Smart Cradle

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***Abstract*- The IoT-based Baby Cradle System is a modern and innovative solution designed to enhance the safety, comfort, and convenience of infant care. This system leverages Internet of Things (IoT) technology to provide real-time monitoring and control of a baby's cradle. A user-friendly mobile application is developed to enable parents and caregivers to monitor the baby's status remotely. The application provides real-time data updates, allowing users to check on the baby's comfort and safety from anywhere. By harnessing the power of IoT, this system provides an effective and modern solution to assist parents and caregivers in taking care of their infants, providing them with the peace of mind they need while attending to other responsibilities.**

Keywords: **Node MCU, cradle monitoring, IoT technology, sound sensor, moisture sensor.**

Published in IJIRMPS (E-ISSN: 2349-7300), Volume 11, Issue 6, Nove-Dec 2023

1.INTRODUCTION

Traditionally, the task of monitoring and attending to a baby's needs has been labor-intensive and often requires round-the-clock vigilance. Parents and caregivers face the challenge of ensuring that infants are sleeping soundly, maintaining an appropriate room temperature, and soothing them when necessary. From last few decades there is a large migration of people in metro cities in search of better job opportunities (specially women workforce). At present couples who both are working may find it difficult to give proper time and care to their baby. In corona times many people were working from home and it was difficult for them to balance workload and parenting, this put extra burden on parent, Situation aggravates when baby is ill where it requires a constant monitoring which results in taking leave from works. This not only affect the career of parent but also put a stress on them so there is a need to reduce burden of monitoring and nurturing on parents.

The child observing framework is a sort of alert framework which can distinguish infants' developments and exercises and can pass on the message about the state of children to the concerned authority by means of a radio or versatile or even a showcase. Since the absolute starting point of humankind, families have had senses to make sure about their infants from likely threats and hazard. Be that as it may, the route by which guardians take care of their youngsters has changed with the mechanical forward leaps.

They are presently contemplating receiving the innovative and designing developments for getting favorable circumstances and advantages as far as wellbeing issues of their children. In this period when guardians are occupied with their vocation, a cutting edge infant checking framework can be an answer for dealing with babies appropriately as opposed to keeping them in children's day care focuses or designating a caretaker for them. Observing an infant constantly is actually an intense activity just as it isn't feasible for the guardians to do their children all the time with them particularly while working. Employing a guardian for the constant observing of children is a choice when guardians are occupied at home or in the working spots or as an elective arrangement is day care focus. Be that as it may, these two techniques may not be roomy for guardians as indicated by their requests. In particular guardians don't get guarantee about their children's security in both

of the cases. In this viewpoint, an infant observing gadget can be the best answer for evacuate the uneasiness and worry of the guardians.
The IoT-based Baby Cradle System aims to simplify and enhance this caregiving process through the integration of various sensors, wireless connectivity, and mobile applications. Key components of the IoT-based Baby Cradle System include smart sensors that continuously collect data on parameters such as humidity, and motion within the baby's sleeping environment. This data is then transmitted to a central control unit, allowing for real-time monitoring.

2.LITURATURE SURVEY

Marie R. Harper and Maxine R. Blea developed the first automatic rocking cradle which swings side by side on a horizontal axis which replicate the motion same as achieved by human oscillation of cradle. Spring motors are used to provide oscillatory motion to crib. Springs motors are attached to the crib of cradle that produce motion same as human efforts. The spring motor is of any known type in which the gear –operating means is easily stopped when the slightest resistance or opposition to its movement is encountered, thereby providing on extremely safe device for use with small children or babies. The advantages of this system is cost effectiveness, safe for small babies as it has mechanism to stop swinging of crib whenever a resistance is occurred, require less human efforts and presence. The limitation of this system is it does not support video monitoring [1].
Yang HU developed an algorithm to control the speed of motors based on the parameters obtained from baby monitoring this model help the user to control the speed of swinging on pattern of intensity of baby crying. [2].
In this paper a cradle system with an android app to monitor baby, which swings automatically after detection of baby crying sound. The principle behind this mechanism is that a sound sensor detect sound made by baby during crying and compare it to Preset value in microcontroller if sound made by baby is greater than preset value a signal is generated by microcontroller who activates the swing mechanism also an SMS is sent to parent phone using GSM module. Additionally, a camera is placed at top connected with cloud server so that parent can request video from camera from any place. [3]
In this paper a Gas sensor (MQ-135), Temperature sensor (LM-35), sound sensor (KY-038) and a cloud server to integrated it with Raspberry pi in order to upgrade the conventional cradle system to meet the needs of parents. The three sensors record the data collected from baby body parameters and all the information taken from sensors is stored in cloud which keep on sending SMS to parent regarding baby parameters at regular interval of time. This system is user friendly as it requires less hardware components and cost effective. The limitation of this system is that it only informs the parent about baby status but don’t take any action to make him/her stop crying. [4]
This introduced a framework which observe all necessary indication of the child like heartbeats and the internal heat level utilizing remote innovation and sound sensors which is used for observing the cry pattern of the child. Additionally, the live images of the infant are obtained through camera module through a Wide Area Network (WAN) which can be sent through mail and it can keep surveillance on the baby from distant areas around the world. The camera module is also induced which is responsible for observing the activities of the child and keeping an eye on the infant’s development in a limited area. This framework is easy to use and quite cost effective. [5]

