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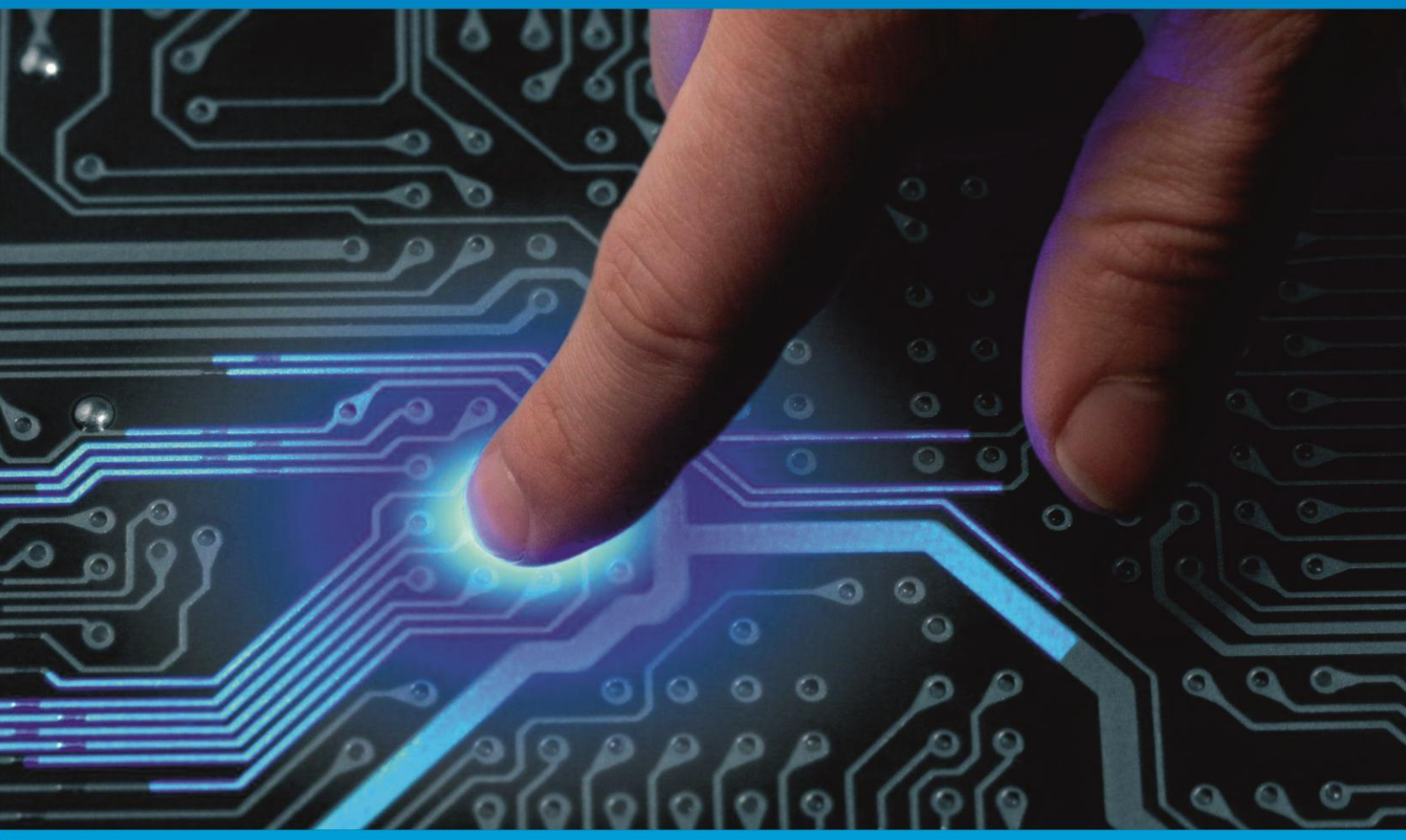

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Internet of Things Based Baby Monitoring System for Smart Cradle

Tina Kishor Lokhande[1] , Ankita Jagannath Bankar[2] , Vaishnavi Bhalchandra Mahajan[3] ,

Komal Balasaheb Pagare[4] , Prof. V.N Pawar[5]

Student, Department of computer Engineering, Guru Gobind Singh Polytechnic, Indira Nagar, Nashik, India[1,2,3,4]

Lecturer, Department of Computer Engineering, Guru Gobind Singh Polytechinc, Indira Nagar, Nashik, India [5]

