IOT BASED ADVANCED SMART CRADLE FOR BABY MONITORING SYSTEM

A Product Oriented Minor Project work submitted in partial fulfilment of the requirement for the award of the degree of

BACHELOR OF TECHNOLOGY

in

ELECTRONICS & COMMUNICATION ENGINEERING

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CERTIFICATE

This is to certify that the Minor Project work entitled on the IOT Based Advances Smart Cradle for Baby Monitoring System is being submitted by B.Siri(22211a0440) B.Lahari(22211a0441) E.Sangeetha(23215a0407) in partial fulfilment of the requirement for the award of **B. Tech** degree in **Electronics & Communication Engineering**, by Jawaharlal Nehru Technological University Hyderabad is a record of Bonafede work carried out by them under my guidanceand supervision from 2023 to 2024.

The results presented in this project have been verified and are found to be satisfactory.

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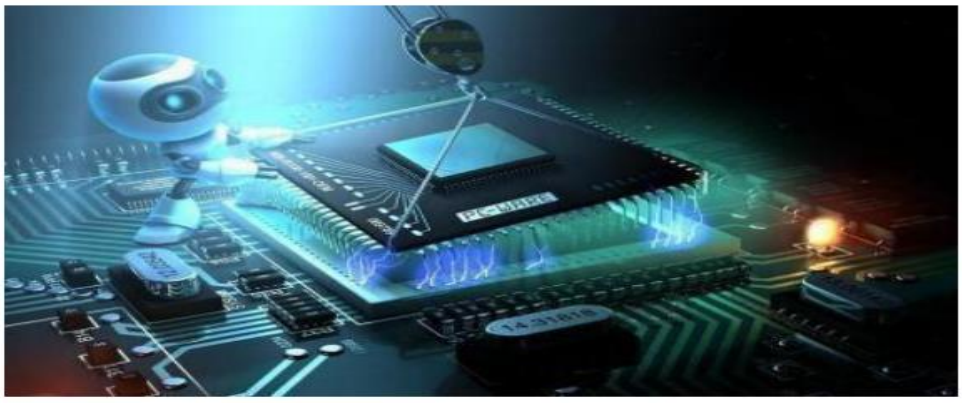
Department of Electronics and Communication Engineering

CENTRE FOR EMBEDDED SYSTEMS DESIGN



CERTIFICATE

This is to certify that B.Siri , B.Lahari , E.Sangeetha Rani bearing Roll Nos. 22211a0440 , 22211a0441 , 23215a0407 respectively have successfully completed his/her on training Embedded systems and Implemented a Project titled "IOT Based Advances Smart Cradle for Baby Monitoring System". in Centre for Embedded Systems Laboratory, B.V. Raju Institute of Technology from 2023 to 2024.

Coordinator

Head of the Department

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ACKNOWLEDGEMENT

We take opportunity to express our indebt gratitude to the persons who contributed for our work, for being our inspiration and guide which led to the successful completion of the project.

We are grateful towards our College Management and our beloved Principal **Dr. Sanjay Dubey** for providing us the necessary infrastructure and facilities that ensured smooth and satisfactory execution of the project.

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We express our sincere thanks to our guide **Mr. D.Srikar Assistant Professor**, Dept. of ECE, for his valuable suggestion and motivation in successfulcompletion of project.

We also wish to express our thanks to all the faculty members andlaboratory staff who were helpful directly and indirectly for the completion of the project.

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DECLARATION

We hereby declare that the project entitled "**IOT Based Advances Smart Cradle for Baby Monitoring System**" submitted to B. V. Raju Institute of technology, affiliated to Jawaharlal Nehru Technological University, Hyderabad for the award of the degree of Bachelor of Technology in Electronics and Communication Engineering is a result of original project work done by us.

It is further declared that the project report on any part therefore has not been previously submitted to any University or Institute for the award of degree or diploma.

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ABSTRACT

The concept for the project stems from the reality that a woman struggles to focus on her child due to her demanding home life. This challenge becomes more pronounced when she is employed or engaged in home-based business, as she is unable to give up her job and neglect her child's needs. Numerous tools exist to assist her in managing her responsibilities and attending to her child's requirements. Our Automated Cradle is one such solution.

There's a pressing need to create an affordable, locally made electronic baby cradle due to the high cost and foreign origin of current models. This document outlines the design and development of a new, locally produced, low-cost electronic baby cradle. This cradle is equipped with an automatic swing feature that activates when the baby cries, utilizing a cry detection system to recognize the baby's cry and adjust the swing until the baby ceases crying. The speed of the swing can be adjusted to suit the baby's needs. The system features a buzzer that signals two critical situations: first, when the mattress becomes wet, indicating the need to maintain the baby's hygiene, and second, when the baby does not stop crying within a certain timeframe, signaling the need for attention. This system aids parents and caregivers in caring for babies without direct physical contact.

PREFACE

As a part of the B. tech curriculum and in order to gain practical knowledge in the field of Electronics and Communication, we are required to make a project report on “IOT Based Advances Smart Cradle for Baby Monitoring System”. The report is prepared with the view to include all the details regarding the project that we carried out. Thebasic objective behind doing this project report is to get knowledge on differentsoftware tools.

In this project we have included various concepts, technology and implementation regarding Power consumption monitoring. Subject to the limitation of time efforts and resources every possible attempt has been made to study the problem deeply.

Doing this project report helped us to enhance our knowledge regarding the work. Through this report we come to know about importance ofteamwork and role of devotion towards the work.

