

Monitoring & Controlling a Baby Cradle with Adaptive Features

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ABSTRACT: In order to support a family in the current growing economy both the parents are expected to work. Thus it becomes difficult, on part of the parents to make sure that their babies are taken well care of. Such working parents tend to leave their babies at their parent's house or daycares. As parents, they have natural instincts to worry for their baby. This project deals to solve such issues. We use a wireless web cam to stream live footage of the baby for continuous surveillance, which is viewed through the android mobile application. This system includes various sensors to monitor a baby's condition. The sensors are connected to a Micro-Controller which collects information from the sensors and transmits to the server. When the threshold value is reached for the corresponding sensors, notification or message is send to the parent. And the cradle automatically swings whenever the crying sound is detected to calm down the baby, which is done using a motor. All these features are available and controlled by an android application. Additional a LCD board is also fitted to the cradle, so that the person whom the baby is with can also monitor the baby's health condition. This system provides safe environment for the babies enabling easy care anytime.

I. INTRODUCTION

At present, female participation in the workforce has greatly increased thereby affecting complete focus on baby care in many families. As we are familiar with the hurdles faced by parents to nurture their baby and especially in case of both working parents. Thus, we require a system that can help parents to have a continuous surveillance of their baby and can notify about the same whenever needed.

The sudden infant death syndrome (SIDS), which is characterized by the sudden death of a healthy infant while sleeping, has long been considered one of the most mysterious disorders in medicine¹. SIDS occurs when three factors are present simultaneously which are vulnerability of the infant, a critical developmental period and an exogenous stressor (During the first year of life, rapid changes in maturation of cardio respiratory control and in cycling between sleeping and waking occur)^[1].

Thus, we have come up with an idea to design a Smart Cradle System using IOT that helps the parents to monitor their baby even if they are away from home and detect every activity of the baby from any distant corner of the world. Internet of things simply refers to a network of objects that is connected to the internet; here the IoT is integrated into our baby monitoring system to achieve a rapid response time and to provide a greater sense of security for parents.

II. EXISTING SYSTEM

Generally baby cradle is used in various hospitals and maternity homes for infants to sleep in and for soothing them. Conventional cradles are used many areas particularly non urban areas because of their cost and simplicity. However conventional cradles are manually swung and required man power, they lack automation and are not electronically equipped. Consequently, conventional cradles should be automated to be more convenient, safe and efficient in monitoring the baby's situation in real time. Surveillance web camera is present almost in everywhere, so most of the houses use web cameras to monitor their children.

III. LITERATURE SURVEY

Few similar works are studied. In ^[2] cribs are larger in volume and are fenced in a fixed position. This system gives details on temperature and weight of the child. It also has live video monitoring and a sensor to measure light intensity in the room. This system also sends alert at times of abnormalities. However, Cribs are not portable where else cradle are portable and is used widely. RachanaPalaskar proposed a system^[3] that uses facial expression detection to detect crying, then the cradle swings automatically and send message via SMS. But, Facial expression detection may result in false negative identification of child's crying. In^[4] the system involves continuous real time monitoring of an infant's vital signs like temperature, ECG and CO₂ exhale rate. All these information are gathered from wireless sensors and a buzzer is turned on when the values collected rises beyond a fixed threshold. But, Buzzer sound may be disturbing for the child and surrounding and there is no video monitoring.

IV. PROPOSED SYSTEM

We propose an efficient system which shows live footage of the baby and updates on body temperature and moisture content using a web cam, temperature sensor and humidity sensor. A sound sensor is also fixed to the cradle in order to sense a baby's cry and accordingly the cradle automatically swings slowly using a motor. If the child continues to cry a notification is sent to the parents. And the caretaker can also view all these data through LCD display, which is also connected to the ArduinoUNO. All the sensors are connected to ArduinoUNO which collects data from the sensors and sends it to the server via NodeMCU. An android application is used to control all the features mentioned above. This provides a safe environment to the baby.

