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IOT Based Baby Monitoring System

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Abstract: ***The current number of working mothers has increased dramatically. Later, child-rearing has become a daily challenge for many families. Thus, many parents send their children to grandparents' homes or to daycare centers. However, parents are not always able to monitor their children's every move. Therefore, the Internet of Things-based Baby Monitoring System (IoT-BBMS) is being proposed as an efficient and inexpensive IoT-based monitoring system in real time. We also came up with a new algorithm for our system that plays a key role in providing better child care in the absence of parents. In the design process, the Node Micro-Controller Unit (NodeMCU) is used to collect sensor-readable data and upload it via Wi-Fi to the AdaFruit BLYNK server. The proposed system uses sensors to monitor important fetal parameters, such as ambient temperature, humidity, and crying. The system structure consists of a baby's crib that will automatically swipe using the engine when the baby cries. Parents can also monitor their children's condition with an external webcam and open a playful toy located on the baby's crib from a BLYNK server to entertain the baby. The proposed prototype of the system is designed and tested to prove its cost-effectiveness and simplicity and to ensure safe operation to enable child rearing anywhere and anytime via the network. Finally, the child monitoring system is proven to be effective in monitoring the child's condition and the environment in accordance with the model. All data taken from the sensors / modules will be stored in the Mobile application and periodically updated. The Health Algorithm is used in these databases to get information about useful physical conditions as any common symptoms of the disease can be easily identified. The proposed prototype of the system is designed and tested to prove its cost-effectiveness and simplicity and to ensure safe operation to enable child rearing anywhere and anytime via the network. Finally, the child monitoring system is proven to be effective in monitoring the child's condition and the environment according to the prototype.***

Keywords: IOT, Research, Node MCU, BLYNK, MQTT

I. INTRODUCTION

Internet of Things (IoT) simply means a network of objects connected to the Internet. It gives devices the ability to transfer sensor data online without the need for intervention. IoT integrates multiple devices and grows rapidly because it is a broad phase. The forecast says that by 2019, approximately 26.66 billion IoTs will be operational; by 2025, 75 Billion IoT devices worldwide will be available and connected wirelessly online. Among these connected devices, millions of wearable sensors are widely used in health care systems. The total amount of money spent worldwide on IoT in 2016 was $ 737 billion and was projected to reach $ 1.29 trillion by 2020. IoT is an outstanding sector that will grow and expand significantly. The function of the IoT is to control, monitor in real time, and perform independent or independent work and efficiency. Perhaps one of the main reasons why IoT is so big is that it aims to make life easier, and people tend to invest in things that make their lives easier. Thus, the number of IoT applications continues to grow in various sectors. In this study, IoT was integrated into our child monitoring system to achieve a faster response time and provide a greater sense of parental safety.

It is a new, smart and protective program for Cradle to breastfeed the baby properly. This program considers all the minutes necessary to care for and protect the unborn child. Intelligent design and innovation comes with the use of technologies / methods that include Internet Of Things (IoT) (Modules such as nodeMCU board, Humidity & Temperature sensing), Swing Automation, Cry Detecting Mechanism, Live Video Surveillance, Mobile App. Computer Making (Data Storage) and Android Friendly User (User Management) mobile app.

II. METHODOLOGY

1) *Observational Research:* We came across new parents and observed their difficulties while managing the infants.
2) *Interviewed Parents:* We tried to interview them and gathered all the data we wanted.
3) *Discussion with Peers:* Discussed with peers to get an overall clear solution.
4) *Block Diagram and Component Selection:* Researched about the component suitability with our proposed solution and the headed toward block diagram creation.

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5) *Coding and Simulated on Proteus:* We coded a program for that and simulated it virtually to check its working and areas to improve on.
6) *Cost approximation and Hardware Implementation:* Calculated the cost of the prototype and verified with the budget window we had. Then we jumped onto hardware implementation for the prototype.