CONTENTS

CHAPTER 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION TO IOT BASED ADVANCED SMART CRADLE FOR BABY MONITORING SYSTEM:

In today's fast-paced world, parents often find themselves consumed by their careers, leaving little time to devote to their children. The cost of hiring a nanny can be prohibitive for many families. Women today are expected to juggle their responsibilities at home with their jobs, leaving them exhausted after long hours at work. This leaves little energy for manually rocking the baby to sleep or soothing them. Additionally, the modern lifestyle makes it challenging for even stay-at-home mothers to be physically close to their infants and provide comfort when needed.

The solution to this problem is the development of an automatic baby cradle designed to assist parents and caregivers in caring for infants. This cradle is equipped with several features aimed at making the care of babies easier and more efficient. It includes an automatic swing that starts when the baby cries and continues until the baby stops crying. It also has a buzzer that alerts parents when the mattress becomes wet.

The primary use of the baby cradle is for sleep and soothing the baby. For instance, parents can leave their child in the cradle while they attend to other tasks, ensuring the baby is safe and comfortable. This is particularly beneficial for working parents who need a reliable and hands-free solution for their child's care.

However, the need for such an automatic cradle highlights the challenges parents face in balancing their professional and personal lives. It also underscores the importance of technology in simplifying caregiving tasks, not just for parents but also for healthcare professionals, such as nurses in maternity wards, who can benefit from such innovations.

1.2 OBJECTIVE :

To create a smart baby care system capable of tracking a baby's movements, bed-wetting status, and body temperature.

Making the cradle is safe and comfortable for the baby by using a PIR sensor that detects the baby's body movements and the wetting condition to keep the baby away from hygiene

To make cradle innovation that is more flexible and less expensive to market.User friendly-simple and complete with instruction

1.3 MOTIVATION:

Many of IOT devices are being develop in the IT sector. There are some cradles also, which are built with integration of IOT, but still there are some less feature which could be threat to the health of the babies. As we have seen in India or any other industrializing nation that both parents need to go to work and also look after the baby which increases workload on both the parent, it could also affect their professional life and their babies' life. Due to less featured cradle systems and parents busy schedule we are implementing modern day cradle system.

1.4 SCOPE:

As we are very well familiar with the hurdles faced by Parents to nurture their infant and especially in case if both the Parents are working. To give 24 hours of time in such cases is next to impossible. Thus, we need to develop something unique that can help Parents to have a continuous surveillance on the Baby can notify about the same. Thus, we have produced an idea to design a Smart Cradle System using IOT which will help the Parents to monitor their child even if they are away from home and detect every activity of the Baby.

The proposed prototype of smart baby cradle will monitor the activities of the infant. The cradle has motor which will rotate the mobile toy. The smart baby cradle has noise detection which will sense the noise when the baby is crying or making loud noise. A servo motor will rotate (swing) the cradleup to an angle that is safe when infant is inside the cradle. A GSM module to communicate with a remote device that is operated by parents. And an Arduino microcontroller to control and monitor the activities of the cradle. Also whenever the wet is detected it gives an buzzer alert and also sends an SMS alert to the parents.

CHAPTER 2

LITERATURE SURVEY

CHAPTER 2

LITERATURE SURVEY

2.1 INTRODUCTION:

Based on the latest studies and innovations in electronic devices aimed at minimizing standby energy consumption, despite the existence of numerous patents focused on standby technology both domestically and internationally, there is a scarcity of literature on utilizing remote control or wired control methods to enable smart standby power management. Currently, the patents primarily concern the physical design and aesthetics of the remote control. There is a lack of patents addressing the operational mechanisms and the methods for establishing the link between the remote control and the electrical device. Furthermore, the overall system design and procedure are not well-documented.

S.no	Title of the project	Author(s)& Journal Details	Description/Interpretation
1	Smart Cradle with IOT based Baby Monitoring System	K. Swathi , P. Meghana, D. Shiva kumar, I. Vinay kumar , Dr. D. Vemana chary, INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY,June 2023	. The system consists of a baby cradle that will automatically swing using a motor when the baby cries. DC fan is automatically turned on when surrounding temperature exceeds a specified range.
2	IoT based Smart Cradle for Baby Monitoring System	N. L. Pratap, K. Anuroop, P. N. Devi, A. Sandeep and S. Nalajala, INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY, 2021	In the baby monitoring system, the necessary parameters of the infant like temperature, heartbeat rate, gas molecules, capture the motion and position of the baby were measured and monitored.
3	IOT Based Baby Monitoring System Smart Cradle	7th International Conference on Advanced Computing and Communication Systems , 2021	To recognize each and every movement of Baby, various Sensors are connected to the Cradle: Gas & Temperature Sensing Module for discovery of wetness of the cradle.

CHAPTER 3

ANALYSIS AND DESIGN

CHAPTER 3

ANALYSIS AND DESIGN

3.1 **ARDUINO**:

Arduino is a single board smaller scale microcontroller expected to make the use of intuitive protests or situations more available. The equipment comprise of an open source equipment board outlined around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. Current models highlight a USB interface, six simple inputs pins, and additionally 14 advanced I/O pins which permits a client to connect different augmentation sheets. Arduino Uno can sense the environment by using the sensor , sensor receive the signal from environment and send to the input part of Arduino, Arduino give the output from the output part as the programming burn in the microcontroller. Arduino accept a programming software called sketch. An Arduino can program infinite time. If a new program burn in the Arduino then previous program will automatically vanish. We can use multiple of sensor at a time and all the instruction should be in one program.

