speed), control to show on the live footage from the camera, and control to play the toy/projector anytime the baby cries.

## 2. Literature Survey

[1] [2] [3] The availability of high-speed Internet and widespread use of cell phones are driving the increasing popularity of IoT. Such an important concept is the use of mobile phones by working parents to observe the baby's activities while taking care of the baby. This document introduces the Smart Cradle design that supports video surveillance. This cradle will rock automatically when it detects baby's cry. It also activates the buzzer and gives notifications on the phone, firstly, when the baby keeps crying until the certain time, it then means that the baby now needs personal attention, which on the other hand states that human intervention is required since mattress is now found to be wet, this crib features an auto-rotating toy for baby's entertainment that reduces the chances of baby crying.

[4] This project represents a baby observance system for busy folks to make sure correct care and safety of their babies. this technique will find the baby' movement and sounds, particularly crying, and therefore the video output of the baby' current position is displayed on a monitor so the mother or different accountable person can watch the baby whereas they're not around of the baby is located. This baby monitoring system is ready to mechanically detect the baby' movement and crying status. The hardware full system is realized by victimization the Raspberry Pi B+ module, the electrical device MIC is employed to find the baby' crying, the PIR motion detector is constitutional to detect the baby' movement, and therefore the Pi Camera is used Capture the movement of the baby. A screen is used to possess a video product of the sleeping baby. Finally, the developed hardware is going to be tested to research the flexibility to detect the baby' movement and crying, still because the video output. This planned system offers busy folks a neater and more convenient thanks to watch out of their babies.

[5] so as to enhance the standard of baby medical care, it's planned to feature the baby decision finding perform to the nursery box. The core of the hardware consists of a TMS320DM643 Digital Signal Processor (DSP) chip associated a TLC320AIC23B transmission Audio Codec chip, that works well in period of time to detect a baby' crying. once the pads collect the baby' cry signal, it is processed by the audio decoder chip so sent to the DSP chip. In the DSP chip, the audio signal is pre-processed and extracted by an optimized autocorrelation perform formula for the characteristic parameters of the linear prediction constant (LPC). it's accurately detected by the Dynamic Time Regular (DTW) detection algorithm method, so the results are sent to the host laptop through the serial port. it's tested that the accuracy of the baby' crying state is recognized up to 97.1%, this study is of nice importance within the field of babe care.

[6] As people, we start to associated with the world by communicating our essential wants through crying. People try to identify these related needs in time before hysterical crying occurs. But new parents sometimes fail, and that ends in frustration and helplessness. In this context, our work focuses on creating an automatic system capable of distinguishing between completely different needs of babies while they are crying. We tend to extract numerous paralinguistic options sets from the baby cry audio signals and train various applied or rule-based mathematical classifiers. We tend to evaluate and compare the results thoroughly and get up to 70 accuracy for the analysis data set.

[7] The baby's body temperature may be a exceptionally vital portion that seem tell around a baby's current wellbeing condition. People and caregivers are often unaware of a dramatic increase in vital signs in an extremely short period of time, and symptoms of seizures leading to epilepsy can occur. A device that could monitor a baby's body temperature is now available in Malaysia. However, the device could not be used continuously for a long time and caused discomfort in babies due to its device size of. Therefore, a small and lightweight device is developed that continuously monitors body temperature and is well used by the baby. It helps people directly by alerting them when the baby's vital signs rise above normal levels. This method controls the very important parameter, body temperature, through the use of a portable detector. The data was then transmitted to her parents via a wireless network. The system will be enhanced to interface with cellphones to modify remote viewing. The system design consists of a wearable sensor for monitoring vital signs and a tone buzzer, where the whole element is controlled by a microcontroller, the ESP8266-compatible ESPressoLite V2.0, and powered by the atomic number chemistry battery.