ABSTRACT: The current number of working moms has significantly expanded. Consequently, child care has become a day by day challenge for some families. Consequently, most guardians send their infants to their grandparents' house or to infant care houses. Nonetheless, the guardians can't continuously screen their infants' conditions either in ordinary or unusual circumstances. Hence, an Internet of Things-based Baby Monitoring System (IoT-BBMS) is proposed as a productive and minimal effort IoT-based framework for checking progressively. The proposed framework abuses sensors to screen the infant's crucial boundaries, for example, encompassing temperature, dampness, and crying. The framework engineering comprises of an infant support that will consequently swing utilizing an engine when the infant cries. Parents can likewise screen their infants' condition through an outside web camera and switch on the cradlesong toy situated on the child support distantly to engage the infant. The proposed framework model is manufactured and tried to demonstrate viability regarding cost and straightforwardness and to guarantee safe activity to empower the infant nurturing anyplace and whenever through the organization. At long last, the infant checking framework is demonstrated to work viably in observing the child's circumstance and encompassing conditions as indicated by the model.

KEYWORDS: Baby monitoring, smart cradle, NodeMCU, AdaFruit, MQTT.

I. INTRODUCTION

At present, female participation within the hands within the industrialized nations has greatly multiplied, thereby affecting baby care in several families. Both parents are needed to figure because of the high price of living. However, they still have to be compelled to take care of their babies, thereby increasing employment and stress, particularly of the mother. Working parents cannot continuously look after their babies. They either send their babies to their grandparents' or rent a baby caregiver till the time they're working. Some parents worry about the protection of their babies within the care of others. Thus, they're going home to see on their babies during their free time, like lunch or snack. A baby monitoring system that may monitor the babies' condition real time is planned to resolve these issues. A baby observation system consisting of a video camera and mike without limitations of coverage. It will send knowledge and right away inform the guardians regarding urgent things, thereby shortening the time required to handle such situations. Generally, babies cry as a result of they're hungry, tired, unwell, or would like their diaper to change.

Sudden Infant Death Syndrome (SIDS) is additionally referred to as crib death, as a result of several babies World Health Organization die of cot death, are found in their cribs. It happens to infants younger than twelve months old. Most SIDS deaths occur in infants younger than six months old [01]. Professionals still don't understand the causes of SIDS; however, risk may be reduced by rental the baby sleep on a firm surface (crib mattress). Additionally, the baby mustn't sleep on a pillow or another a soft surface. The researchers don't understand why sleeping on such surfaces increase the danger of SIDS, however they warn that it may be dangerous [02].

Internet of Things (IoT) purely refers to a network of objects that are connected to the web. It provides devices with the power to transfer sensing element information on the web while not requiring intervention [05],[06]. The IoT encompasses several devices and is growing at a speedy rate, as a result of it's such a broad class. IoT may be an outstanding field that may increase and grow exponentially. The operate of IoT is management, time period observation, and perform autonomy or autonomous operate and optimization. Maybe one in every of the most reasons why the IoT is very massive is that it aims to form life additional convenient, and other people are a lot of probably to take a position in things that build their lives easier. Consequently, the amount of IoT applications continues to extend in several fields. During this study, IoT is integrated into our baby observation system to realize a speedy interval of time and to supply a larger sense of security for guardians.

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Node Micro-Controller Unit (NodeMCU) Wi-Fi-Based Controller Board is an open supply platform for IoT applications and is employed because the main micro-controller during this project. It's usually used to gather information by the sensors and uploads these knowledge to the MQTT server. It additionally receives commands given by the user to perform specific tasks via the MQTT server. NodeMCU consists of physical programmable printed circuit the same as that of the other development boards, like Arduino board and Raspberry Pi. The programming of the NodeMCU may be performed using Arduino software package, that is associate Integrated Development surroundings (IDE), wherever the code of directions is written and therefore the microcontroller is uploaded. Generally, the baby cradle utilized in various hospitals and maternity homes for infants to sleep in and for soothing them.

Conventional cradles are utilized in villages or non-urban areas due to their low price and ease. However, typical cradles are manually swung and need hands. They lack automation and don't seem to be electronically equipped. Consequently, typical cradles should be automatic to become additional convenient, safe, and economical in observation the baby's scenario in real time.