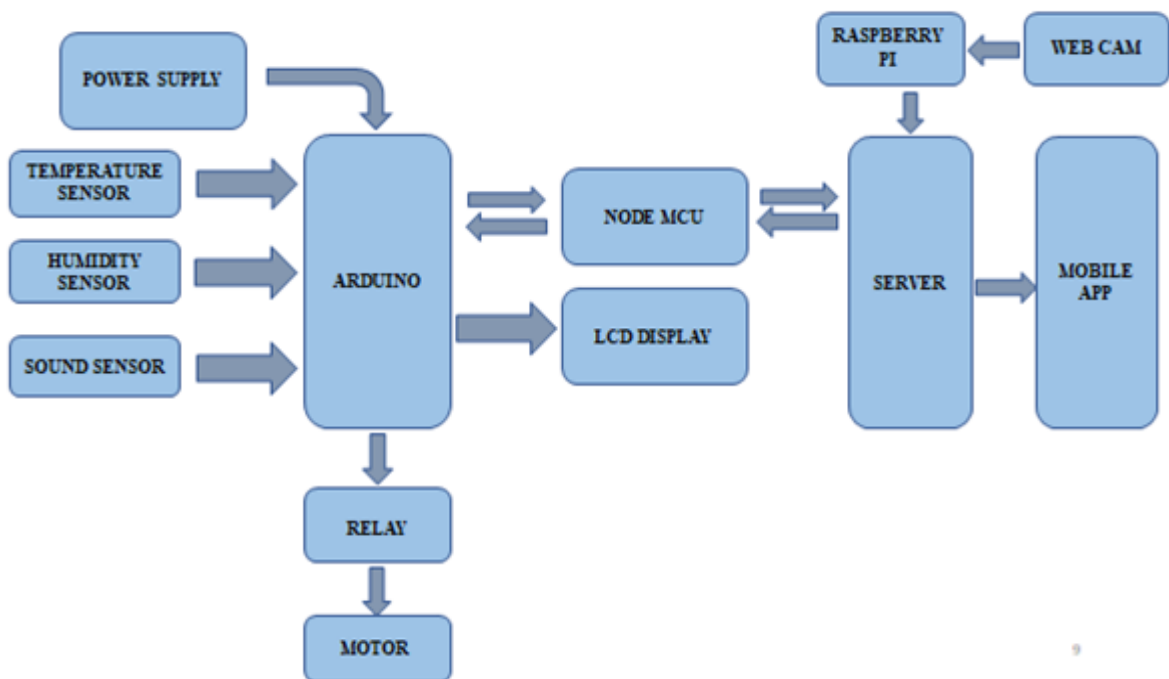


Fig. 1. Block Diagram

The system architecture of the proposed scheme comprises of four modules:

- 1) Data Acquisition
- 2) Live Video Monitoring
- 3) Transmission of Data
- 4) Notification & Other Actions

Various sensors are used in this system like temperature sensor, humidity sensor and sound sensor. All these sensors are integrated to ArduinoUNO initially. These sensors continue to collect data and these data are compared with the threshold values, so as to send any notification when required. Additionally a voice board is fitted to the cradle;

this enables to play music or voice when the baby cries. While temperature sensor, moisture sensor and sound sensor acts as input devices the voice board acts as an output element.

The web cam is mounted on top of the cradle in such a way that it covers the whole cradle. The web cam is connected to the Raspberry Pi. The purpose of the web cam is to stream live footage of the baby and this footage is stored in Raspberry pi and viewed via mobile application whenever needed.

ArduinoUNO is connected to NodeMCU for transmitting the data to the server. All the collected data from NodeMCU is transmitted to the server where the threshold comparisons are made. The server is interfaces with the mobile application. The parents are able to view the baby’s status through the android application from their mobile phones.

