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Effective Remote Tracking and Monitoring System Used in Baby Care

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A B S T R A C T

This paper proposes the creation of an Internet of Things (IoT) Smart Cradle System that would enable parents to keep an eye on their child when they are away from home and track their every move from anywhere in the world. It is an effective, clever, and protected cradle system for raising a child. This technique takes into account every little aspect needed for the baby's security and care in the cradle. The Internet of Things (IoT) (modules like Arduino UNO, humidity & temperature sensing, etc..), cry detection mechanism, and user-friendly web application (for user controls) are some of the technologies/methodologies that enable smart & innovative design. Several Sensors and Modules are fastened to the Cradle in order to monitor the Baby's every move: The Humidity and Temperature Sensing Module is used to determine the bed's wetness, while the Cry Detection Circuit is used to examine cry patterns on a regular basis.

Keywords: IoT, GSM , Arduino, Sensor.

1. Introduction

We are all too aware of the difficulties parents experience in raising their children, particularly when both parents work. In these kinds of situations, it is nearly hard to grant 24 hours. Therefore, we must create something special that enables parents to keep a close eye on their child or infant and to be informed when something unusual happens. Therefore, we have devised a plan to use IOT to build a Smart Cradle System that would enable parents to keep an eye on their child even while they are away from home and track their every move from anywhere in the world.

2. Literature survey

Savita P. Patil et al. [1] presented a baby monitoring system based on GSM network. The system monitor's health parameters like temperature, moisture, pulse rate and movement and send these measured parameters to the parent's mobile using GSM network.

Soukaina Bangui, Mohammed El Kihal and Yassine Salih-Alj [2] in which the microcontroller-based project. The authors have designed a low-cost baby monitoring system which detect sound baby crying sound and is attached to a cradle which swings automatically once the system detects a sound and the cradle does not stop until the baby stops crying. A camera is mounted on the top of the cradle to monitor the video output around the baby. Aslam Forhad Symon et al. [3] designed baby monitoring system to detect baby's activities like motion and cry sound. This system is motion on display unit accomplished with display unit, buzzer and camera module. Whenever baby motion on display unit and buzzer to indicate Detection. System proposed in [2] is designed using raspberry pi 3, camera, wet sensors, sound sensor, PIR sensor, sound sensor, DC motor and SMS module. This system having different features like camera monitoring, automatic swinging of cradle when baby cries, sensing the wetness condition of baby's bed, Complete monitoring presence of baby in the cradle. Message about baby crying, wetness in bed and absence of baby in the cradle are sent to parent's mobile number to intimate them about their baby.

Sonal Cynthia Pereira [4] the paper titled as "Baby Monitoring using Sensor and Wireless Camera" proposed a support system to parents who are busy in their career. The monitoring system designed which consists of motion, temperature, moisture and cry detection sensors. The system uses GSM network to send alert messages to the parents also when any of these parameters exceeds the threshold, the system is attached with a video camera which operates based on the instructions is give microcontroller and is used to capture the video when the motion sensor detects the baby's movement. The video will be displayed on the screen to monitor the baby lively.

3. Existing system

During the beginning phases, newborn children need legitimate rest and Rest for development and improvement. Subsequently, it is the thoughtfulness regarding the baby. Be that as it may, with the cutting-edge way of life, guardians are occupied and have a great deal of work and buzzer to indicate with brief period to accommodate their last baby's cry obligation of the guardians/watchman to give the fundamental consideration and ones. In this day and age, we see that the vast majority of the families comprise of for the most part the guardians and youngsters. At the point when a child is brought into the

world in a family there must be somebody to take care of the child. A few guardians need to do a twofold errand of keeping a mind the child just as accomplish the family work. Keeping a caretaker could be a choice yet not all can manage the cost of babysitters and furthermore it is consistently hard for guardians to depend on certain aliens to take care of their child. So, to help such guardians we have chosen to think of a keen support which will help a mother or a dad have a track of their kid and accomplish some family work all the while. The temperature and wetness sensor distinguishes the temperature and wetness of the child and in the event that it builds a specific level, hint message will be ship off the guardians.

3.1 Block Diagram

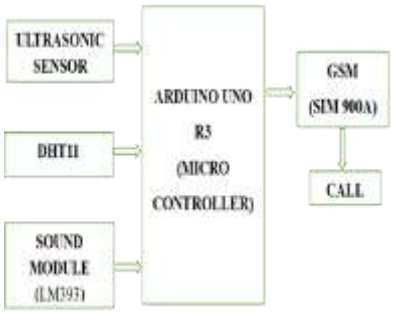

FIG 3.1: BLOCK DIAGRAM OF EXISTING SYSTEM

In recent times, baby care has come more important and challenging for working maters. Indeed home, working maters will not have sufficient time to track their babies continuously. They give the responsibility of their baby to either a baby caretaker or they shoot the baby to their grandparents' house. In the proposed plan, a smart carrycot with an automated baby monitoring system was developed. In the baby monitoring system, the necessary parameters of the child like temperature, beat rate, molecule of gases, capture the stir and position of the baby were measured and track. The baby monitoring system is attached to the cradle so that an incubator kind of surrounding will be created for the baby. The baby monitoring system tacks the baby 24x7.

