IOT-BASED BABY MONITORING SYSTEM

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Abstract

These days the current number of working women and mothers has skyrocketed. As a result, for many families, baby care has become a daily challenge. As a result, the majority of parents leave their children with their grandparents or at child care facilities. Unfortunately, under both regular and exceptional circumstances, the parents are unable to continuously check their child's health. Thus, an Internet of Things-based baby monitoring system (IoT-BBMS) is suggested as an effective and affordable IoT-based system for real-time monitoring. Also, we suggested a new algorithm for our system that is crucial to delivering superior baby care while parents are abroad. The application of technology such as Internet of Things (IoT) modules for sensing temperature and humidity, cry detection systems, and real-time video surveillance. We are able to monitor the temperature, the sound of the infant crying, and the posture of the baby in the cradle live. The infant cradle in the system architecture uses a motor to swing automatically whenever the baby screams. Parents can also remotely monitor their baby's health using an external web camera and turn on the lullaby in the baby cradle. The proposed system prototype is created and tested to demonstrate its effectiveness in terms of cost and simplicity as well as to guarantee safe operation so that parents can have access to their children whenever and wherever they choose over the network. The prototype has shown that the baby monitoring system is effective at keeping track of the infant's situation and its surroundings.

Keywords: Arduino UNO , Temperature Sensor, Moisture Sensor, Sound Sensor , LCD Module , Node MCU, DC / Servo Motor , Music Generated Circuit and Speaker , Wireless Camera , 12V Transformer , Voltage Regulators.

Introduction

In today's emerging countries, women hold the majority of jobs/professions. Many mothers work, which makes it difficult to care for their children. Both mother and father are working hard to make ends meet in this fast-paced society. In any event, they are needed to care for their infants, which increases responsibility and stress, notably on the mother. Working guardians/parents are frequently unable to focus on their children. Either they leave their toddlers with their parents or they pay a babysitter to watch the children while they work. Some parents worry about their kids' safety when they are being looked after by others. As a result, when they have free time, like at lunch or coffee breaks, they go home to watch over their young children. To address these challenges, a baby

screening framework that may screen the children's condition gradually is presented. For this goal, a child observation framework comprised of a video camera and amplifier is built. It delivers information and immediately informs guardians about critical circumstances, reducing the time required to deal with such scenarios. Children typically cry when they are happy, exhausted, sick, or when their diapers need to be changed. Sudden Infant Death Syndrome, also known as SIDS, is frequently referred to as "den demise" since so many children who die of SIDS are found in their bunk beds. It affects neonates who are under a year old. The majority of SIDS deaths occur in babies under the age of a year and a half [1]. The cause of SIDS is unknown to scientists, although the risk can be decreased by letting the youngster rest on a surface(den bedding). Although experts are unsure of the reason why sleeping on certain surfaces raises the risk of SIDS, they do issue a warning. For instance, a 2003 study discovered that placing a newborn baby to sleep on soft sheets as opposed to hard sheets doubled the chance of SIDS.

Related Work

1. LITERATURE REVIEW

Goyal and Kumar introduce the e-baby cradle. [1The cradle starts to rock when an infant cries or makes noise, and stops rocking when the child stops crying. Swinging speed can be adjusted to meet the needs of the user. The alarm that is built in the system alerts people in two scenarios. The alarm first informs that it's time to replace the cradle's mattress when the mattress gets damp. Second, if the baby continues to cry after a predetermined amount of time, an alert notifies the parent so they can tend to their baby.. Only a buzzer alert is used in this setup. The buzzing noise may frighten the baby. Even yet, this method is only useful when the parent is close to the cradle. This method's major drawback is that parents are unable to watch over their infants while they are out from the house.

[2] introduced a similar type of automatic newborn monitoring device. The system is designed with a minimum budget such that when the baby starts wailing, the cradle starts oscillating and stops when the baby stops. This system was designed with an alert method built in, and it will begin alarming in one of the following two scenarios: When the infant cries incessantly and does not stop after some time, or when the cradle mattress is discovered to be damp. To keep an eye on the child, a video camera is mounted above the cradle. Parents have little control over the system; they can only get information via messaging or notifications. Consequently, the given method is extremely effective in the current analysisThe current method makes use of an IoT application to control and keep track of the smart cradle in real time, wherever it is.