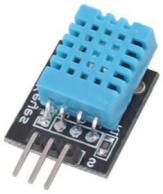
III. MODELING AND ANALYSIS

A. *Materials*

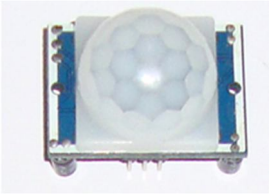
1. Node MCU



2. DHT 11 Sensor



3.Motion Sensor



4. Sound Sensor



5. Servo Motor

X

6. DC Battery



7. ESP32 Camera



Figure 1: view of components

B. *Block Diagram*

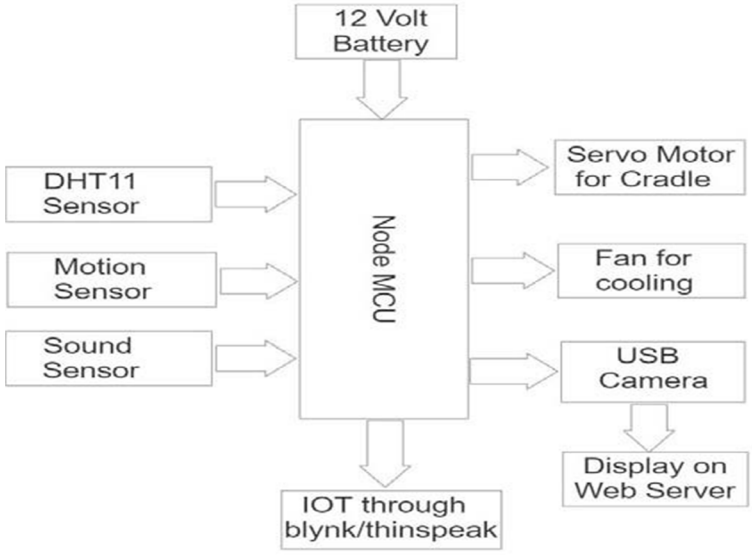


Figure 2: view of Block Diagram

C. Flowchart

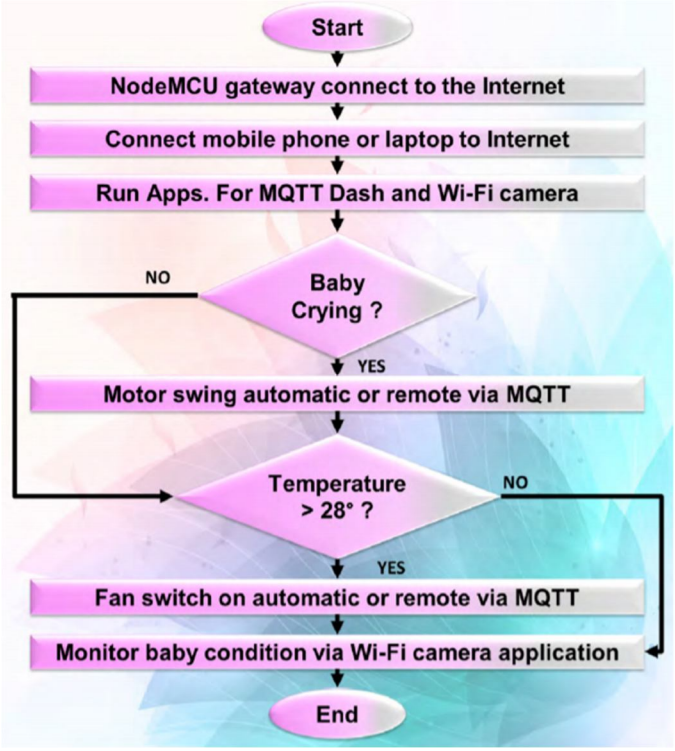


Figure 3: view of flowchart

D. Software Simulation

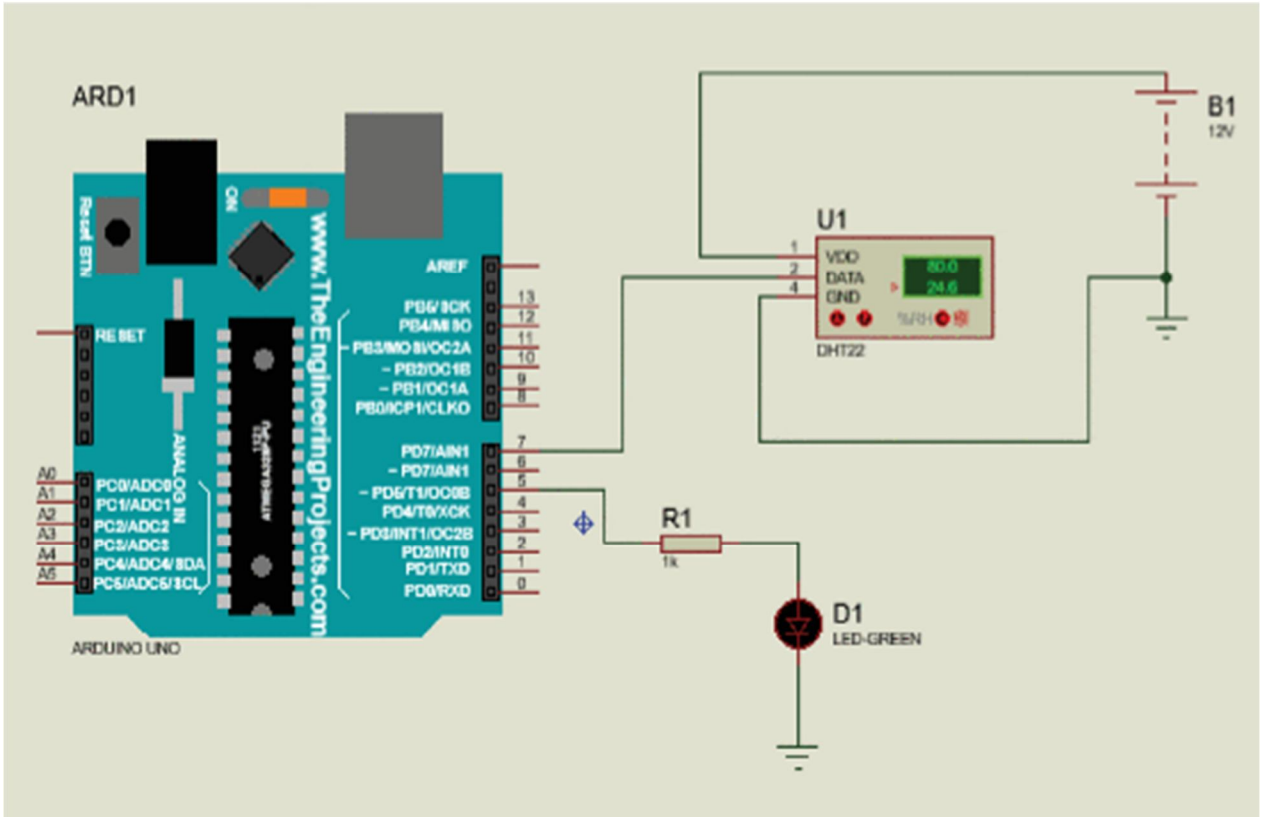


Figure 4: view of software simulation

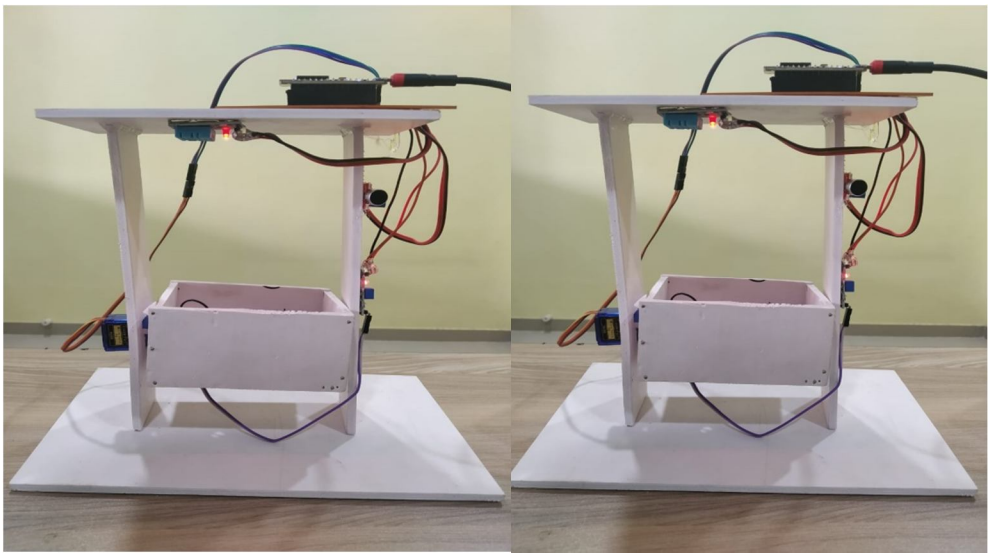
E. Dumped Code

```
#define BLYNK_PRINT Serial
#include <Servo.h>
Servo myservo;  // create servo object to control a servo
// twelve servo objects can be created on most boards
int pos = 0;    // variable to store the servo position
 #include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <DHT.h>
 // You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] = "dyBhHOMy6udsSrLm1nZz8nyAh0_uM1qS";
 // Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "iPhone";
char pass[] = "harsh123";
 #define DHTPIN D3          // D3
 // Uncomment whatever type you're using!
#define DHTTYPE DHT11     // DHT 11
DHT dht(DHTPIN, DHTTYPE);
BlynkTimer timer;
 void sendSensor()
{
  float h = dht.readHumidity();
  float t = dht.readTemperature(); // or dht.readTemperature(true) for Fahrenheit
  if (isnan(h) || isnan(t)) {
  Serial.println("Failed to read from DHT sensor!");
  return;
  }
  // You can send any value at any time.
  // Please don't send more that 10 values per second.
  Blynk.virtualWrite(V5, t);
  Blynk.virtualWrite(V6, h);
}
 void setup()
{
  // Debug console
  Serial.begin(9600);
  Blynk.begin(auth, ssid, pass);
  pinMode(D5,OUTPUT);
  pinMode(D6,OUTPUT);
   pinMode(D7,OUTPUT);
   pinMode(D8,OUTPUT);
   // digitalWrite(D5,HIGH);
  digitalWrite(D6,HIGH);
   digitalWrite(D7,HIGH);
   digitalWrite(D8,HIGH);
   myservo.attach(D5);
   myservo.write(90);
  dht.begin();
```

```
 // Setup a function to be called every second
  timer.setInterval(1000L, sendSensor);
}
 void loop()
{
  Blynk.run();
  timer.run();
  int a=analogRead(A0);
  int c =map(a,1024,400,0,100);
  int b=digitalRead(D2);
  Serial.println(a);
  Serial.println(c);
  Blynk.virtualWrite(V4, c);
  Blynk.virtualWrite(V3, b);
 if(a>800)
  {
    for (pos = 0; pos <= 180; pos += 1) { // goes from 0 degrees to 180 degrees
    // in steps of 1 degree
    myservo.write(pos);              // tell servo to go to position in variable 'pos'
    delay(15);                       // waits 15ms for the servo to reach the position
  }
  for (pos = 180; pos >= 0; pos -= 1) { // goes from 180 degrees to 0 degrees
    myservo.write(pos);              // tell servo to go to position in variable 'pos'
    delay(15);                       // waits 15ms for the servo to reach the position
  }
     }
    else
    {
      myservo.write(90)
      }
}
```