FIG-1: ARDUINO UNO

3.2 **SOUND SENSOR:**

The Sound Sensor can detect both decibels [dB] and adjusted decibel [dBA]. A decibel is a measurement of sound pressure.dB A: in detecting adjusted decibels, the sensitivity of the sensor is adapted to the sensitivity of the human ear. In other words, these are the sounds that

your ears are able to hear..dB:in detecting standard [unadjusted] decibels, all sounds are measured with equal sensitivity. Thus, these sounds may include some that are too high or too low for the human ear to hear. The Sound Sensor can measure sound pressure levels up to 90 dB – about the level of a lawnmower. Sound pressure levels are extremely complicated, so the Sound Sensor readings on the MINDSTORMS NXT are displayed in percent [%]. The lower the percent the quieter the sound.

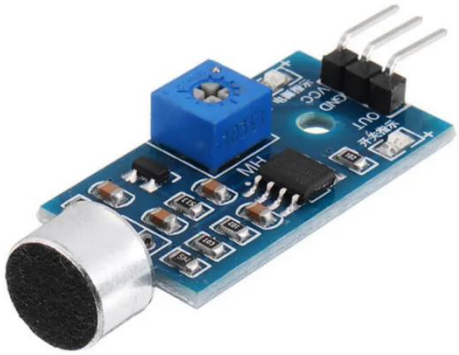

FIG 2:SOUND SENSOR

3.3 MOISTURE SENSOR:

Sensitive Baby Bed Wetting Urine Sensor Wet Diaper Alarm Detector Features: Safe and reliable, no side effects. For children of 0-2 years old. Induction one second that will alert, easy to use. Perfect for avoiding baby catching cold or suffering from crotch eczema due to bedwetting. Material: ABS + Sensor Chip. How to use: Placed wet alert bedside or other suitable places, placed the alert's sensor chip under baby's diaper insert. (Do not direct contact with skin). Turn the switch to NO. Once baby pee, the alarm will remind parents immediately with the music to changing diapers. Then turn the witch to OFF, disarm the alarm. And dry sensor chip with a paper towel or cloth, the wet alarm can be used again. Notice : 1, Use a damp cloth to clean the sensor after every use. Do not submerge the sensor in water or use tissue paper. Also, not cleaning the sensor after every use can lead to skin irritation due to it no longer be hygienic. 2, if the alert is not used for a long time, please turn it off. 3, Make sure that sleep-

tight alert is used under the guidance of adults.be careful not to let the baby swallow it. Package Included: 1 x Baby Bed Wetting Sensor.

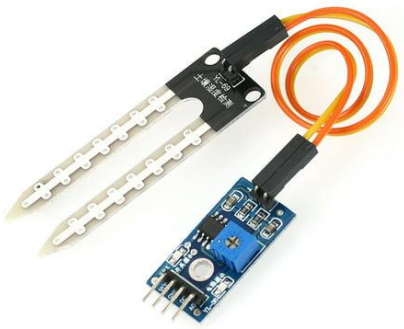

FIG 3 : Moistuer Sensor

3.4 BUZZER :

Buzzer will give sound in on two conditions: 1. When mattress is wet, indicating parents that mattress and baby clothes need to be changed. 2. When baby cries for a specific time. For example, baby cries and baby bassinet swings for 2 min buzzer sounds. This indicates parents that baby needs attention.

FIG4:Buzzer

3.5 BREAD BOARD :

The purpose of the breadboard is to make quick electrical connections between components- like resistors, LEDs, capacitors, etc- so that you can test your circuit before permanently soldering it together. In this project, we are using a breadboard with Arduino. The main purpose of using this is, a breadboard is a solderless construction base used for developing an electronic circuit and wiring for projects with microcontroller boards like Arduino.

FIG 5 :Bread Board

3.6 HUMIDITY SENSOR:

A humidity sensor is an electronic device that measures the humidity in its environment and converts its findings into a corresponding electrical signal. Humidity sensors vary widely in size and functionality; some humidity sensors can be found in handheld devices (such as smartphones), while others are integrated into larger embedded systems (such as air quality monitoring systems). Humidity sensors are commonly used in the meteorology, medical, automobile, HVAC and manufacturing industries.

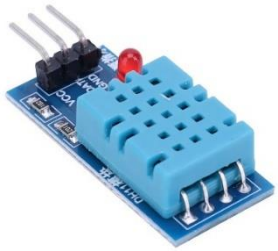

FIG 6:Humidity Sensor

3.7 LCD DISPLAY :

LCD 16x2 is a type of liquid crystal display (LCD) that can display up to 16 characters per line and 2 lines. These displays are widely used in a variety of applications, such as displaying text or data in electronic projects. The LCD is operated through a built-in controller that can understand and execute a series of commands. These commands allow for functions like setting the cursor position, clearing the display, and controlling the on/off state of the display. The LCD 16x2 is a widely used device in electronic projects, such as showing text or data.

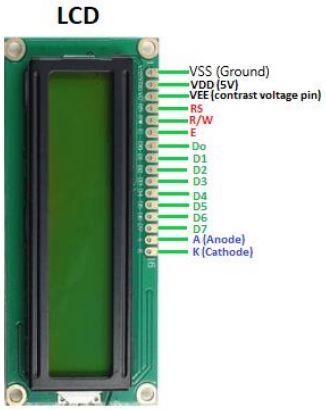

FIG 7: LCD Display

The LCD 16x2 features a screen with the capability to display up to 16 characters per line and 2 lines. This makes it well-suited for showcasing concise messages or presenting data in a compact format.

