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IOT Based Smart Cradle System for Baby Monitoring.

Harshad Suresh Gare[1], Bhushan Kiran Shahne[2], Kavita Suresh Jori[3], Sweety G. Jachak[4]

[1][2][3]BE Students, Dept of Information Technology, SVIT, Nashik, Maharashtra, India
[4]Professor (internal Guide), Dept of Information Technology, SVIT, Nashik, Maharashtra, India

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Abstract - In the digital world of modern parents, duty of caring new born baby mostly on women which plays role of hurdle and also question marked on secureness, health, comfort, etc. of baby. So, for these people who belief in technology for them we are proposing automated cradle system which will connected to the parent's mobile for sending alert message. Sound sensor will be attached to cradle in such a way that it will take input sound of baby only, it will conclude the activity to be performed as per the range of sound in decibels, if the sound is more than certain amount then system will automatically start swinging the cradle, if baby still not sleepy or stop cry alert will send to the parents. Motion sensor that is PIR sensor will detect the motion it is used for security purpose and in point of view of any danger, if there is too, much motion detected alert will send to the parents. Wet sensor is used for check that has baby done pee? If any kind of wetness is detected it will send the alert message to the parents. There will be two temperature sensors used that are DHT11 and LM35, DHT 11 will check the temperature of whole room and LM 35 sensor will measure temperature of the body of baby, and it will alert the parent if there is huge change. Proposed system will decrease the difficulty of these hurdle, and release the stress of parent and the most importantly baby will safe, healthier and he will sleep without any discomfort.

Keywords: **Wet Sensor, Sound sensor, Temperature Sensor, Smart Cradle, Motion Sensor, GSM Module.**

1. INTRODUCTION

As we all know the term IOT that is internet of things which is designed to save time and for making work easy and accurate. As far as time and security is concern with the help of IOT we will build a cradle system which will make parents stress free and most important it will be safe and secure for the baby. So, managing the work in time and taking care of baby is very important factors.

Cradle system will give parents required time to parent for rest, as if the parents both mother and father goes for the job or even if the mother is house wife. Being stress free will definitely create the great atmosphere which will make great atmosphere around the baby. So, it doesn't matter if there is no one to swing cradle it will do swing automatically if the baby is crying. It doesn't matter if baby has done pee and no one knows about for long time, but not need to worry cradle system will also give the alert about the wetness in cradle. Also, if baby is getting fever or cold Cradle system also have the ability to detect it and send the alert. Our cradle will also able to detect if any motion in the cradle by motion sensor for security purpose of the baby. Proposed system will help the parents, so that they can take good care of their baby.

1.1 Motivation

Many of IOT devices are being develop in the IT sector. There are some cradles also, which are built with integration of IOT, but still there are some less feature which could be threat to the health of the babies. As we have seen in India or any other industrializing nation that both parents need to go to work and also look after the baby which increases workload on both the parent, it could also affect their professional life and their babies' life. Due to less featured cradle systems and parents busy schedule we are implementing modern day cradle system.

2. Literature Survey

For taking care of the baby there were some nannies who were getting paid for taking care of baby. There are some baby health care centres also which takes money and monitor the baby or sooth the baby. As far as time passes there had been lot of fraud detected in these kinds of centres from newspaper and news channels, we get the awareness about it. There are some cradles also designed, but they usually have only one or two features. From that one or two features they itself were making trouble for taking care of baby or disturbing the baby from sleep.

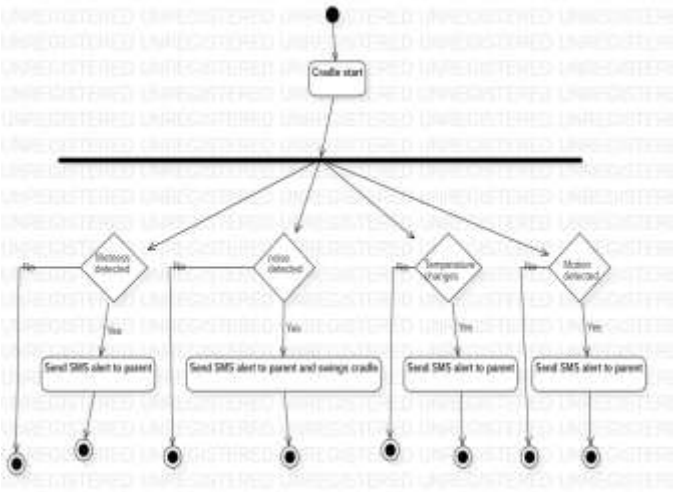
Before concluding to the system that we have to build, we surveyed some papers and they are as follows with problems that found:

First paper is [2] "General Idea about Smart Baby Cradle" published in 2016. In this research paper author state that cradle will swing automatically. But proposed system was making too much noise of swing due to which baby was getting disturb from sleeping. The system had only one module and that was also leading to problem for baby. Second paper is [3] "Development of an Intelligent Cradle for Home and Hospital Use" published in 2015. In this research paper author states that system is designed monitor baby movement, bed-wet condition and body temperature. System was giving three modules that was obviously good point. But there was absence of one important module of swinging cradle automatically.

Third paper is [4] "An Automatic Monitoring and Swing the Baby Cradle for Infant Care" published in 2015. In this research paper author states that swing mechanism has been provided to the cradle and by reading facial expression

system was trying to determine whether baby is safe or not. So, because use of Artificial intelligence cost of system got increased. Fourth paper is [1] "Smart baby cradle" was published in 2018.In this paper author had given features like wetness detection, cradle swing, camera monitoring, etc. But there was no facility to measure body temperature of the baby and room temperature of the baby.