IV. RESULTS AND DISCUSSION

A. *Results of Hardware Implementation*



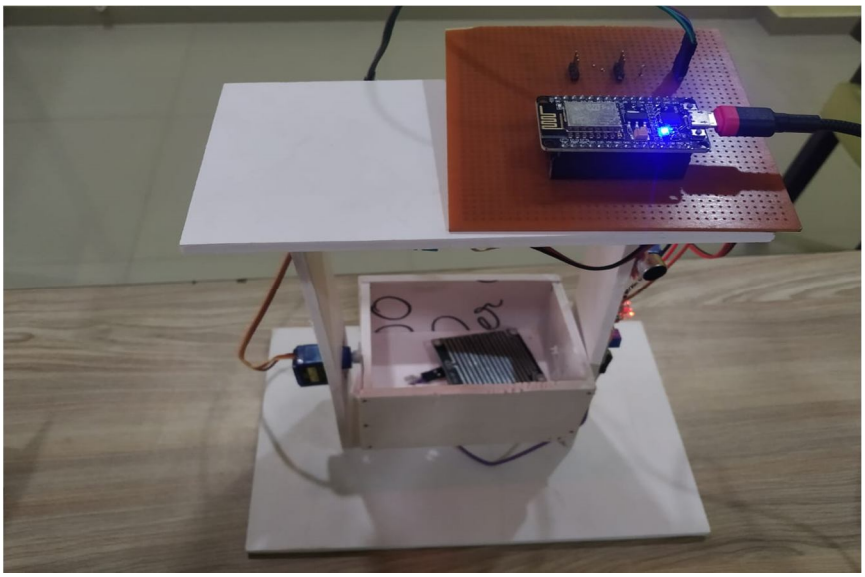


Figure 5: view of Hardware prototype

B. Result of Bylnk IOT Notification App (i.e. Available on Playstore for free)

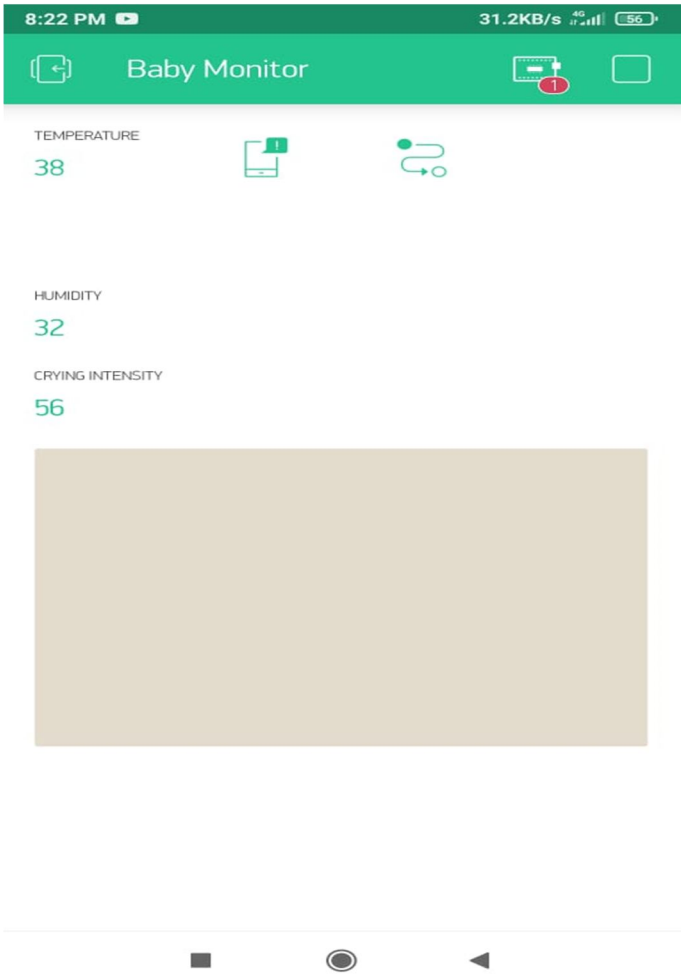


Figure 6: view of IOT Blynk App

