Journal of Current Research in Engineering and Science
Bi-Annual Online Journal (ISSN: 2581 - 611X)
VOLUME:7, ISSUE:2, PAPER NUMBER:47

Smart Baby Cradle

Anjali Dongre[1], Avdhoot Pawar[2], Aditya Bansul[3], Anubhav Pandey[4], Shilpa Lambor[5]

[1,2,3,4] Students, and [5] Faculty
Dept. of Artificial Intelligence Engineering,
Vishwakarma Institute of Technology, Pune,
Maharashtra, India.
[1]anjali.dongre22@vit.edu, [2]avdhoot.pawar22@vit.edu, [3]aditya.bansul22@vit.edu,
[4]anubhav.pandey221@vit.edu, [5]Shilpa.lambor@vit.edu

Abstract: *Adequate and quality sleep is paramount for infants as it plays a crucial role in their overall growth and development. Sleep is not merely a period of rest; rather, it is a dynamic process that influences various aspects of an infant's physical and cognitive well-being. The immune system of infants is also bolstered during sleep. Adequate rest enhances the production of immune cells, strengthening the infant's ability to fight off infections and illnesses. In this way, a good night's sleep acts as a natural defense mechanism, contributing to the overall well-being of the infant. In the fast-paced and demanding landscape of contemporary life, parents often find themselves grappling with the delicate balance between professional commitments and the demands of caring for their infants. In essence, the smart baby cradle emerges as a vital support system, providing parents with the assurance that their little ones are comforted and cared for, even in the midst of their bustling lives.*
Keywords: *Swinging mechanism, Cry Detection, urine detection, sensors.*

1. INTRODUCTION:

In today's fast-paced society characterized by elevated living standards and hectic routines, addressing the requirements of infants presents a significant hurdle due to their continuous need for care and oversight. However, with the advancement of technology, innovative baby cradles have emerged to ease the burden on parents and caregivers. If a system is created to enable parents to stay informed about their baby's well-being, whether during illness or daily routines, it could be a tremendous assistance to such families. This way, they can alleviate concerns about the baby's welfare and focus more on overcoming work-related challenges.

The innovative intelligent baby cradle represents a cutting-edge device embedded with a diverse set of functionalities with the ability to automatically sway the cradle, detect the baby's cries through advanced sound sensors, and provide real-time updates on instances of urination through moisture sensors, this technology stands at the forefront of modern childcare. By integrating motion, moisture, and sound sensors, along with cry detection and urination notifications, this smart cradle not only streamlines the caregiving process but also offers peace of mind to parents, allowing them to stay informed and responsive to their baby's needs even amidst their busy daily routines.

The Smart Cradle not only provides real-time updates but also archives valuable data, offering insights into the baby's sleep patterns and preferences. This data-driven approach allows parents to adapt the cradle's functionality based on the baby's evolving needs, fostering a more adaptive and supportive environment. With the convenience of insightful analytics, the intelligent baby cradle becomes a holistic solution for modern parenting, combining technology and nurturing care.

2. LITERATURE SURVEY

The convergence of healthcare, human-computer interaction, and engineering in the context of the smart baby cradles presents a fascinating intersection. These systems, equipped with an array of sensors, connectivity features, and automation capabilities, hold the potential to redefine the caregiving experience for parents and caregivers. This literature survey endeavors to navigate the current state of research and technological advancements in smart baby cradle systems, shedding light on key themes such as IoT integration, health monitoring, user experience, and safety considerations.

Chitte Pankaj Pramod etc. Al[1] incorporates a Node MCU microcontroller, sound, temperature, and humidity sensors, along with buzzer, motor, and a user-friendly mobile app. Leveraging Node MCU's affordability and versatility, the system analyzes data from sound and temperature sensors to determine the baby's state. The moisture sensor adds an extra layer of vigilance. Arduino IDE facilitates seamless programming, while the Blynk App provides an intuitive interface for real-time monitoring and control. This harmonious blend of hardware and software crafts a responsive and truly intelligent childcare solution.

Gulam Sarwar etc. Al[2] features an automated swinging mechanism triggered by the recognition of the baby's cry. It comes with a predefined time frame for notifying parents if the baby's crying persists. Additionally, a wetness detector senses mattress dampness, promptly sending an SMS alert to the parent's phone. Positioned atop the cradle, a camera provides continuous baby surveillance during parental work hours. Furthermore, an automatic toy is incorporated for the baby's amusement, minimizing the likelihood of crying episodes.