3.8 H- BRIDGE MOTOR DRIVER(L29 3D):

A simple motor driver integrated chip (IC) called L293D allows us to adjust the speed and drive a DC motor in either direction. We can control the motor with the 16-pin integrated circuit (L293D), which has 8 pins on each side. This implies that up to two DC motors can be driven by a single L293D. There are two H-bridge circuits in L293D. The simplest circuit for reversing the polarity across a connected load is the H-bridge.

To drive each motor, there are two OUTPUT pins, two INPUT pins, and one ENABLE pin. In addition to other high-current/high-voltage loads, it is intended to drive inductive loads including solenoids, relays, DC motors, and bipolar stepper motors.

FIG 8: H-BRIDGE MOTOR DRIVER(L29 3D)

3.9 TEMPERATURE SENSOR:

DHT11 sensor is made up of a thermistor for temperature sensing and a capacitive humidity sensor. The moisture-holding substrate serves as a dielectric between the two electrodes of the humidity-sensing capacitor.

Every DHT11 element is meticulously calibrated in a lab setting for utmost precision calibration of humidity. In the OTP memory, the calibration coefficients are kept as programs. which are employed by the internal signal detection mechanism of the sensor. System integration is quick and simple thanks to the single-wire serial interface. Its compact design, low power usage, and up to 20 .Its ability to transmit meters signals makes it the ideal option for a wide range of applications, even the most demanding ones. The part is a single row pin package with four pins. Connections are easy to make, and users can request customized packages.

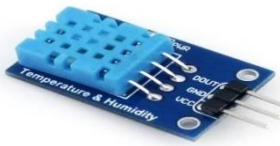

FIG 9: DTH11 Sensor

3.10: ESP8266 WIFI MODULE :

A self-contained SOC with an integrated TCP/IP protocol stack, the ESP8266 WiFi Module allows any microcontroller to connect to your WiFi network. Either an application can be hosted on the ESP8266, or it can delegate all WiFi networking tasks to another application processor. Since each ESP8266 module has an AT command set firmware pre-programmed, all you have to do is connect it to your Arduino device to obtain roughly the same amount of WiFi functionality as a WiFi shield—and that's right out of the box! The ESP8266 module is a very affordable board with a sizable and constantly expanding community.

This module may be coupled with sensors and other application-specific devices thanks to its robust on-board processing and storage capacity.

An inexpensive and incredibly user-friendly device for giving your projects internet access is the ESP8266. The module makes the Internet of Things as simple as possible by acting as a hotspot creator and access point. It can also connect to wireless networks and retrieve data with ease. Additionally, it can retrieve data from the internet through APIs, allowing your project to access any information on the internet and become smarter as a result. This module's ability to be programmed using the Arduino IDE, which greatly improves user friendliness, is another intriguing feature. Nevertheless, this module version only has two GPIO pins .

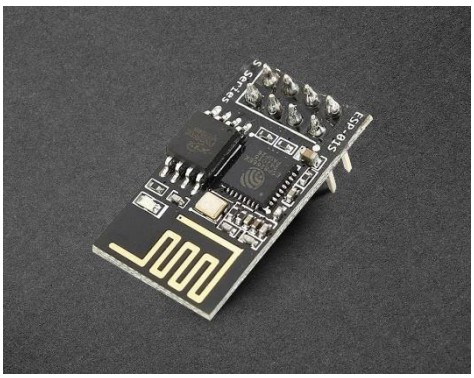

FIG 10: ESP8266 WIFI MODULE

3.11:SERVO MOTOR :

One kind of motor that has extremely precise rotation is a servo motor. Typically, this kind of motor is made up of a control circuit that gives feedback on the motor shaft's present location. This feedback enables the servo motors to rotate extremely precisely. A servo motor is used when you wish to rotate an object at a certain angle or distance. It consists only of a basic motor that is driven by a servo mechanism. A motor is referred to as a DC servo motor if it is powered by a DC power supply and as an AC servo motor if it is supplied by AC power.

It is a closed-loop system that regulates motion and the shaft's ultimate position via a positive feedback mechanism. In this case, a feedback signal produced by comparing the output signal with the reference input signal controls the device.

The third signal is generated by the feedback system, and the reference input signal is compared to the reference output signal in this instance. Additionally, the third signal serves as an input signal for the device's control. As long as the reference input and reference output signals differ or as long as the feedback signal is generated, this signal is there. Thus, maintaining the output of a servomechanism is its primary function.

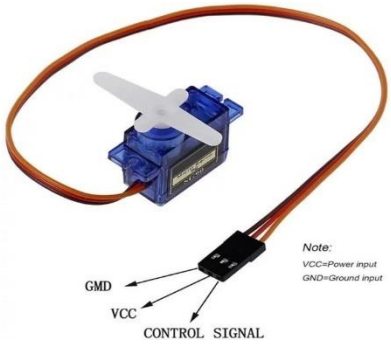

FIG 11: SERVO MOTOR

3.12: 12V DC FAN:

12V DC Cooling Fan, 50mm x 2 Inch Direct current fans, often known as DC fans, are driven by a set potential, such as a battery's voltage. It has long service life, air pressure, enough air volume for heat dissipation, and double ball bearings that require no maintenance. It is appropriate for high-reliability server application places, game machine heat dissipation, chassis heat dissipation, CPU radiator, power fan modification, and water-cooled heat dissipation

Ventilation: Enhances the comfort and quality of the air in homes, workplaces, and businesses. Also utilized in ventilation systems, exhaust fans, and air circulation equipment.
Automotive: Added to cars to control radiator and engine temperatures, preventing overheating and improving performance.
Low Voltage Operation: This 5V power source is perfect for energy-efficient and low voltage cooling application.
Compact Design: Small dimensions allow it to fit into small spaces and beside small electronics.
Long Lifespan: Provides dependable and prolonged cooling service with appropriate maintenance.
Simple Installation: Mounting holes allow for a quick setup in a variety of applications.