3.AIM & OBJECTIVES

- The primary objective is to provide a safer environment for infants. The system monitors critical parameters like humidity, and the baby's sound to ensure that the baby is safe and comfortable.
- To enable parents to achieve a better work-life balance by providing the flexibility to monitor and care for their baby while managing other responsibilities.
- The system allows caregivers to provide care and attention to the baby even when they are not in the same room or location, making caregiving more flexible and adaptable.
- To reduce the stress and anxiety associated with infant care, giving parents and caregivers peace of mind by offering a convenient and efficient way to monitor and care for the baby.

4.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.

5.PROPOSED SYSTEM

The proposed IoT-based Baby Cradle System represents an innovative solution designed to address the challenges and issues associated with traditional infant care. This system leverages Internet of Things (IoT) technology to provide a modern and connected approach to baby cradles, offering numerous benefits to both infants and their caregivers. Cradle system has ability to send alert when baby is crying, it can also swing automatically when baby is crying. Cradle system also gives alert when baby does potty in the cradle. IOT based baby monitoring and automatic swing system that can monitor the baby's condition in real time is proposed to solve these problems. All data taken from the sensors will be stored in cloud and analyzed at regular intervals and notification about the events and the view images captured are uploaded to cloud server. Cradle will trigger automatically via motor driver by microcontroller when the baby cries continuously upon the set point values. The wetness, motion and cry status of the baby displayed on 16x2 LCD display.

SYSTEM ARCHITECTURE

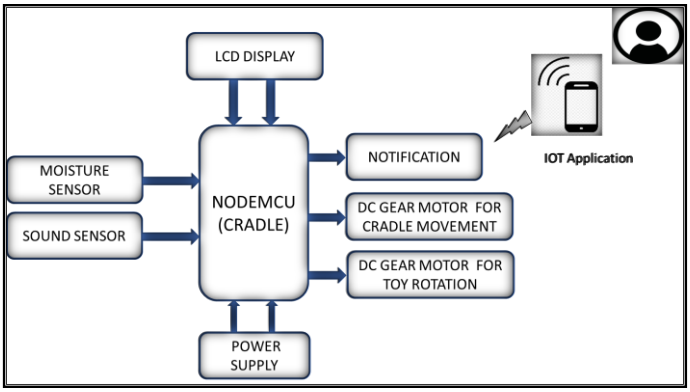

Fig -1: System Block Diagram

6.APPLICATION

- Nursery Automation: The system can be part of a smart nursery, automating various caregiving tasks and creating a comfortable and efficient environment for the baby.
- Parental Insights: The system provides parents with insights into their baby's preferences and habits, aiding in better parenting decisions and adjustments to routines.
- Childcare Facilities: IoT-based baby cradle systems can also find applications in childcare facilities, offering caregivers a more efficient and convenient way to care for multiple infants.
- Healthcare and Medical Monitoring: In certain cases, the data collected by the IoT-based baby cradle system may be shared with healthcare professionals to monitor the baby's health or development, particularly in cases where medical attention or special care is needed.

7.FUNCTIONAL & NON-FUNCTIONAL REQUIREMENTS

Functional requirements

1. Registration
2. User Login
3. Monitoring sensor value
4. Notifications
5. Web Portal
6. Mobile Application

Nonfunctional Requirements

1. Security
2. Authentication and Authorization
3. Reliability
4. Usability
5. Performance

SYSTEM REQUIREMENTS

Software Used:

- Windows 10 or above
- Arduino IDE
- Libraries of IOT
- Iot remote- app Android
- Operating system 5.1 or above

Hardware Used:

- NodeMcu
- Power Supply
- LCD Display
- Moisture Sensor
- Sound Sensor
- DC Gear Motor

8.CONCLUSION

In conclusion, the IoT-based Smart Cradle System is a testament to the potential of IoT technology in improving and modernizing everyday tasks. It transforms infant care, offering caregivers the ability to provide the best possible care while reducing the stress and challenges that come with it. As technology continues to advance, innovative solutions like this system are making a significant impact on the way we care for our youngest family members, creating a brighter, more connected future for parenting and childcare.

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