Recent Trends in Intensive Computing
M. Rajesh et al. (Eds.)

doi:10.3233/APC210268

IoT Based Smart Cradle Using PI

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Abstract. In this modern era, parents are busy building their lifestyle, carrier etc. As we know it has now become hard because parents have to take care of their children simultaneously, which paves a lot of work pressure and family pressure especially for women. Health of the child is affected and better care has also reduced. So, in order to handle such situation, we use temperature, Humidity, ultra-sonic Sensor. The conditions of the external atmosphere help to detect increased body temperature, babies voice while crying and their movements while they are continuously moving and also indicates the time for the diaper to be changed. If there are any abnormal activities are observed in baby's atmosphere. An alert message is sent to the parents. In this system a video camera is attached and operated under the microcontroller's instruction and it records a video when the motion sensor detects any continuous movements. The recorded video is broadcasted in a display to the parents which helps them to monitor baby in live. And in addition, this system detects and displays the status of the infant and alert the respective guardian by collecting values from sensor like temperature sensor, ultrasonic sensor, and also the location value from raspberry pi.

Keywords. Temperature, Weight Detection, Ultrasonic, Location Value, Sensor, Raspberry Pi

1. Introduction

In common, to soothe and make the baby sleep cradle is being used. But even guardian must have a close monitoring until the baby falls asleep. The conventional cradle which is not equipped with battery or adapter that automates the cradle automatically [1]. Rural and non-developed area use conventional cradle because of their economic cost. Manpower is required continuously to take care of their child which serves as its major disadvantage and such conventional cradle may also cause discomfort to the baby. So, we are in need for an automated cradle which can take care of the child with a battery or electrical power source. Besides, this automated cradle carries extra features or function which is beneficial for parents [2]. Ample time is not given to take care of our children in this industrious world because in professional life people are not getting enough time for taking care of their children. It is also much expensive and uncomfortable to hire an baby sitter, who can take care of the child [3]. This may also increase the expenses more than a monthly income. Moreover, in this modern life it's even hard for house wives (mummy) for pampering their children when they are not feeling comfortable.

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Nurses in maternity units in the hospitals find it very useful automated [4]. The Main objectives of this project is to design and implement a baby care cradle, which monitors baby's movements when detected and wet condition of the baby as well as its body temperature.

- To design a comfortable cradle for baby with the help of PIR sensor which monitor's the baby's movements and its wet condition especially when away from the unhygienic environment.
- To provide an innovative and flexible cradle, this is economical in the market.
- User friendly- simple and with easy understandable user manual.

2. Automatic baby cradle

Metropolitan cities use more cradles. The benefits of this cradle include:

a) It serves as a user friendly; it also reduces the manpower. The cradle can be adjusted in custom as per the user's requirement and need.
b) User can set a particular time for cradle movement and while the user can complete their chores.
c) The most beneficial use of the product is, it uses neonatal and maternity units in hospital as bio-medical product. As this dwindles the labor of the nurses for taking care of infant and pamper them whenever they need.

The development of internet and mobile phones increased the popularity of IOT [5]. Working parents can watch their children sitting in live with the help of their mobile phones which serves as another important concept. The project Smart Cradle is enhanced with video monitoring. Also, it alerts by buzzing a buzzer on phone on following occurrence, first if baby cries beyond the noted time for example when the cradle does not handle the baby and it requires some personal care and also if the cloth of the cradle becomes wet [6]. Automated rotated toy is fixed in the cradle for entertaining the baby lively.

For those parents who are out of reach from the baby can still monitor their infant using a mobile phone. The smart cradle is enhanced with live video streaming feature that helps the parent to monitor their infants [7]. Even when the parent is in the next room, they can still monitor baby's movement so that the parent has an eye on their infant closely. This live video monitoring can also be set to stream automatically when the baby cries exceed beyond the set time with an alert notification. The most important and notable feature of the smart cradle is, it checks on the health condition of the baby [8]. The temperature sensor in the cradle senses for temperature change in the infant. Any abnormal heat change in infant body is alerted by the system using a alert notification. The temperature senses have a close monitoring of the temperature change in baby. It also indicates cradle temperature that helps parents to save them from heat in the cradle.