## 3. Proposed system

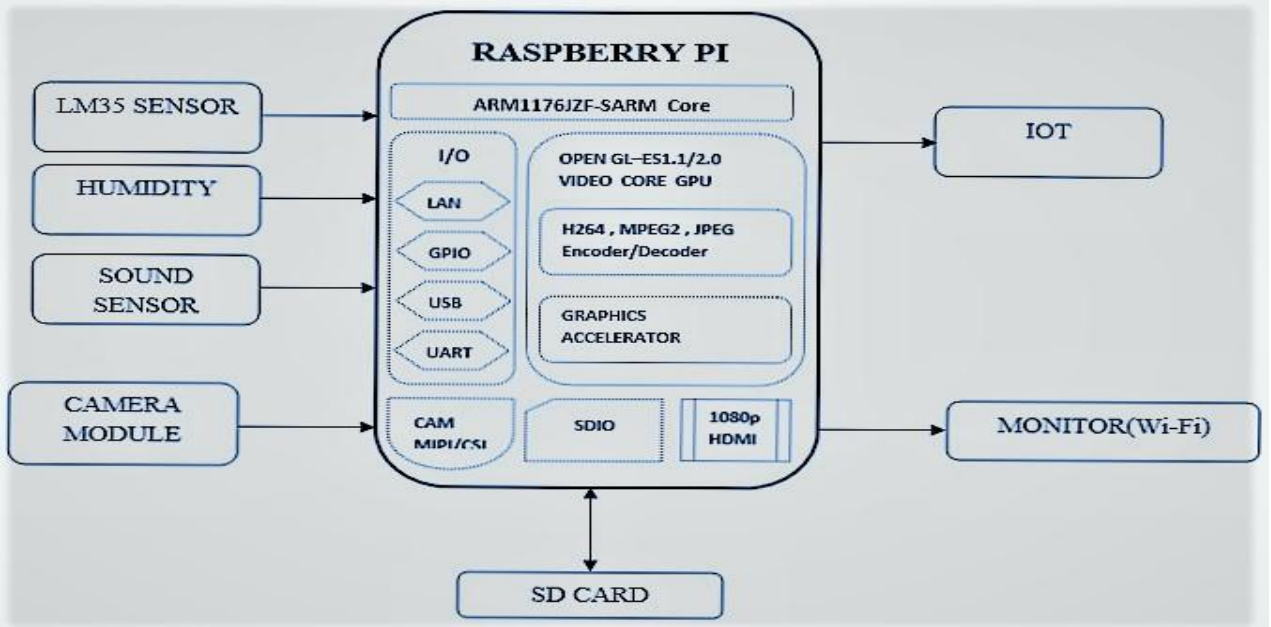


**Figure 1. Electronic components architecture**

In this proposed system, both sensors and a prediction cloud are used, so the resulting data has high accuracy regarding the condition of children, and we can also use surveillance of children with a wide area network (WAN) camera, which is possible displayed in the web application and can also monitor the situation from a remote location anywhere in the world. MCP3008 is used in this project, so connect Raspberry 3.3V pin to all sensors. Likewise, MCP3008 and all ground pins of the sensor must be connected to ground. Now connect the sensor output pins to each channel of the MCP3008 (eg: LM35 to channel 0, MOISTURE to channel 1 and SOUND sensor to channel 2 of the MCP3008). Connect USB Camera to Raspberry Pi from Monitor with VGA to HDMI Converter Cable Connect USB Mouse and USB Keyboard to Raspberry Pi.

## 4. Results and Conclusions

The motive of our models' approach is to monitor/live stream important signs or highlighted parameters such as Humidity, heart rate and human body temperature, using technology and tissue sensors.
To provide remote access, we focus on strengthening the goals of information sharing over the Internet. With the connected camera module, you can view the visual channels child care, care and movement in a small space.
This proposed model/system is usually very convenient due to its cost impact on users, its productivity, usefulness and doesn't have expensive systems.