[3] developed a resonant cradle that relies on Arduino and can recognise baby cries. The cradle can swing freely in the absence of electricity, and ball bearing technology is used to lessen system damping. Along with the cradle swing's condition and the angle that some sensors detected. The inventor says that their technology is power-efficient, and parents can record their child's screams due to pain or hunger on an SD card in the SD module. While parents are gone from their kid, data is not automatically updated into the Internet of Things server, which controls the cot.

2. IMPLEMENTATION

The Arduino software from Arduino.cc has been downloaded, installed, and tested (click the Download link near the top of the website).The Arduino IDE, which stands for Integrated Development Environment, is the name of this programme. Make sure you have all of the necessary equipment before proceeding to the page for

your operating system. Arduino.cc provides the programming environment discussed in this paper without charge, and it is advised for your DuinoKit.

Requirements:

- A computer with an operating system with either Windows, Mac, or Linux.
- An Arduino-compatible microcontroller (DuinoKits use Arduino NANO w/ ATmega328 chip)
- NANO microprocessor must be connected to a computer using USB cable for programming .

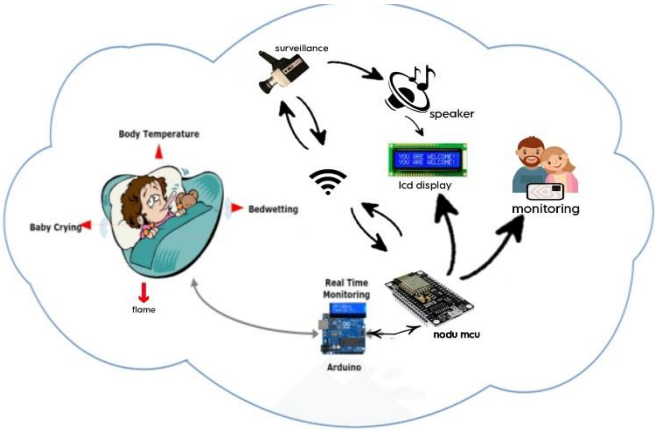


Fig. 1: Basic representation of IOT-BBMS.

Download the Arduino Software (IDE)

Visit the download link to get the most recent version. The Installer (.exe) and Zip packages are your options. We advise using the first one because it automatically loads all of the drivers and the Arduino Software (IDE) that you need. The drivers must be directly installed when using the Zip package. If you want to make a portable installation, the Zip file can help.

When the download is complete, start the installation process. When the operating system issues a warning, please accept it and let the driver installation proceed.

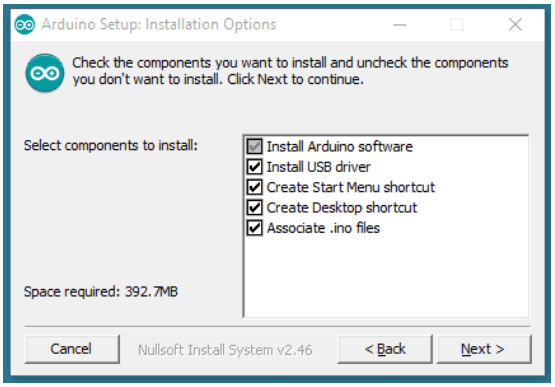


Fig. 2: Choose the components to install.

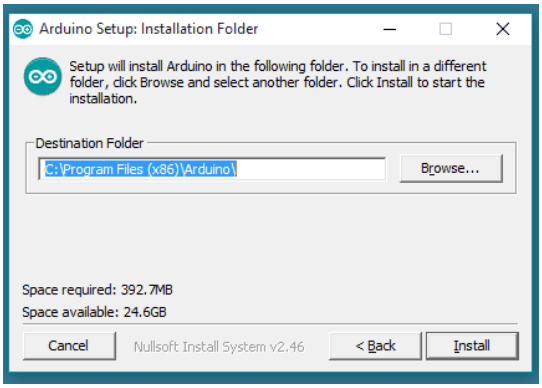


Fig. 2.1: Choose the installation directory.