FIG 3.12: 12V DC FAN

3.13: RELAY MODULE:

Simply put, relay modules are circuit boards with one or more relays on them. Though they can be found in many different sizes and shapes, they are typically rectangular and can have two, four, or eight relays installed on them—up to sixteen relays in some cases.Other parts are included in relay modules besides the relay unit. These consist of transistors, resistors, protection diodes, indicator LEDs, and other components.

Relays are electrical switches that are useful for managing systems and equipment that require greater voltages. An electromagnet is commonly used as the mechanism in module relays.Typically, the input voltage of the relay module is DC.

FIG 13: RELAY MODULE

3.14: Adxl345 :

The Adxl345 is a compact, thin, low-power, three-axis accelerometer that can measure up to ±16 g with excellent resolution (13 bits). A digital interface such as SPI (3- or 4-wire) or I2C can be used to access digital output data, which is structured as 16-bit twos complement. The Adxl345 works great with apps for mobile devices. In tilt-sensing applications, it measures the static acceleration of gravity in addition to the dynamic acceleration brought on by motion or shock. Its measurement of inclination changes less than 1.0° is made possible by its high resolution (4 mg/LSB).

The integrated circuit that makes up this Adxl345 Accelerometer module includes resistors, capacitors, a voltage regulator, a level shifter, and an Adxl345 Accelerometer IC. Various voltage regulator integrated circuits are used by different manufacturers.

The Analog Devices Adxl345 IC is the module's brain. The Adxl345 is a compact,thin, full 3-axis accelerometer with signal-conditioned voltage outputs that consumes little power. The product has a minimum full-scale range of ±16g for measuring acceleration.

The accelerometer module Adxl345 has eight pins. It's fairly simple to use the Adxl345 module with a microcontroller. Attach the microcontroller's VCC and GND pins to its 5V and GND pins. Additionally, attach the SCL and SDA pins to the Arduino's

corresponding pins.

Fixed and movable plates make up the accelerometer's fundamental construction. The capacitance between stationary and moving plates changes as acceleration is applied along an axis. As a result, the amplitude of the sensor's output voltage is proportional to the acceleration.

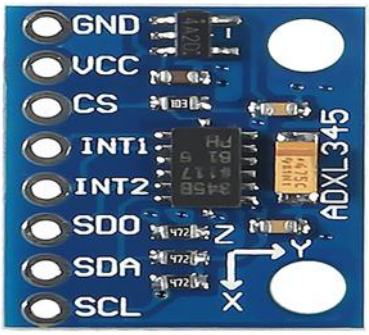

FIG NO 14: Adxl345 ACCELEROMETER

CHAPTER 4

IMPLEMENTATION

4.1 FEATURES AND OPERATIONS:

Cradle Swinging Principle:

The moment the Sound sensor reaches the threshold, the Cradle Swing will start. The Cradle will swing with the aid of the Servo Motor.

1.Turn on the system.

2. Look to see if the baby is crying or making any noise.

3. If so, the Servo Motor is triggered, causing the Cradle to swing.

4. Additionally, it sends the corresponding alert message.

Wetness Condition:

This sensor assists in determining the level of wetness or dryness in the baby's diaper. An alert message will be sent to the parent if it is found to be wet. This will support maintaining a clean and healthy environment for the infant.

1. Turn on the system.

2. Continue to observe whether the baby's diaper is wet or dry.

3. If so, send a message to the parent informing them of this.

Temperature/Humidity Check:

This sensor assists in identifying ongoing temperature changes. And aduct the speep of the fan accordingly.

1. Turn on the system.

2. Continue taking the room temperature.

3. Based upon the temperature the speed of fan is adjusted.

Motion Detection :

This sensor aids in the system's motion detection. The function verifies if the infant is within the cradle. It will begin to swing and send a . message to the parent if it detects any movement.