Below is the tableof data from the proposed system to successfully detect Human body temperature and other parameters such as sun light, gas and etc.

| **Parameters** | **Detection result** |
|---|---|
| Temperature in Celsius | Yes 29.8 C |
| Atmosphere Humidity | Yes 64.4 |
| Sun Light Detection | Yes |
| Fire Detection | No |
| Gas Detection | No |

**Table 1. Parameters detection result**

Below is the screenshot from the proposed system to successfully detect Human body temperature and other parameters such as sun light, gas and etc.

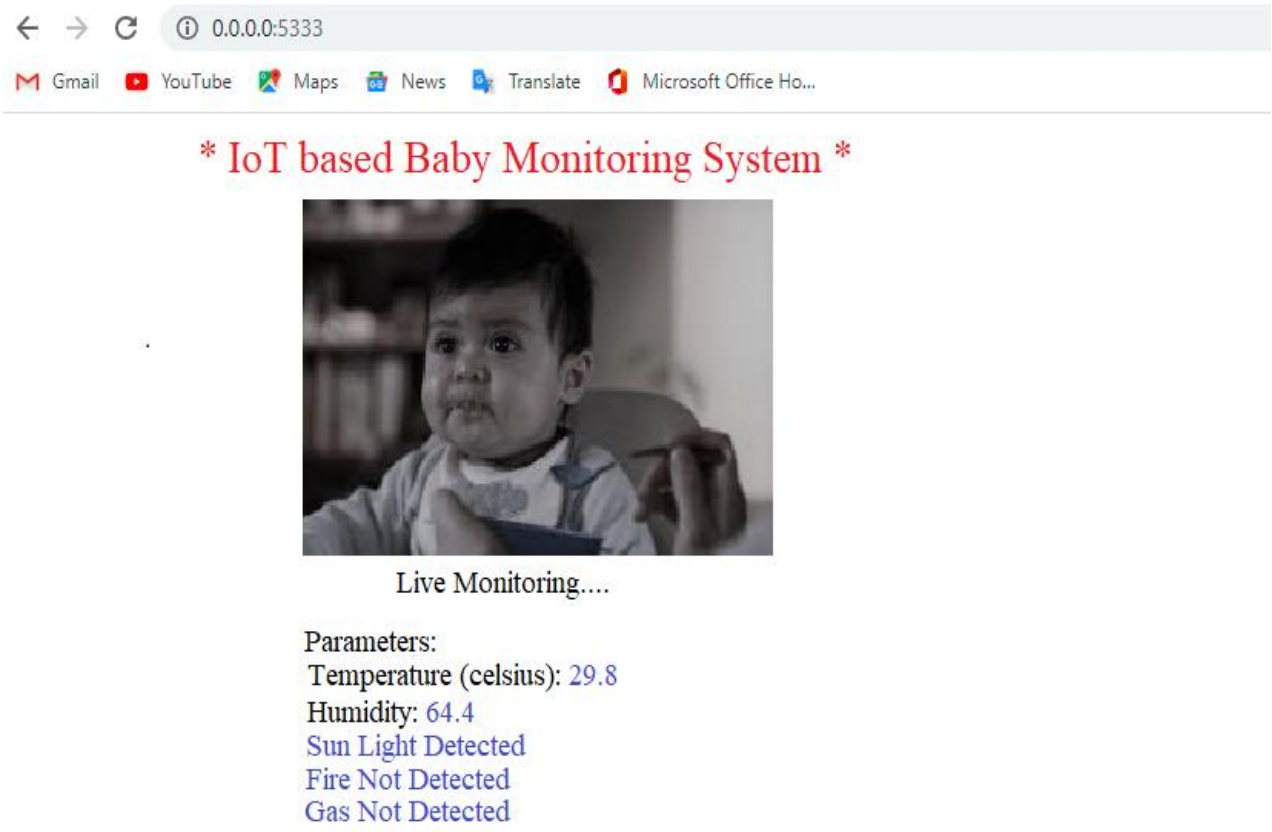


**Figure 2. Proposed system streaming and its user interface**

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