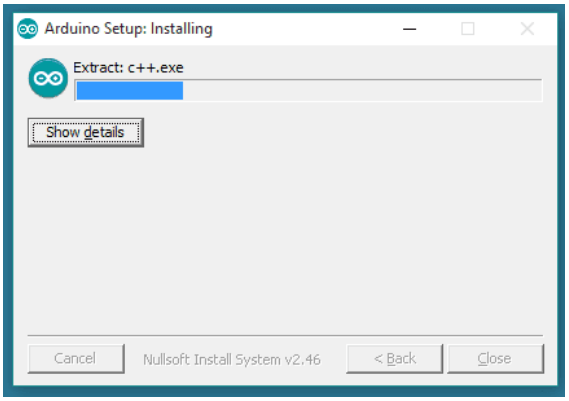


Fig. 2.2: Installation is in process

Making The procedure will extract and install each of the necessary files for the Arduino software to function correctly (IDE). The material of the Arduino getting started guide is covered by a creative commons attribute share alike 3.0 License. The audience can use the code samples in the manual

CONFIGURING THE ARDUINO IDE:

Making sure the program is configured for your specific Arduino board is the next step. Find "Board" under the "Tools" drop-down option. A different menu with a list of Arduino models will then show for your selection. I selected "Arduino Uno" because I have an Arduino R3.

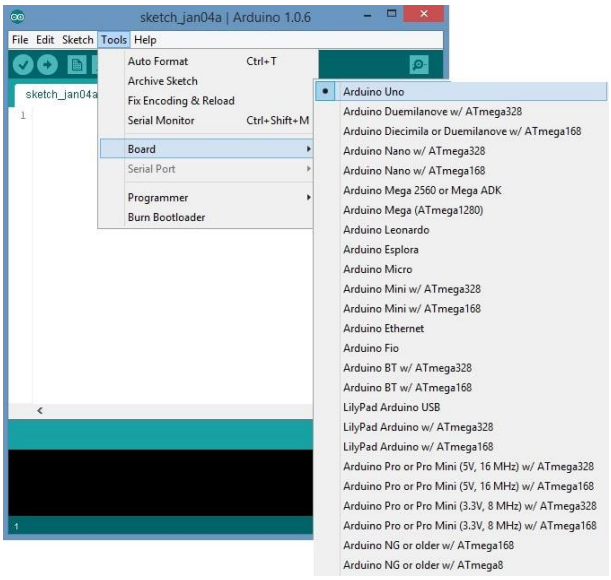


Fig. 2.3: Configure the Arduino IDE

EXPLORING THE ARDUINO IDE

You are welcome to spend some time exploring the IDE's various options. The "Examples" menu in the IDE contains a good selection of example applications. Without doing a lot of study, these will assist you in getting started with your Arduino right away:

