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Machine Learning Based Infant Surveillance System Using Advance IoT.

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ABSTRACT:

A cradle is a device that puts a baby to sleep. The cradle has a side rocking motion to relax your baby to sleep. Physically rocking and rocking the cradle requires lot of effort on the parent. Parents should constantly monitor the baby's activity when the baby is cradled in the cradle. The idea proposed in this smart charging station prototype allows the charging station to be efficiently integrated with smartphone (usually Android device). Assemble all necessary sensors and hardware components using an Arduino and pi microcontroller. Babies in cradles are constantly monitored. Notifications are sent on the parent's device via IOT when activities like urinating or baby waking up. Smart cradle also has an additional features such as: B. Baby automatic locking by geared motor system.

Keywords: ***Smart baby cradle; motor; wet sensor; micro controller; pi camera; Raspberry pi ; android device; IoT; Arduino microcontroller.***

INTRODUCTION

As we all know that we all live in very hectic life where we have no time for our loved one, we engaged our self in this type of life so for this when we have baby similarly, we are not able to focus on our child so seeing this that parents are facing a little bit of problem nowadays they cannot keep their eyes on their baby so for this they mostly take nanny for take care to their baby in that case also they are not seeing that nanny also take care their baby properly or not and sometime they are not aware of that their baby is not feeling well or having sort of issues and some parents are not fully trust the nanny so that our IOT based device help those parents who needs see their baby virtually any time and take care that baby is okay or not so for this we made the device through which they connected to the baby with the help of the smart device they don't need to go back on their free time as it takes so much time and energy and they easily get exhaust some time woman take the baby with themselves but sometime some job places are not allowed to take the baby with them as they disturbs the working environment so the baby monitoring system consist of camera, sensor an in the sensor part we have used four type of sensor in which first one is temperature sensor, second one is moisture sensor, third one is sound sensor and fourth one is motion detection by which can easily sense the baby body temperature is normal or not and we can easily check that baby dipper needs to change or not by came we can easily see that baby is enjoying or in dangerous situation or not the all activities easily can seen in the smart devices of their parents and this is not even so big in cost it is design in affordable price so that every needy parents buy this and we can help them.

1. TECHNOLOGIES USED

There are numerous health management and systems to protect the “health” of adults and the elderly. It can monitors many health conditions and automatically send the alert, and much more. However, these systems must be used with caution, making them impractical for infants. Unlike adults, infants are completely dependent on their parents and therefore require a completely different approach to health care. Infants cannot give feedback on their health status. Because crying is the only way to express your displeasure.

Therefore, we need a medical system specifically designed to care for infants. The burden on parents, especially mothers, is gradually reduced. To support the above theory, the authors developed a system based on GSM networks. Important baby variables such as body temperature via temperature sensor, marks then passed to the microcontroller chip. Wet-sensor that detects the state of the urine in the baby “smart cradle” and all other collected data is passed to the microcontroller. A camera to the cradle so that live images of the toddler can be viewed when the parents are not there.

A speaker sound system that listens to the parent's voice and play songs while the baby is crying or to soothe the baby. Also, place moveable toys on your baby's crib to keep him calm. Remote system with a “GSM” module receives the data and sends it to the microcontroller for the processing. The proposed smart baby cradle prototype monitors infant activity. The cradle has a motor that rotates the movable toy. The ‘smart infant cradle system’ has a sound

detection feature that detects sounds when your baby is weeping or making loud noises. A motor rotates (vibrates) the crib frame to a safe angle when a child is in the cradle.

“The Raspberry Pi is a credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. ‘It is a capable little device that enables people of all ages’ to explore computing, and to learn how to program in languages like Scratch and Python”. The design principle and functional blocks of the proposed system are presented. First, the image analysis functions can be divided into two subgroups: facial image analysis and environmental image analysis.

2. LITERATURE REVIEW

In paper [1], The prototype of the smart infant cradle has design features proposed by the authors that describe the essential hardware design elements. Although the core components will be altered to a more effective and progressive order, the finished infant cradle product will still adhere to the same design specification. "All designs in this document consider the initial customer and safety criteria mentioned in the functional specifications," according to the document. The requirement identifiers used in this document and the functional specification are the same. The infant's curiosity sets the boundary.