4. Proposed system

A proposed baby monitoring system could incorporate various features and technologies to ensure the safety and well-being of infants. Wireless Camera a high-resolution wireless camera that can be easily installed in the baby's room. Mobile App a dedicated mobile app for parents to access the live video and audio feed from the camera on their smartphones or tablets. Two-Way Communication the app should support two-way audio communication, allowing parents to talk to and soothe the baby remotely. Night Vision infrared or night vision capabilities for monitoring in low-light or dark conditions. Temperature and Humidity Sensors Integrated sensors to monitor the room's temperature and humidity, with alerts for any significant fluctuations. Motion and sound Detection motion sensors and sound is microphones for detecting movements and sounds in the baby's room. This can trigger alerts to the parents' devices. Mobile Alerts push notifications on the mobile app to notify parents of any unusual activity or environmental changes. Secure Cloud Storage option to store video and audio recordings securely in the cloud for later review or sharing with healthcare professionals if needed. Baby Health Tracking an optional feature to log and track baby's sleep patterns, feeding schedules, and other health-related information. Privacy and Security Robust encryption and security measures to protect the data and ensure the system cannot be easily hacked. Lullabies and White Noise built-in library of soothing sounds and lullabies battery or backup power source to ensure continuous monitoring during power outages.

4.1 Block Diagram

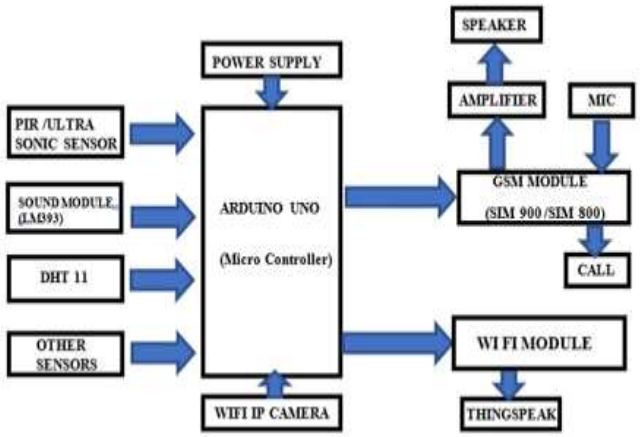

FIG 4.1: BLOCK DIAGRAM OF PROPOSED SYSTEM

Expandability the system could be designed to support additional cameras for monitoring multiple rooms or areas. Integration with Smart Home Devices Compatibility with other smart home devices like smart lights, thermostats, or voice assistants for added convenience.

User-Friendly Interface an intuitive and user-friendly interface in the mobile app for easy setup and operation. When proposing such a system, it's essential to consider the practicality, ease of use, and cost-effectiveness to meet the needs of parents and caregivers while ensuring the safety and comfort of the baby

5. System architecture:

The architecture of the system consists of both hardware and software, the code is written in embedded C and is burnt into the microcontroller.

Ultrasonic sensor:

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

Sound module:

LM393 Sound Detection Sensor Module for Arduino detects whether the sound has exceeded a threshold value. The sound is detected via a microphone and fed into an LM393 op-amp. The sound level setpoint is set via an onboard potentiometer.

It is single channel single output sensor. This module is used to detect the baby's sound. The range of operating voltage is 3V and 4~5mA current.

DHT-11:

The DHT-11 Digital Temperature and Humidity Sensor is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin (no analog input pins needed).

DHT11 sensor measures and provides humidity and temperature values serially over a single wire. It can measure relative humidity in percentage (20 to 90% RH) and temperature in degree Celsius in the range of 0 to 50°C. It has 4 pins; one of which is used for data communication in serial form.

WIFI IP Camera:

An Internet Protocol camera, or IP camera, is a type of digital video camera that receives control data and sends image data via an IP network. They are commonly used for surveillance, but, unlike analog closed-circuit television (CCTV) cameras, they require no local recording device, only a local area network.

GSM Module:

A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here.

A GSM modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network. GSM modems are used in mobile telephones and other equipment that communicates with mobile telephone networks. They use SIMs to identify their device to the network.

6. Software details:

After the processing of the signals which are got from the sensors, they are converted into digital if necessary and are given to a decision algorithm which is previously written in the form of code and it is stored in the memory of a microcontroller. These signals are compared with the standard statistics of a normal standard values. Hence the continuous inspection of the patient which is in the intensive care unit is done using indicators and sensors. The output of the sensors, indirectly or in some form are connected to indicators. If the patient is in good health condition, then the indicator will display "BABY IS NORMAL", otherwise it will display "BABY IS ABNORMAL". It should be noted that: If the patient is normal, then no warning/alert messages are sent to the doctor; otherwise, the doctor receives alert messages which indicate him to attend the patient immediately.