Kannan P etc. Al[3] Utilizing Raspberry Pi as its core, this system employs saved value differentials to alert parents. It orchestrates a video camera to continuously record the baby's movements, with live feed displayed on a monitor. The system's capability extends to motion detection and sound analysis, enhancing parents' ability to remotely monitor their baby's well-being. This technical innovation streamlines childcare, providing real-time data and prompt alerts for more efficient parenting.

Harshad Suresh Gare etc. Al[4] uses sound sensor to detects the baby crying, it triggers the cradle's swinging mechanism, and a corresponding SMS alert is sent to the parents via the GSM module. Additionally, if the cradle's matrices detect wetness, an alert SMS is dispatched. Rapid changes in the baby's body temperature, compared to the ambient atmosphere, prompt another alert through the GSM module. The PIR sensor detects any baby movement in the cradle, sending an alert SMS. Simultaneous detection of baby crying and wetness results in a combined alert. If the baby continues crying after five minutes of swinging, a heightened alert is sent to the parents.

Ms. Diya Karkhanis etc. Al[5] included Sound, Moisture, Methane, and Contactless Temperature sensors. This project introduces a Cloud-connected Smart Cradle System, offering real-time monitoring of the baby's temperature, detecting wetness and diaper conditions, automatic cradle swinging on sound threshold breach, and maintaining room temperature with a fan. It includes reminders for feeding intervals, activity notifications, and live video streaming for parents, aiming to seamlessly connect working parents with their infants by providing continuous, real-time updates.

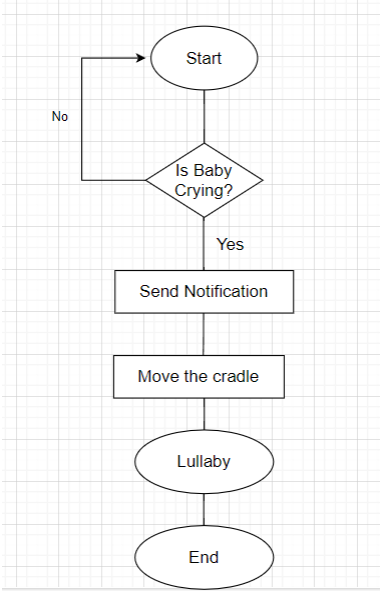
Distinguishing our Cradle from existing counterparts are several key differentiators. Firstly, our solution prioritizes cost-effectiveness, ensuring accessibility and affordability for a broader demographic. Secondly, a noteworthy inclusion is our integrated sanitization system,

a unique feature absents in other systems. This addresses the crucial aspect of maintaining a hygienic environment for the baby, aligning with contemporary health standards. Lastly, our project strategically avoids incorporating unnecessary elements, streamlining functionality for heightened efficiency. By emphasizing cost-effectiveness, incorporating a sanitization system, and steering clear of superfluous components, our innovation stands out as a practical and tailored solution, contributing to the advancement of smart cradle technology.

3. METHODOLOGY/EXPERIMENTAL

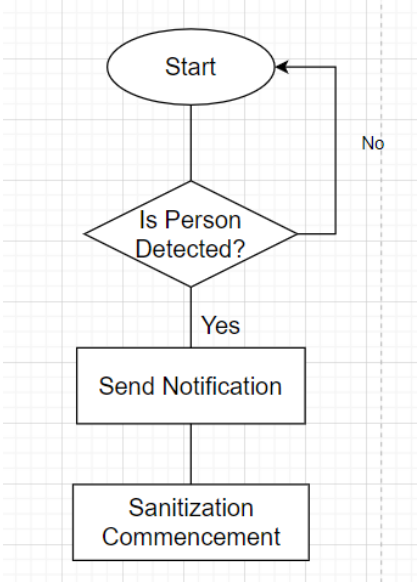
At first, the displayed flowchart explains the moving of cradle on detecting a baby cry by the use of a sound sensor to sense the cry and the servo motor as an actuator to move the cradle. At the same time a notification regarding the same is also received on the Blynk Application on the parent's mobile phone. Simultaneously, Start the Lullaby or Mother’s voice.