1. Activate the system.

2. Examine whether the Cradle is moving at all.

3. A notification alerting the parent is sent if motion is found.

4.2 BLOCK DIAGRAM

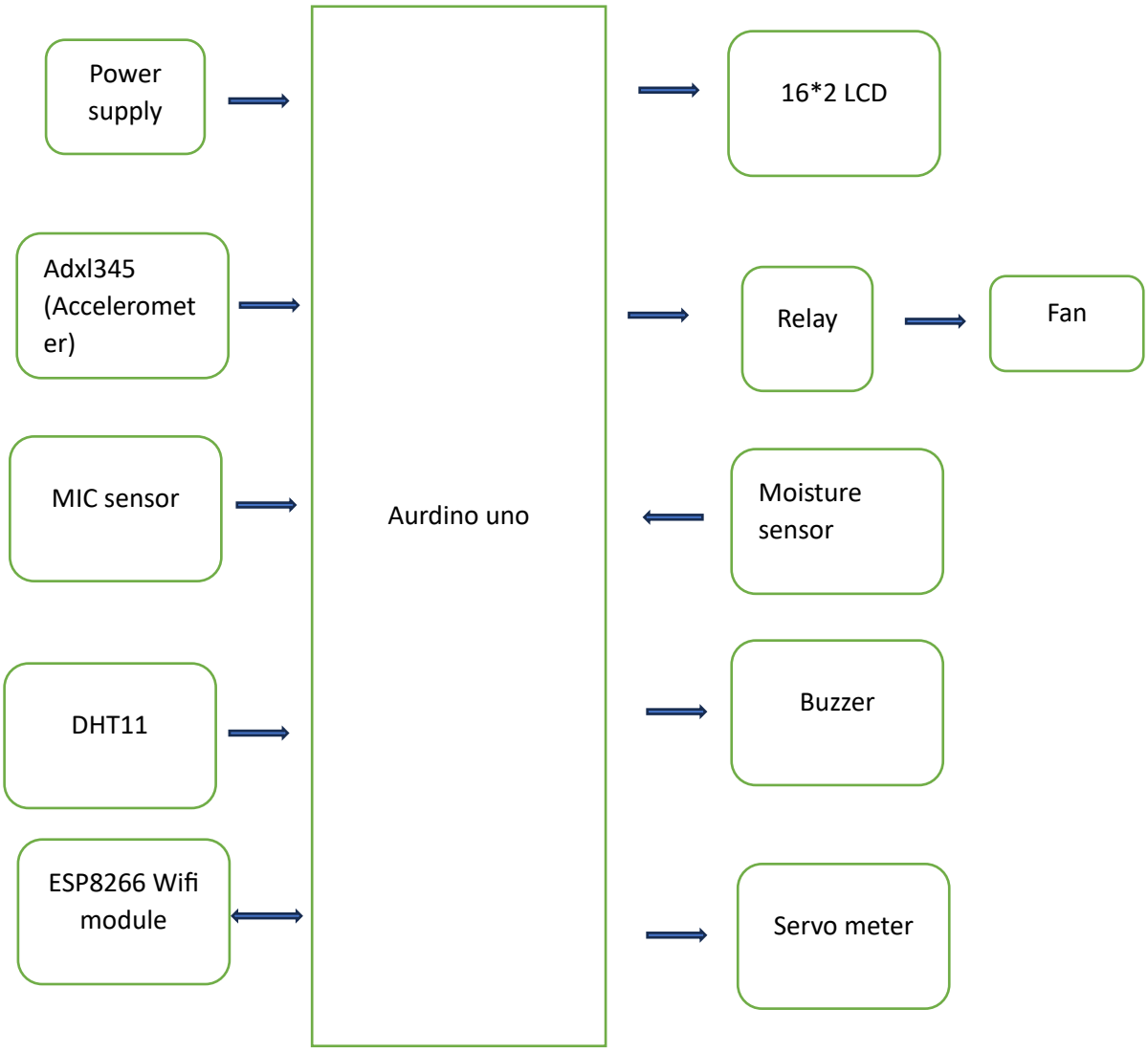

FIG 9 Block Diagram

4.3 ADVANTAGES:

- Cost efficient
- User friendly
- Ensures safety
- Minimum manual work
- Baby sooth comfortably
- Baby stays healthy

4.4 APPLICATIONS:

- An external supply of 6–20 volts can power the board. 7–12 volts is the recommended range.
- To turn your Arduino on or off, it's a good idea to connect a switch in series with this battery.
- It saves time by allowing parents to take care of their children less frequently because it sends out alarms and SMS alerts at the appropriate times.
- It it doesn't require any additional hardware or software knowledge or human interaction to rock the cradle, it is very simple to use.
- The cradle can be operated by GSM messages, and its interface is user-friendly.
- The smart cradle gives parents free time and notifies them of any unusual activity by their child.

CHAPTER 5

RESULTS

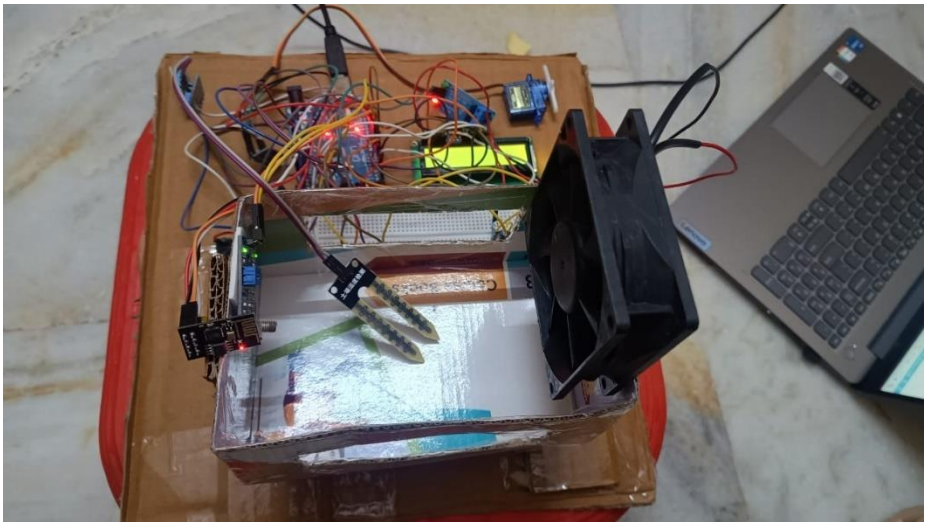

FIG 16 : Fan Speed based upon Temperature

Based upon the temperature of room and surrounds of the baby cradle the speed of the fan gets adjusted automatically and makes baby feel cozy without any discomfort due the the atmospheric temperature.