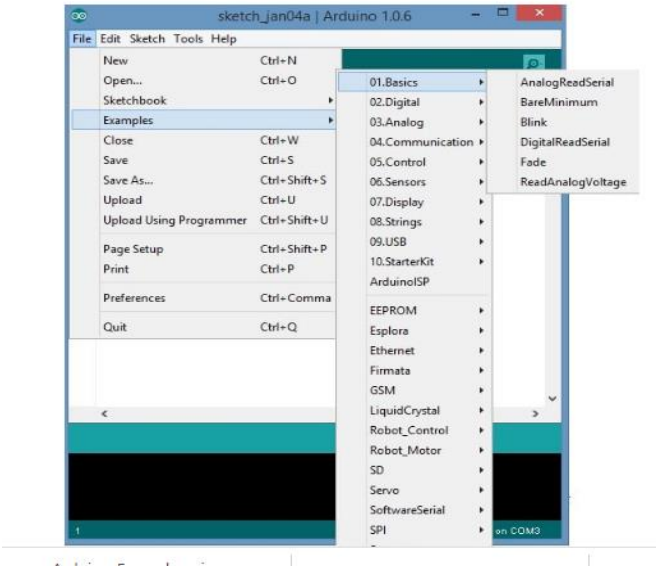


Fig 2.4: Exploring the Arduino IDE

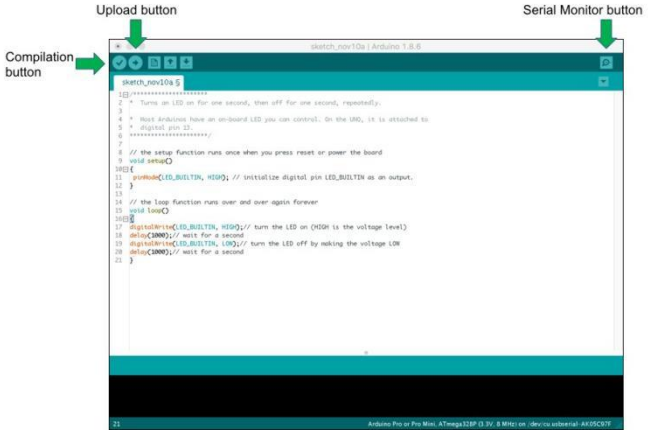


Fig 2.5 : compiling the programme

3. METHODOLOGY

Node MCU and IoT Cloud server Blynk is used to view sensor data from anywhere in the World. Sound sensor is used to check the baby crying condition, if any sound is detected than cradle DC Motor / Servo Motor gets activated and cradle status oscillated for predefined time. A prototype version of Cradle is designed for demonstration of swinging operation. LCD Module is used for display of important notification such as Moisture and Temperature. A light music using UM66 is also activated along with the movements of cradle. If moisture is detected by the sensor than, a LED Indication is activated to alert the Parents to change diapers. Wireless Internet based camera is installed near cradle for live monitoring of baby status is tracked using LCD Module. Node MCU and IoT Cloud server Blynk is used to view sensor data from anywhere in the World. Sound sensor is used to check the baby crying condition, if any sound is detected than cradle DC Motor / Servo Motor gets activated and cradle status oscillated for predefined time. A prototype version of Cradle is designed for demonstration of swinging operation. LCD Module is used for display of important notification such as Moisture and Temperature. A light music using UM66 is also activated along with the movements of cradle. If moisture is detected by the sensor than, a LED Indication is activated to alert the Parents to change diapers. Wireless

Internet based camera is placed near cradle for live monitoring of baby status.

The LCD module is connected to the Arduino's digital pin 2, pin 3, pin 4, pin 5, pin 6, pin 7, the sensors are connected to analogue pins A0 through A5, the WiFi module-Node MCU is connected to pins 8, 9, and the swing motor is connected to pins 10, 11.

Having a backup strategy is advisable in case something goes wrong.. A bridge rectifier is utilised to convert it to DC. It uses a capacitive filter and a 7805 voltage regulator to adjust the voltage to the required +5V.

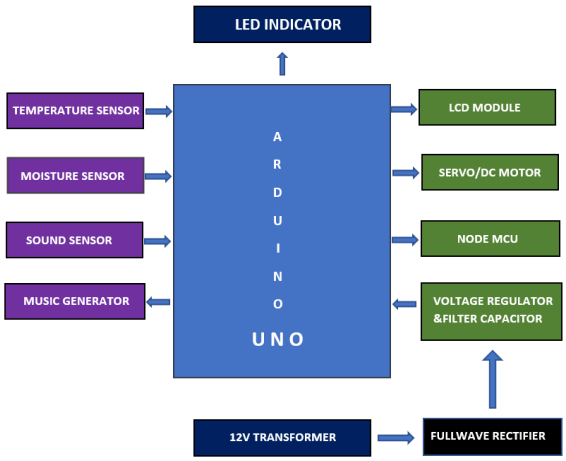


Fig 3: Block Diagram

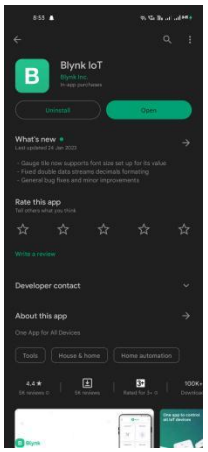
Hardware Requirements

- Arduino UNO
- Temperature Sensor
- Moisture Sensor
- Sound Sensor
- LCD Module
- Node MCU
- DC / Servo Motor
- Music Generated Circuit and Speaker
- Wireless Camera
- 12V Transformer
- Voltage Regulators
- Other Misc Components

Software requirements

- Embedded C Programming Language
- Arduino IDE Compiler
- Blynk cloud Server

Download and Install Blynk App from your preferred App Store. **PlayStore** /**Apple AppStore.**