In paper [2] The authors made the decision to design a cradle that can be operated by a smartphone app. B. Sending a video/audio stream. When parents can't immediately get to babies, we need a routine comforting method. after developing a few functionalities. I utilized a stepper motor, speaker, microphone, router, Wi-Fi module, and microcontroller. The baby's interest is this paper's main flaw. In addition to the potential for electric shock, infants may drop or damage components.

In paper [3], The authors suggested creating an intelligent cradle alarm system that alerts parents to their baby's activity. The system is made to fit in the majority of typical cots and cribs. Sensors in the system look for baby activity and notify parents. This system's lack of a pivoting mechanism or rocking motion is a drawback of this paper. It makes use of a Wi-Fi module that is restricted to specific locations.

In paper [4] The rotation of the cradle was calculated mathematically by the authors. The rotation angle, velocity, and all other input variables influencing the swing motion were determined by the author and incorporated into a single formula. The authors went over the crib's design requirements. The author raised the possibility of creating an additional crib fence with a safety focus. disregarding all other aspects.

In paper [5], Without a human or sensor, the authors swing or vibrate the cradle autonomously. A "slider-crank" mechanism is used to change the rotational motion of a revolving moving beam into translational motion. An instrument that can detect moving things, particularly people, is a lead-acid battery. a sound sensor that can measure both absolute and adjusted decibels Sound pressure is measured in decibels. This paper's drawback is that it makes more noise, which can wake up the infant. The proposed system is incapable of managing sound.

In the paper [6] The infant's motions, status as a bed wetter, and body temperature can all be tracked by the authors' smart baby care system. Following are some suggestions from researchers for soothing and calming your baby: For instance, feeding, weighing, or singing to a baby. The project's hardware includes a gear motor, Arduino UNO, a GPRS shield, surface temperature monitoring sensor, and a wet sensor (built on a PCB). Its lack of a sound detector means that it is unable to pick up sounds like crying or other baby activity.

In paper [7] When a baby screams, a cradle, a device that automatically swings, is introduced by the author. It uses facial expression recognition, video recording, and automatic massage sending to determine whether your kid is safe in order to take their temperature. The device is more expensive and took longer to build because it employs "artificial intelligence" to identify emotions, it doesn't come with a crib, and the parts are attached to the mattress. Someone else asserts that parents can record.

In paper [8], The author describes the design architecture of a GSM-based infant monitoring system. Key metrics like body temperature, heart rate, hydration level, and child movement are tracked by the system, and updates are sent to the parent via her GSM network. “Temperature sensor, heart rate sensor, humidity detection sensor, LCD screen, GSM module, motion sensor, and controller make up the integrated hardware”. The system's shortcomings include the lack of a crib and the lack of a see-saw motion. Cause the infant discomfort.

In Paper [9] Without human intervention, the author had the cradle vibrate and swing automatically thanks to sensors. By way of a revolving driving beam, the Slider-crank mechanism converts rotational motion into translational motion. battery, lead-acid Devices that detect moving objects, especially people, are called motion detectors. Decibel [dB] and adjusted decibel [dBA] sound sensors are used. Sound pressure is measured in decibels. This paper's drawback is that it makes more noise, which disturbs the infant. The proposed system can't handle sound well enough.

In Paper [10] The traditional cradle system can be upgraded to better fulfil parents' needs by integrating a cloud server, a sound sensor (KY-038), and a temperature sensor (LM-35). The three sensors keep track of the information gathered from the baby's physiological characteristics, and all of the data is kept in the cloud where it is continuously sent to the parent through SMS. Because it requires fewer hardware components and is less expensive, this system is user-friendly. This system's drawback is that it merely notifies the parent about the baby's status and does nothing to halt the wailing.

In Paper [11] introduced a system that monitors all vital signs of the child, including heartbeats and body temperature, using remote technology and sound sensors to track the infant's crying patterns. Additionally, a Wide Area Network (WAN) allows the camera module to capture real-time photographs of the child, which may then be transmitted by mail and used to maintain tabs on the child from afar. The camera module is also activated, and its job is to monitor the child's actions and keep tabs on the baby's growth in a specific area. This framework is simple to use and fairly affordable.

In Paper [12] The authors created a low-cost device that swings the cradle when the infant starts to cry and stops it when the baby stops. Either one of the following situations causes the built-in alarm to sound: the mattress is damp; or the baby's wailing continues after a predetermined amount of time. To keep an eye on the child, a video camera is positioned above the cradle. However, the parents are unable to operate the system and can only receive SMS notifications.