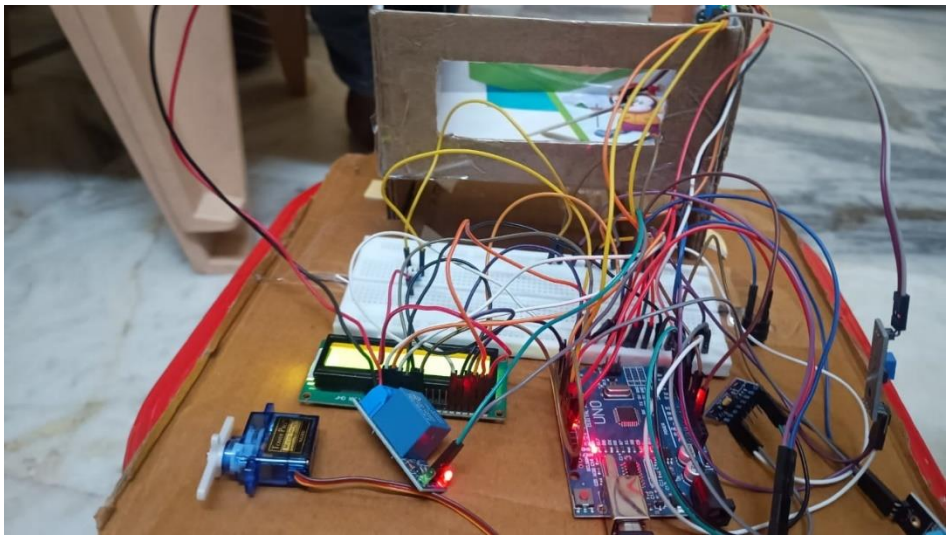

FIG 17 : Swing of Cradle based upon the movement detection of baby

The cradle automatically swing by observing the momentum of baby and also when cry is detected. The swing of the cradle depends upon the adjustment required as per baby moventum.

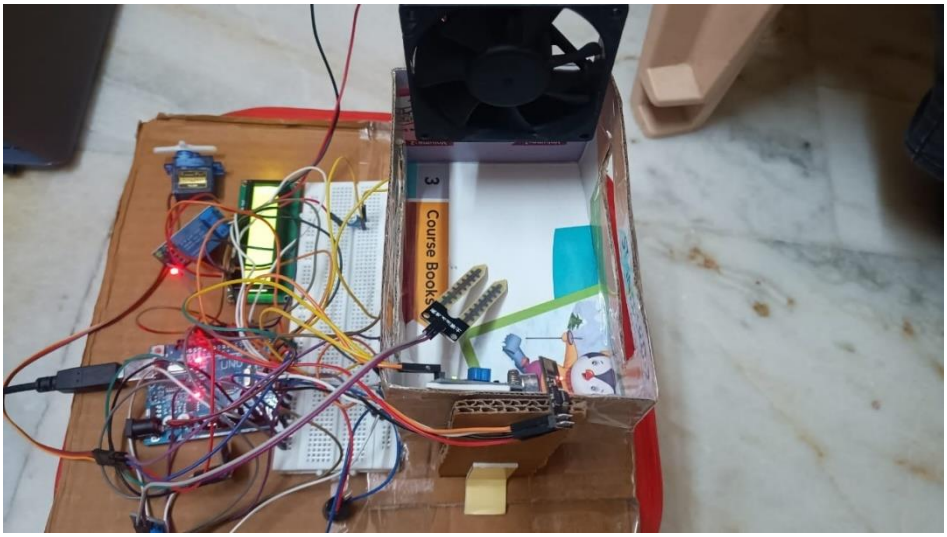

FIG 18 : Moister Detection and intimation

Based upon the moister detected the system identifies wetness of Diaper and indicates with buzzer to parents to alert the wet diaper. This helps parents easy to look after their even during their working which also helps in accurate prediction and helps children from feeling discomfort and helps in preventing skin issues from wet diapers.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 CONCLUSION:

The advancement of technology has experienced a rapid acceleration in recent times. With significant developments in technology, it has the potential to make valuable contributions to society. Technological progress has revolutionized various aspects of human life and continues to play a

In various situations, one effective solution is the use of automated cradles. This is particularly beneficial for working parents who already shoulder a heavy workload and also need to attend to the care of their baby. Automated cradles serve as a prime illustration of how

The cradle system provides a sense of assurance to parents by ensuring the safety and security of their baby while resting inside the cradle. Apart from offering a secure environment, the cradle is also known for its cost-effective nature compared to other options in the market. Parents find

Parents are constantly concerned about the well-being of their young babies, making the health of infants a top priority. Consequently, the cradle system is designed to offer additional features that cater to these worries. This innovative approach not only ensures the safety and comfort of the baby but also

To ensure the infant's well-being, the use of an automated baby cradle is proposed. This innovative baby cradle allows working mothers the flexibility to manage household responsibilities efficiently while guaranteeing the baby's health and comfort. Caring for an infant concurrently.