This is a project representing a baby monitoring system which helps busy parents to take care of their children safely. This system also notes the baby's motion and sound; especially crying and video output of baby's present position which can be displayed on a display monitor so that the mother or another responsible person can watch the baby while away from him or her [9]. Raspberry Pi B+ module controls the hardware of the system and baby's movement is monitored by incorporated ultrasonic

sensor and baby's motion is captured using USB camera. The video which has recorded the sleeping baby is displayed in the display monitor [10]. At last the final output which is the developed hardware is used for detecting the crying sound and the video of the baby. Busy parents can find it convenient and easier for taking care of their baby [11].

3. Proposed System

Figure 1, shows the representation of a system, which is organized and supports the reasoning and behaviour of the system is the architecture description which is also known as formal description. The system consists of temperature sensor, humidity sensor, sound sensor and the camera. All these are connected to the raspberry pi. The message is forwarded to the parent using GSM and the L298N motor driver is used to move the dummy shaft using the dc motor. In this proposed system the high accuracy about the children condition is recorded in the resulted data because it uses both sensors and forecasting clouds, also camera surveillance of the children is managed with the help of Wide Area Network (WAN) and the result can be seen from anywhere from the remote area in the web application.

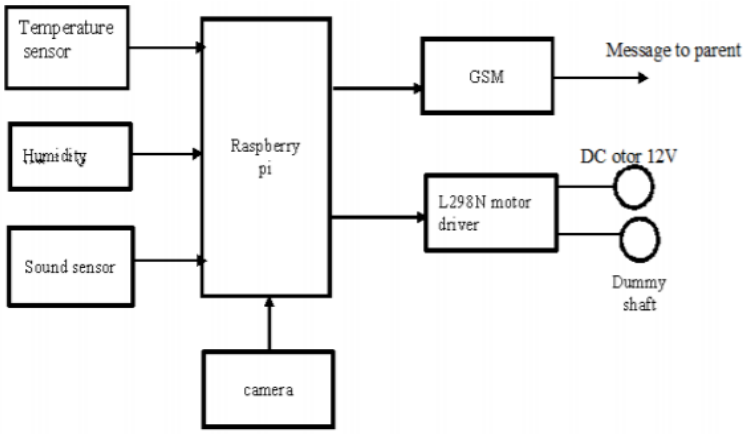

Figure 1. Represents the Architectural Design

4. Result and discussion

The system is based on raspberry pi in which any one of the saved values differs, it alerts the parents. This raspberry pi also gives instruction to the video camera attached with the system and the video will be recorded when the baby's movements is monitored continuously. The monitoring video will be displayed live on the monitor. At present, females have started working in industrialized sectors which in turn affects the child care in the families. Since nowadays managing the cost of living has become difficult, females started working which has affected their children's care.

This baby monitoring system is used to solve this problem. Video output is setup to monitor the sleeping baby. Finally, the output is analysed and the capability is

tested for detecting the motion and the sound of the crying baby is also displayed in the output. This proposed system helps in offering an easier and convenient way for the parents to take care of their children. A baby monitoring system which includes the video camera and microphone without any limitations of coverage is used for sending the data immediately and also to inform parents when there is any emergency. This helps in minimizing the time needed for handling the situation. Babies usually cry when they need food, tired, unwell or their diaper needs to be changed.

The circuit connection is properly completed, that is the ultrasonic sensor, buzzer, temperature sensor, motor driver and 12v dc motor. All these components are connected to the raspberry pi. The code is allowed to run in PC and hence the output is verified on the monitor. The value of ultrasonic sensor increases and decreases in accordance with echo and trigger so in order to monitor this, the buzzer alert is given. The video camera which is attached to the system is connected to the raspberry pi and is working under its instructions and is used for capturing the video when the baby's movements is detected continuously. The power supply is connected and the live video is monitored on PC. The website is created and the result is displayed in laptop. The person who has the IP address can watch the live video streaming.

Figure 2. Cradle setup

Thus, the final cradle setup as per Figure 2, is done and numerous sensors connected to this smart cradle will help in acquiring the accurate value.

5. Conclusion

This system which we have proposed aims at monitoring the vital signs of the baby which includes heartbeats and body temperature with the help of wireless technology and textile sensors that made it comfortable to wear and this is accurate and precise than other sensors. The information which can be transmitted over the internet which provides the remote access has been increased. The camera module which is attached to the cradle helps in finite monitoring of the baby in the finite area and their movements are monitored continuously. The drawbacks of the previous system which includes less user friendly, clumsy, and other factors are overcame in this system.

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