II. RELATED WORK

Today's life is made easier when all the things get automated.This can be achieved using Internet of Things Technology. Parents are not available full time in a day for monitoring their baby due to official work. The working women's are facing difficulty to manage all the office work and also a household works at one time. By using of "smart infant cradle" parents can save their time, and it also very useful to watch the baby actions. When the baby cries or moves out of cradle, bed get wet or diaper gets wet or if just in case temperature is high immediately the message is send to the parents or caretaker of that baby. They can also monitor the baby using webcam which takes picture of baby and it sends to the parents via the WIFI module. The parents or caretaker can perform some in built operations like when the baby cry the cradle automatically swings and if the bed (diaper) gets wet they will take actions, and also they can play sooth music. So that the mother can save their time to another work and also she can do the work simultaneously and make a baby feel comfortable.[1] In the existing system, mobile application for monitoring the live movement of the baby is absent. Here they build a mobile application for specific task that is monitoring he baby activities. When the baby cries, sound is recorded in microphone and is sent to signal conditioning and that sound is converted into analog signal and then sent to the microcontroller. When the baby diaper gets wet, the moisture sensor gets activated which sends notification to the microcontroller. Finally, the microcontroller is sending the notification to the parents or caretaker. Microcontroller is connected to the mobile via the internet and all the data will be stored in the cloud server. It contains some inbuilt functions, first one is, when the baby cries, cradle will automatically swings, second is, if the bed gets wet the moisture sensor gets activated and it sends a notification to the oldsters . When the notification is send to the parents they can perform actions like swaying the cradle and playing sooth music and make baby peaceful sleep.[2] This paper represents an automated alarm system for Diaper wet. The design of the system used by an Advanced RF transceiver and GSM system. The GSM system is used for sound an alarm by the identification of the moisture in the diaper, this system is to alert the parents to change the diaper. The need of diaper is to soak up the moisture content, so that the clothing of the baby still dry and comfortable. When he diaper is moistered, the resistance between the spaced conductors drops down to the pre-built value. Therefore, the identifier and RF transmitter send out the signal to RF receiver. The GSM is especially wont to bring out the required alarm. When the diaper is replaced by new one, the detector is dissociate from the pressure studs for reusable and the conductor is throw away along with the soiled diaper. When alarm, it'll reflex and notified the users via the mobile network about the probabilities of break-in using either call or SMS. The mobile call GSM alarm system can stores up to 6 digit phone numbers and the alarm system are operate by make the alarm calls to these numbers. This system can also stores 3 digit SMS number. It will help to sends alarm SMS to these numbers automatically when alarm gets on.[3] The system is especially focuses on the planning and implementation of a replacement low-cost E-Baby Cradle. The cradle will swings automatically when the baby cries. This system contains a cry analyzing system which identifies the baby cry voice and in accordance with the baby cry, the cradle will swing until the baby stops crying. The speed of the baby cradle is control as per the user demand. This system contains microphone, which detect the baby cry voice and convert that sound signal into the electrical signal, that electrical signal is fed into the amplifier. Here, the system is employed of PIC16F73 to receive the amplified signal. The received amplified signal is again converts into the digital signal. Microcontroller is especially used for the controls the driving force circuit, it'll starts a motor and sways the baby cradle with accordance with input . Baby bassinet is that the baby's bed , this is often connected to motor which helps to sways the baby bassinet supported the facility , which can receives from the driving force circuit.[4]

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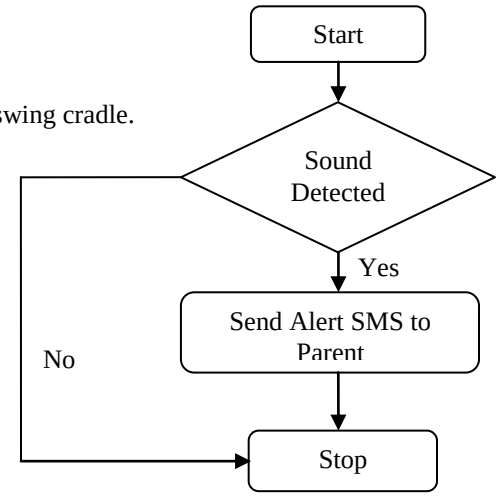
III.PROPOSED ALGORITHM

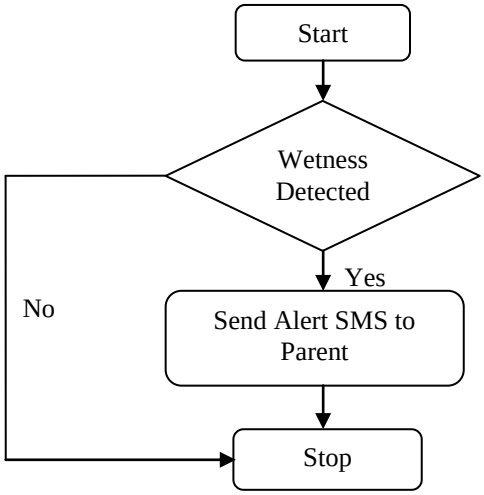
Automatic cradle swing:
Cradle will begin swinging the cradle once baby is crying, if continues to be crying for over a pair of minutes then it's going to send SMS to the parents.