In Paper [13] created a baby monitoring system based on the Raspberry Pi and the Pi camera. The system's design allows it to detect a baby's activity and crying patterns. With the aid of the Pi camera, they employed a condenser MIC to detect the crying state and a PIR motion sensor to detect the baby's movement.

In Paper [14] proposed a device that could track a person's body temperature and heart rate. To monitor the health state and save the collected data in the Bluemix cloud, dedicated sensors are installed with Raspberry Pi and IoT. The doctor receives the saved data for health analysis and to look for anomalies. The heart rate is determined using the KG011 sensor.

In Paper [15] An incubator was given a monitoring system. An infant is fitted with a pulse sensor to gauge their heart rate, and a humidity sensor gauges the relative humidity. The computer will receive the recorded data via the Arduino microcontroller.

3. FIGURES AND TABLES

Parameters	*Efficiency of Paper [1] [%]*	*Efficiency of Paper [1] [%]*	*Efficiency of Paper [1] [%]*	*Efficiency of our Paper [%]*
Temperature measurement				*100*
Expression recognition		*68*		*95*
Humidity	*62*	*59*	*64*	*97*
Cry monitoring	*65*	*67*	*61*	*92*
Cry Indication				*96*

Tab. 1. Research parameter

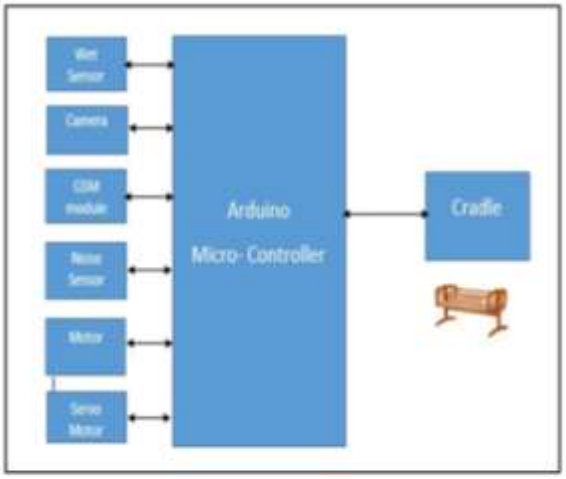

fig. 1. Component Diagram

4. CONCLUSION

In this paper, this cradle system was developed for young parents who cannot afford a full-time nanny. As a

result, it is very affordable for those parents who cannot afford an expensive cradle system, ensures baby safety in the majority of cases, and allows parents to stay constantly connected to their child.

This gadget continuously snaps photos of the baby to send to their parents. This equipment also looks after the internal health conditions of the newborn. Therefore, we may connect working parents to their child via a technology, especially mothers who wish to view their child constantly.

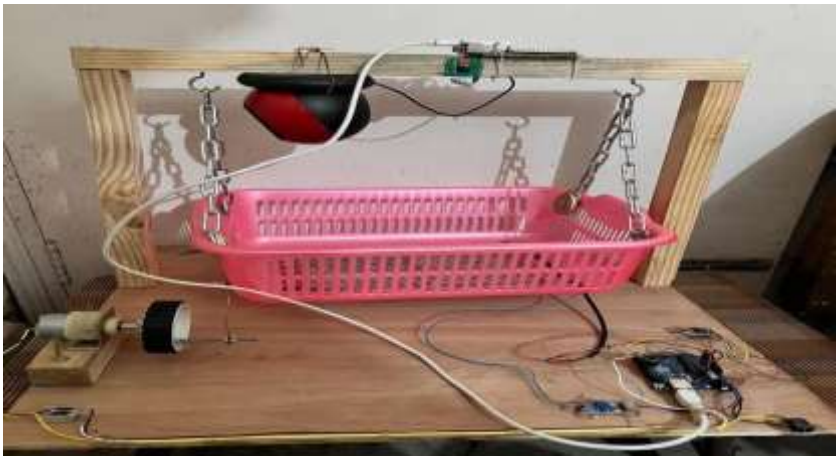

Fig. 2. Smart cradle system

Some parents place their baby in a separate room. Therefore, parents could not hear the baby crying and could not be there to ease their baby back to sleep in the middle of the night. Other parents may be occupied with house chores. Sometimes, the baby only needs a little distraction to return to deep sleep.

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