Now Add widgets to the main screen for displaying and controlling modules fig 4

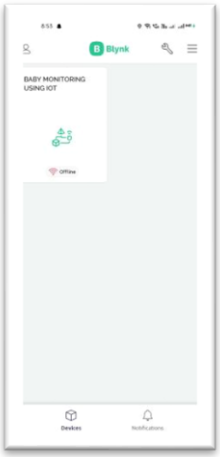


Fig 4: Adding Blynk server

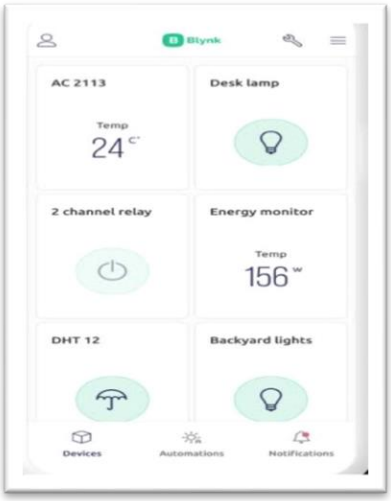


Fig 5: viewing Blynk server

Here we can view the temperature and flame and dyper wetting or not etc in above (figure 5).

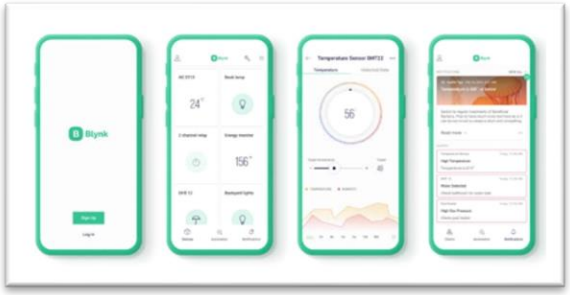


Fig 6: viewing the Blynk app

In above fig(6) we can view in our mobiles by using Blynk app , baby monitoring live .

Fig 7 : using ZEB home app

We can using this ZEB home app as shown above figure(7) we can view in our mobile live video recording and capture by using web cam.

Fig 8: ZEB web camera mobile viewing live

In above fig (8) here the web cam connect with wifi and send the live video to mobile in any were in our mobile.

Fig 9: web cam access in mobile app

4. FINAL CONCLUSION

The spread of technology has rapidly increased. Given how rapidly technology is developing, there are many ways in which it can benefit society more. Working parents and caretakers who have a heavy workload and the responsibility of caring for a baby can use an automated crib easily. The automated crib's safety and security are assured by the baby tracking system. This baby monitoring system is affordable and offers better security in addition to other features. Parents always place a high emphasis on their child's health. Consequently, the goal of this baby monitoring cradle device was to create a healthy and secure infant or baby. The automatic infant cradle monitor is also included.

5. FUTURE SCOPE

We can add more features in the future to enhance functionality and usability(figure 10). The system features could be improved by adding features like a revolving toy and a sound detector to listen for baby sounds.

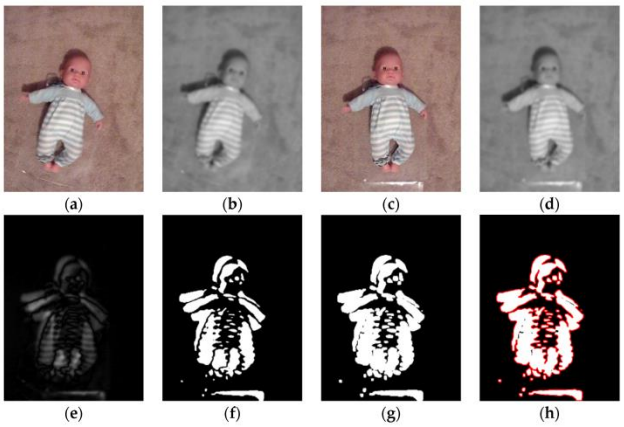


Fig 10: AI using machine learning

Machine learning can be used to identify simply the voice of the baby. Baby can be amused by adding music or a lullaby. With the advancement of technology, parents' daily routines and child care have been made easier.

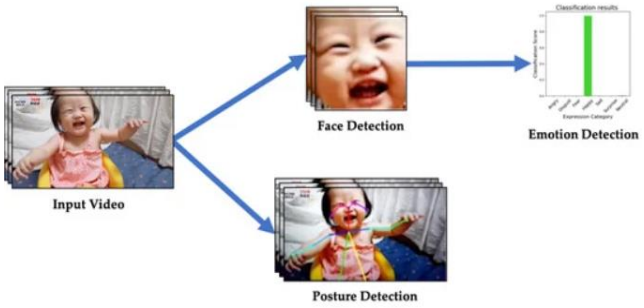


Fig 11: AI detection

6. REFERENCES

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