Fig. 1. Cry Detection



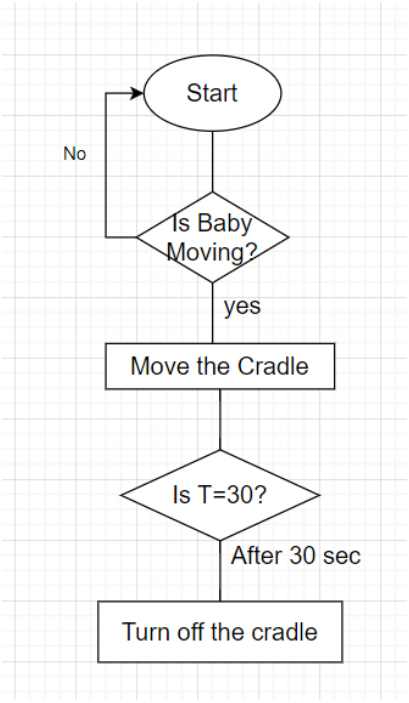
At Second, The baby cradle is equipped with a unique feature of sanitization that sanitizes the surrounding as soon as it detects presence of any moving object (person or insect, etc) in the baby's vicinity using the ultrasonic sensor and simultaneously sends notification regarding the same on the application.

Fig. 2. Sanitization



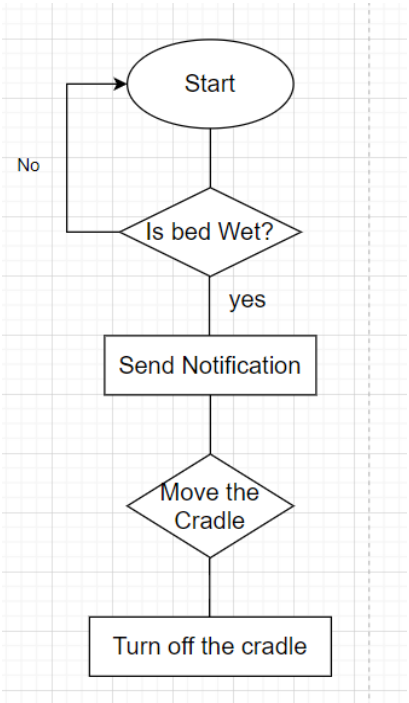
At Third, the cradle is capable of detecting any sort of movements that the baby does using the motion sensor and thus, moves the cradle in parents' absence with the help of servo motor for 30 seconds and then stops and remains stationary until it detects any further movement.

Fig. 3. Baby Movement



At Fourth, the baby cradle includes yet another unique feature, Moisture Detection. Whenever the baby urinates it senses the urine using the moisture sensor and simultaneously send the notification regarding the same on the Blynk Application. Also, the cradle moves automatically on detecting moisture for a set time limit.

Fig. 4. Moisture Detection



4. RESULT AND DISCUSSION

The implemented cry detection feature of the SMART BABY CRADLE has proven to be highly effective, detecting 18 crying events in the last hour. This real-time monitoring system actively listens for sounds of distress, providing caregivers with timely alerts to attend to their infant's needs promptly. Additionally, the moisture detection feature, currently registering at a level of 2404, allows the system to track moisture levels, signaling potential diaper changes or other care requirements. Together, these features contribute to a comprehensive monitoring system designed to ensure the well-being of infants by actively monitoring key indicators of their health and comfort.

In addition to the cry and moisture detection features, the BABY CRADLE incorporates a sanitizer component designed to enhance infant safety. Upon detecting someone approaching the baby, the system activates a servo motor to dispense sanitizer, effectively sanitizing the room and mitigating potential hygiene risks. This innovative addition contributes to a comprehensive approach to infant care, ensuring a clean and safe environment. During testing, the sanitizer function demonstrated reliable activation and dispensing, adding an extra layer of protection to the infant's surroundings.

Other noteworthy features of the BABY CRADLE include a centralized dashboard providing real-time monitoring of key indicators, including crying events, moisture levels, and sanitizer activations. The dashboard not only ensures caregivers stay informed but also promotes quick and informed responses to the infant's needs. The cry detection, moisture monitoring, and sanitizer dispensing capabilities collectively create a smart, responsive ecosystem tailored to prioritize the well-being of the infant.