6.2 FUTURE SCOPE :

We can add more features in the future to make it more effective and user-friendly. We can add features to this device, including a revolving toy with music and live 3G baby monitoring for parents and camera, as well as a sound detector to identify the baby's sounds, might be added to improve the system's functionality. The advancement of technology has made parenting and child care easier for parents and their everyday routine.

REFERENCES

REFERENCES :

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APPENDIX

APPENDIX

```
#include <DHT.h>

#include <ESP8266WiFi.h>

#include <LiquidCrystal.h>

// Constants for DHT11

#define DHTPIN 2

#define DHTTYPE DHT11

DHT dht(DHTPIN, DHTTYPE);

// Pin Definitions

const int soundSensorPin = 11;

const int moistureSensorPin = 10;

const int memsSensorPin = A0;

const int buzzerPin = 13;

const int fanPin = 12;

const int motorPin = 9;

// LCD Pins (RS, E, D4, D5, D6, D7)

const int rs = 5, en = 4, d4 = 14, d5 = 12, d6 = 13, d7 = 15;

LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

// WiFi credentials

const char* ssid = "vivo 1916";

const char* password = "HELLO WORLD";

// Server details

const char* serverName = "http://your.server.url/upload";
```

```
// Variables
float temperature;
float humidity;
int moisture;
bool babyCrying;
bool babyMoved;
// Threshold for moisture
const int threshold = 500; // Example threshold value, adjust as needed
void setup() {
  Serial.begin(115200);
  // Initialize DHT11 sensor
  dht.begin();
// Initialize pins
  pinMode(soundSensorPin, INPUT);
  pinMode(moistureSensorPin, INPUT);
  pinMode(memsSensorPin, INPUT);
  pinMode(buzzerPin, OUTPUT);
  pinMode(fanPin, OUTPUT);
  pinMode(motorPin, OUTPUT);
// Initialize LCD
  lcd.begin(16, 2);
 // Initialize WiFi connection
  connectWiFi();
}
```

```
void loop() {
  // Read sensors
  babyCrying = digitalRead(soundSensorPin);
  temperature = dht.readTemperature();
  humidity = dht.readHumidity();
  moisture = analogRead(moistureSensorPin);
  babyMoved = digitalRead(memsSensorPin);
// Print to Serial Monitor
  Serial.print("Temperature: ");
  Serial.print(temperature);
  Serial.print(" °C, Humidity: ");
  Serial.print(humidity);
  Serial.print(" %, Moisture: ");
  Serial.print(moisture);
  Serial.print(", Baby Crying: ");
  Serial.print(babyCrying ? "Yes" : "No");
  Serial.print(", Baby Moved: ");
  Serial.println(babyMoved ? "Yes" : "No");
// Handle baby crying
  if (babyCrying) {
    digitalWrite(motorPin, HIGH);  // Swing the cradle
  } else {
    digitalWrite(motorPin, LOW);  // Stop swinging
```

```
  }
// Handle baby urination
  if (moisture > threshold) {
    digitalWrite(buzzerPin, HIGH);  // Turn on the buzzer
  } else {
    digitalWrite(buzzerPin, LOW);  // Turn off the buzzer
  }
 // Handle baby movement
  if (babyMoved) {
    digitalWrite(fanPin, HIGH);  // Turn on the fan
  } else {
    digitalWrite(fanPin, LOW);  // Turn off the fan
  }
 // Display crying and movement status on LCD
  lcd.setCursor(0, 0);
  lcd.print("Crying: ");
  lcd.print(babyCrying ? "Yes" : "No ");
  lcd.setCursor(0, 1);
  lcd.print("Moved: ");
  lcd.print(babyMoved ? "Yes" : "No ");
  delay(1000); // Delay to make sure status is visible
// Display temperature and humidity
  lcd.clear();
  lcd.setCursor(0, 0);
```

```
  lcd.print("Temp: ");
  lcd.print(temperature);
  lcd.print("C");
  lcd.setCursor(0, 1);
  lcd.print("Hum: ");
  lcd.print(humidity);
  lcd.print("%");
  delay(1000); // Delay to make sure values are visible
// Display moisture
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Moisture: ");
  lcd.print(moisture);
  delay(1000); // Delay to make sure value is visible
// Send data to IoT server
  sendDataToServer(temperature, humidity, moisture, babyCrying, babyMoved);
 // Small delay for stability
  delay(2000);
}
void connectWiFi() {
  Serial.println();
  Serial.println("Connecting to WiFi...");
  WiFi.begin(ssid, password);
```

```
  while (WiFi.status() != WL_CONNECTED) {
    delay(1000);
    Serial.print(".");
  }

  Serial.println("");
  Serial.println("WiFi connected");
  Serial.print("IP address: ");
  Serial.println(WiFi.localIP());
}

void sendDataToServer(float temp, float hum, int moist, bool cry, bool move) {
  if (WiFi.status() == WL_CONNECTED) {
    WiFiClient client;
    if (client.connect(serverName, 80)) {
      String postData = "temp=" + String(temp) + "&hum=" + String(hum) + "&moist=" +
String(moist) + "&cry=" + String(cry) + "&move=" + String(move);
      client.println("POST /upload HTTP/1.1");
      client.println("Host: " + String(serverName));

      client.println("Content-Type: application/x-www-form-urlencoded");
      client.println("Content-Length: " + String(postData.length()));
      client.println();
      client.print(postData);
```

```
      Serial.println("Data sent to server");
    } else {
      Serial.println("Connection to server failed");
    }
    client.stop();
  } else {
    Serial.println("WiFi not connected");
  }
}
```