5. PROPOSED SYSTEM



Above diagram is activity diagram of the proposed system. Activity diagram states the complete overview of the system. Activity diagram starts and then there is a fork.

There are five modules in cradle system from which any one will be operated after any kind of situation that are given as follows:

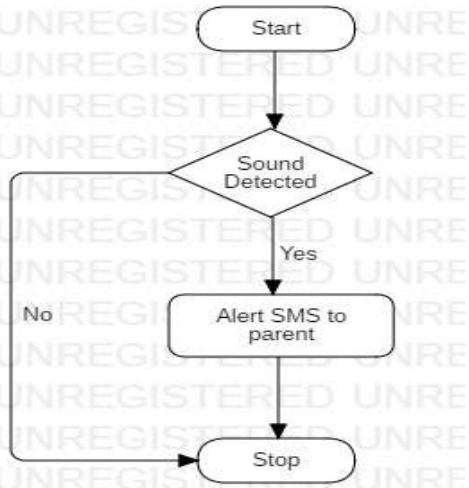
If the baby is making noise or baby is crying then sound sensor will hear that frequency and it will start swing. Also, SMS alert will send to parent through the GSM module. If the baby had wetted the matrices of the cradle then alert SMS will send to the parent through the GSM module. If the body temperature of the baby changes rapidly with comparing atmosphere then alert SMS will send to the parents through GSM module. If baby is moving in cradle or any kind of movement detected by the PIR sensor then alert SMS will send to the parent through the GSM module.

5.1 ALGORITHMS

5.1.1 Automatic cradle swing:

Cradle will start swinging the cradle when baby is crying, if is still crying for more than two minutes then it will send SMS to the parents.

Step 1: Start
Step 2: Check if baby is crying
Step 3: If sound detected then send SMS alert to the parent and swing cradle.
Step 4: If no sound detection then ends.



5.1.2 Wetness:

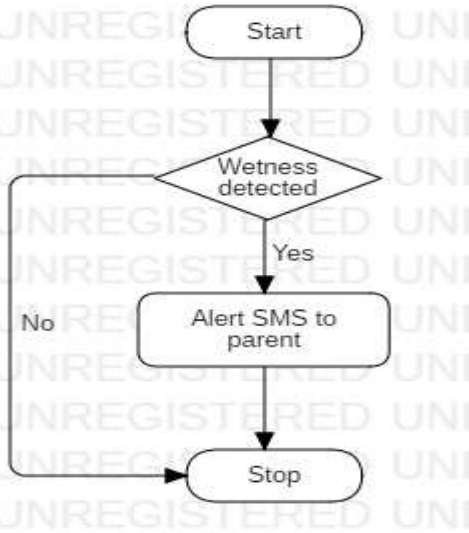
Baby's wetness can be identified by wet sensor. A wet sensor continuously keeps on checking whether the baby's mattress is wet or not. When the wetness is sensed then parents are intimated by sending SMS. This system helps in keeping the baby in a Hygienic environment.

Step 1: Start

Step 2: Check if Mattress is wet

Step 3: If wetness is detected then send SMS alert to the parent.

Step 4: If no wetness detection then ends.



5.1.3 Temperature:

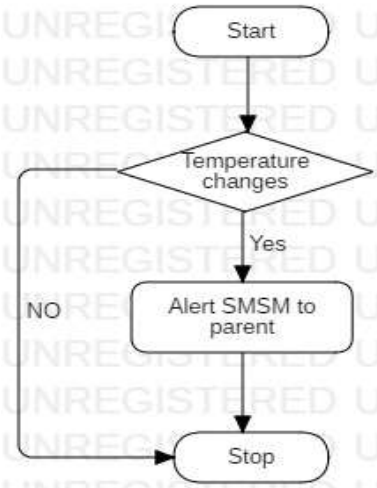
Temperature sensor helps in finding the body temperature of the baby. It checks the body temperature of the baby and sends SMS to parents when temperature increases.

Step 1: Start

Step 2: Check if body temperature changes rapidly

Step 3: If temperature change detected then send SMS alert to the parent.

Step 4: If no temperature detection then ends.



5.1.4 PIR

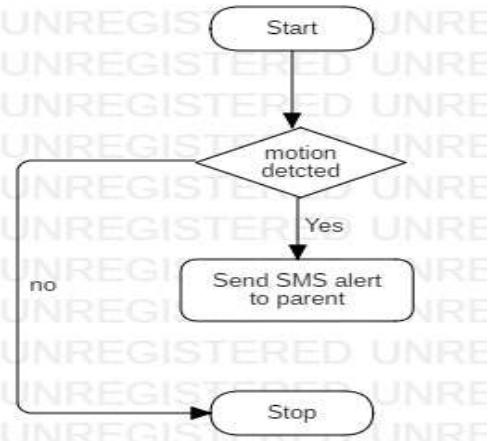
A motion detection may detect moving objects, particularly people. For detecting an object PIR sensor is used. Here it performs a task like it checks the presence of baby in the cradle. The motion detector is mainly used for security purpose. It alerts the parents when baby is not found in the cradle, by sending SMS to parents.

Step 1: Start

Step 2: Check if any motion in cradle.

Step 3: If motion detected then send SMS alert to the parent.

Step 4: If no motion detection then ends.



4. CONCLUSION

Growth of technology has been rapidly increased. Since technology has been developed greatly it can contribute to the society in various way. Automated cradle is the best example where working parents have lot of workload already and they have to care of baby as well. Cradle system assures them that their baby is safe and secure inside the cradle. Cradle which is less expensive and more secure and have more features. As health of small baby is always factor for which parents are always worried. So that cradle system is built for that purpose that baby will be healthier. This automatic baby cradle would let the working mother to do household works besides taking care of baby at the same time.

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