Fig.5. Real Time Monitoring

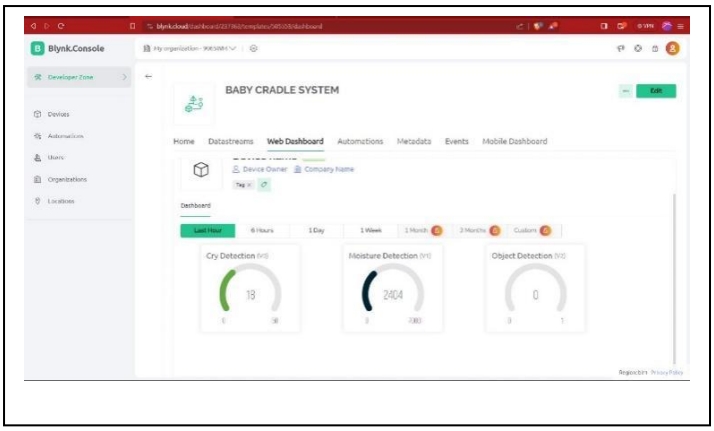
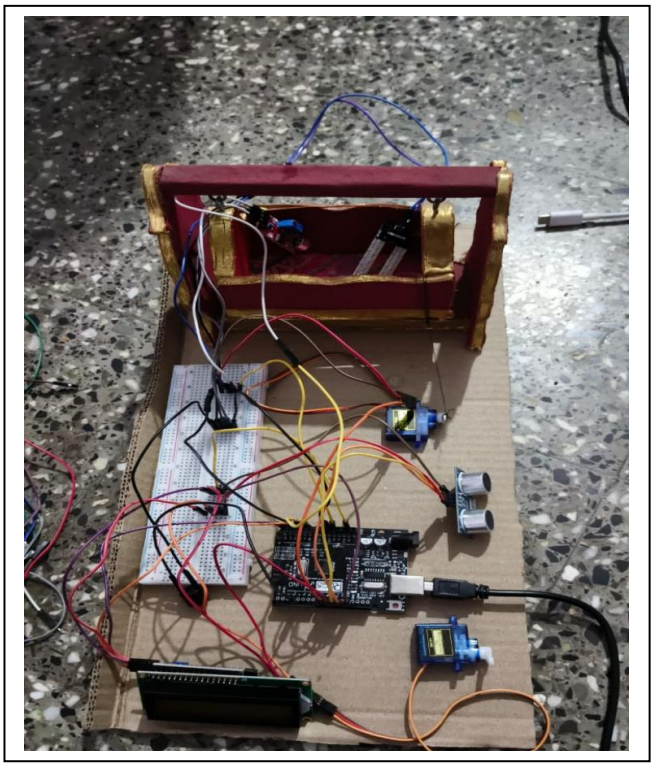


Fig.6. Circuit of Smart Cradle



5. CONCLUSION AND FUTURE SCOPE

The SMART BABY CRADLE is a cutting-edge infant care solution, integrating cry detection, moisture monitoring, and sanitizer dispensing features. The precise activation of the sanitizer component using a servo motor underscores the system's commitment to hygiene and safety. Recommendations for improvement include adding data visualizations for cry and moisture data, real-time alerts, and exploring additional contextual data streams like room temperature and sound levels. With ongoing refinements, the SMART BABY CRADLE has the potential to revolutionize smart infant care systems. Looking ahead, possibilities for refinement and expansion, along with user-driven updates, position this system for a significant impact on the landscape of infant care, ensuring the well-being of our youngest members through innovative technology.

6. References:

[1] Chitte Pankaj Pramod, Kumbhakarn Ganesh Pramod, Bhosale Akshay Anil, “Development of an Intelligent Baby Cradle for Application at Home”, International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 9 Issue VI June 2021.

[2] Gulam Sarwar, Mohd Amir, Nikhil Yadav, Prince Meenia “DESIGN OF SMART CRADLE SYSTEM USING IOT”, International Research Journal of Modernization in Engineering Technology and Science, Volume 04 Issuse 05, May-2022.

[3] P. Kannan Paramasivan, Allwin Devaraj, B. Pradheep T Rajan, Swathira P K, “IoT Based Smart Cradle Using PI”,

[4] Harshad Suresh Gare, Bhushan Kiran Shahane, Kavita Suresh Jori, Sweety G. Jachak, “IoT Based Smart Cradle System for Baby Monitoring”, International Journal of Creative Research Thoughts (IJCRT), Volume 8, Issue 3 March 2020.

[5] Ms. Diya Karkhanis, Mr. Yogesh Kendre, Ms. Siddhi Hande, Mr. Sagar Dhawale, “A Review Paper on “Smart Cradle System”, International Journal of Creative Research Thoughts (IJCRT), Volume 9, Issue 12 December 2021.