7. Result:

Improved Safety a well-designed baby monitoring system can enhance infant safety by providing real-time audio and video surveillance, room temperature monitoring, and alerts for unusual activity.

Convenience parents and caregivers can benefit from the convenience of remote monitoring, enabling them to keep an eye on the baby from anywhere using a smartphone or computer. Sleep Quality parents may experience improved sleep quality, knowing they can quickly check on their baby without physically entering the room. Data Collection the system could collect data on baby's sleep patterns, room conditions, and more, which can be useful for tracking development.

Safety Assurance the system ensures the safety of the baby by alerting parents to any unusual events, such as crying, motion, or changes in room conditions. Improved Sleep Parents can use sleep analytics to better understand their baby's sleep patterns and make adjustments to improve their sleep quality. Data Insights parents receive insights and recommendations based on provide peace of mind, reduce stress, and enhance the parent-child bond. Safety Assurance the system ensures the safety of the baby by alerting parents to any unusual events, such as crying, motion, or changes in room conditions. Improved Sleep Parents can use sleep analytics to better understand their baby's sleep patterns and make adjustments to improve their sleep quality. Data Insights parents receive insights and recommendations based on data collected by the system, aiding in baby care and routine planning

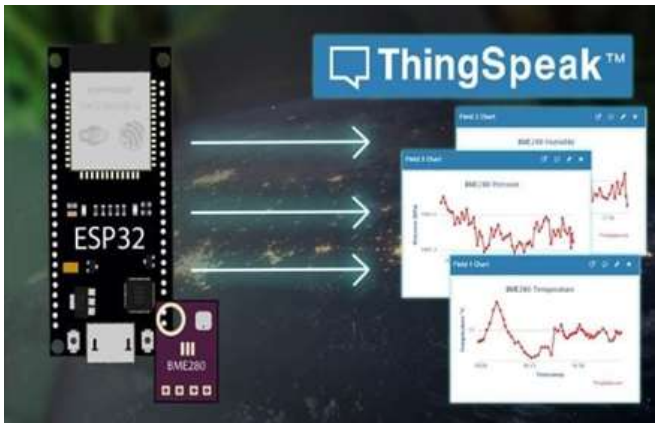

FIG 7.1 THING SPEAK

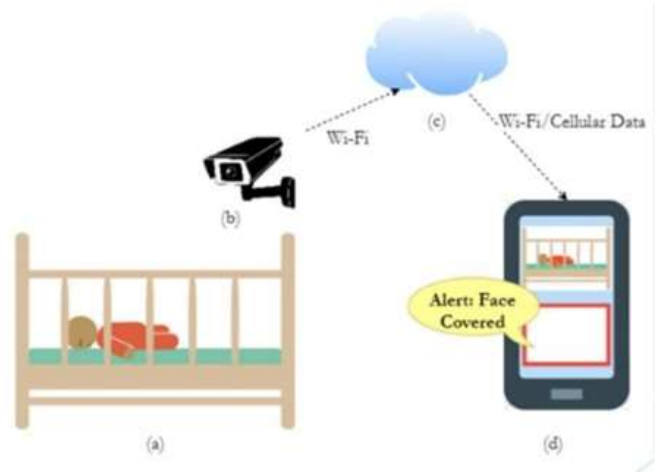

FIG 7.2 WIRELESS CAMERA MONITOR

User Satisfaction parents are satisfied with the system's ease of use, reliability, and the peace of mind it provides. Reduced Stress parents experience reduced stress and anxiety knowing they can monitor their baby easily and receive alerts when needed. Customization the system allows parents to customize alerts and settings.

8. Conclusion and future work:

The Baby Monitoring System would be measured by its ability to provide peace of mind to parents while ensuring the safety, comfort, and well-being of the baby. Continuous improvement and responsiveness to user feedback would be essential to maintain its effectiveness and relevance in the market. In conclusion, a proposed Baby Monitoring System is designed to cater to the needs of parents by offering real-time monitoring, safety assurance, convenience, and valuable insights into their baby's well-being and sleep patterns. Such a system aims to system includes video and audio surveillance, motion and environmental sensors, mobile app access, data analytics, safety features, and robust security measures. It should comply with relevant regulations and offer scalability and ongoing support. The success of this system hinges on it provides peace of mind, reduce stress, and enhance the parent-child bond. This system includes video and audio surveillance, motion and environmental sensors, mobile app access, data analytics, safety features, and robust security measures. It should comply with relevant regulations and offer scalability and ongoing support. The success of this system hinges on its ability to meet the specific needs of parents and caregivers, ensuring the safety and comfort of the baby while addressing concern. Development Compliance the system complies with relevant safety and privacy regulations, ensuring it is safe for use.

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