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



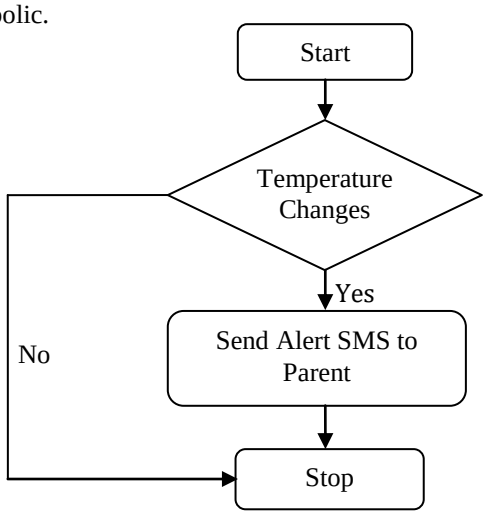
Wetness:
Baby's condition is understood by wet device. A wet detector unendingly keeps on checking whether or not or not the baby's diaper is wet or not. once the condition is detected then of us ar intimated by inflicting SMS. this system helps keep the baby terribly} very healthful atmosphere.

Step 1: begin
Step 2: Check if diaper is wet
Step 3: If the condition is detected then send SMS tuned in to the parent.
Step 4: If no condition detection then ends.



Temperature:
Temperature detector helps realize the temperature of the baby. It checks the temperature of the baby and sends SMS to the guardians once temperature has hyperbolic.

Step 1: begin
Step 2: Check if temperature changes quickly
Step 3: If action detected then send SMS alert
To the parent.
Step 4: If no temperature detection then ends.



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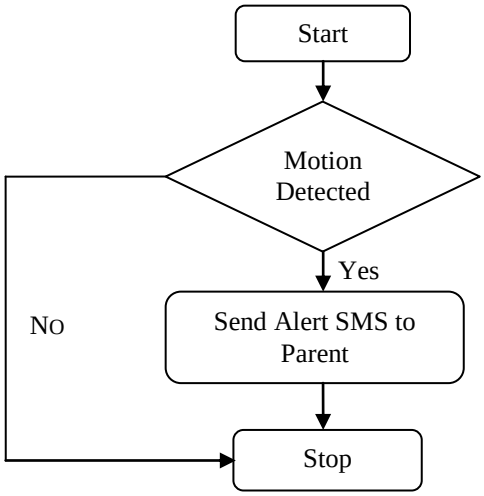
PIR :

A motion observation may notice moving objects, considerably people. For detection associate object PIR device is used. Here it performs a task like checks the presence of baby among the cradle. The motion detector is very used for security purpose. It alerts the guardians once baby is not found among the cradle, by causing SMS the guardians.

Step 1: begin
Step 2: Check if any motion in cradle.
Step 3: If motion detected then send SMS tuned in to the parent.
Step 4: If no motion detection then ends.



IV.RESULTS

The live information from the cradle is distributed to the mobile application with the temperature, humidity, the movement of the baby and therefore the sound of the baby. encase if the kid needs a swing the parent will swing the cradle. The app indicates a alert to the parent if any sensors aren't operating.

V.CONCLUSION

A smart cradle with a baby monitoring system over IoT has been designed and invented to watch a baby's important parameters, like crying condition, humidity, and temperature.NodeMCU was used as main controller board within the project's circuit design, as a result of it had a inbuilt Wi-Fi module, that enabled the implementation of IoT concept within the developed system. The demand of IoT was achieved by using the NodeMCU because of its simplicity and open-source nature.

Our system's graphical user interface has to be improved to beat limitations of each Adafruit.io MQTT server webpage and MQTT Dash mobile application. We will develop our own web-based and Android-based dashboards for laptops, PCs and smart-phones, to add additional watching and dominant functionalities supported our system needs. Another limitation of the developed system is that the wireless camera used, which is can only be connected to a neighborhood network. guardians will only view the section wherever the camera is positioned after they are connected to a similar network as that of the wireless camera. TransFlash card are often used for the camera to record the baby's activities, however it's not thought of real-time monitoring. Therefore, for future works, the wireless camera will be turned into AN information processing camera to modify information processing hosting viewing in the network. the guardians will sort the set information processing address for the information processing camera within the network browser to observe the baby's conditions in real time. additionally, different future works will be conducted to any improve this method. A sound device with higher quality are often enforced for higher noise capturing. The temperature and humidity of the surroundings were determined, and the mini fan was turned on if the measured temperature was above 28 C.

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