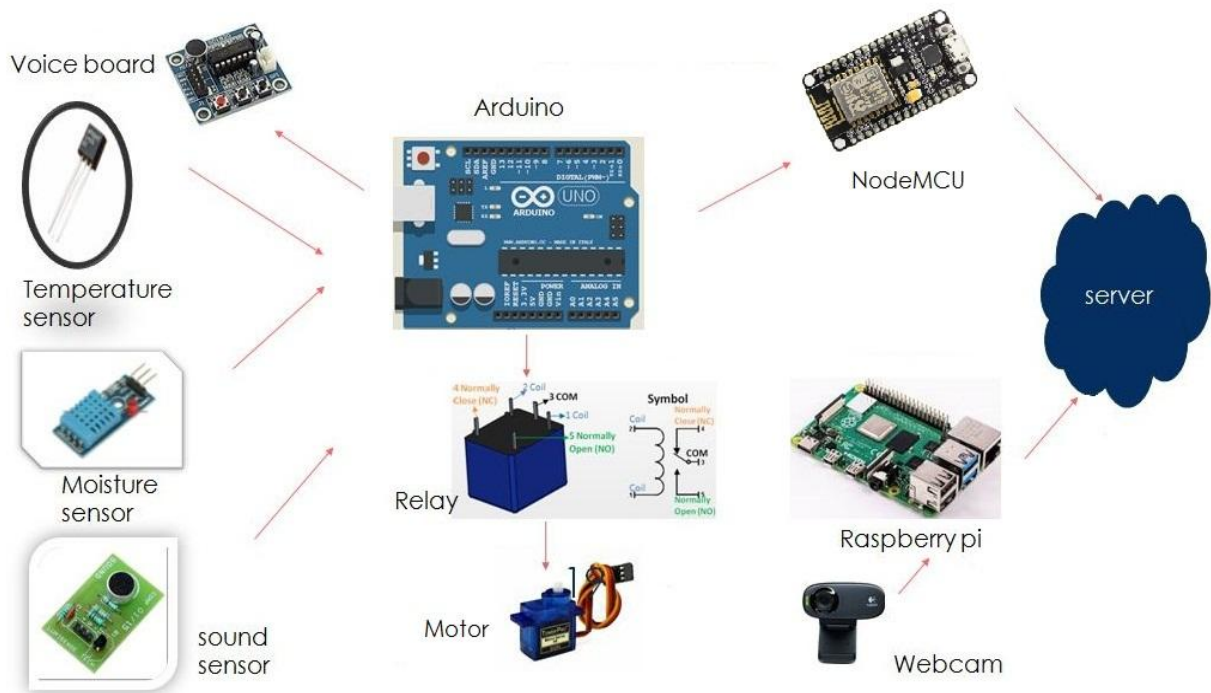


Fig. 2. Architecture Diagram

V. WORKING

For transferring the data to server we need internet connection, so for this system we are using a mobile phone and configure it as access point or hotspot. Once you have configured it as access point you can connect it with ESP8266 NodeMCU. Now with the help of wifi module all the sensor data are transmitted to the server where the threshold comparison is made. Whenever the baby cry is detected the relay triggers the motor to make the cradle swing automatically. Now with the help of Android application, parents can view the features such as body temperature, moisture content etc. Once they come to know that their baby is suffering from fever, the parents can immediately approach their baby or just make a phone call to the person whom the baby is with. Similarly if the parents come to know that their baby’s diaper has not been changed for too long, then they can just remind to the care taker. And with the help of web cam they can continuously monitor and it also ensures that the baby is safe in the cradle. Thus this system helps parents to be free from their worrying thoughts and parents can also work with full concentration without getting distracted. The LCD display makes the care taker work easier.

VI. CONCLUSION

This system is cost efficient and easily implemented. It provides an optimum solution for working parents. It is safe for the child and enables ease of parenting anytime. For future enhancement a video calling service can be included and sensors can be upgraded to wireless sensors.



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