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V. CONCLUSION

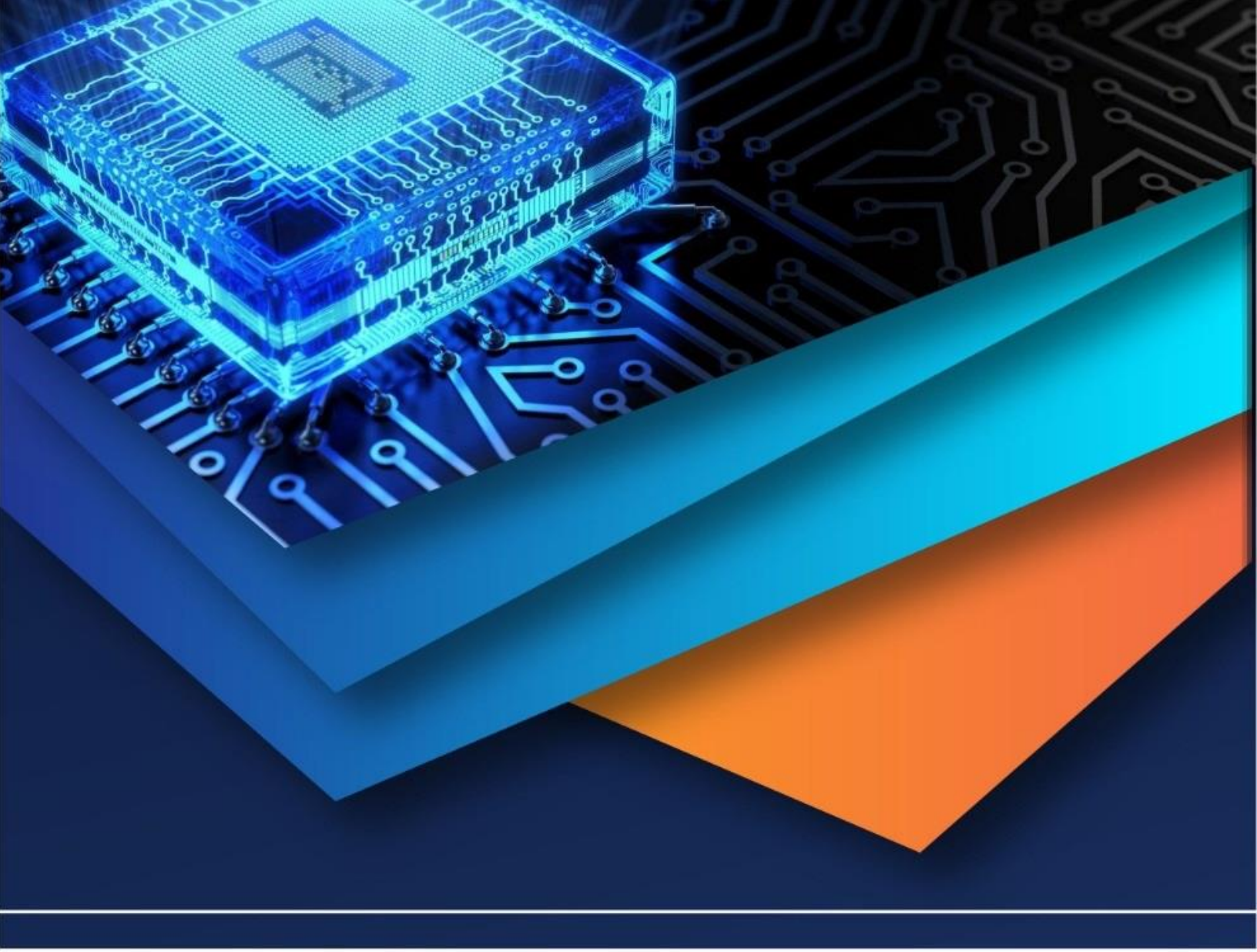
A smart crib with an IoT baby monitoring system is designed and built to monitor the baby's vital parameters, such as crying, humidity, and ambient temperature. NodeMCU was used as the main control board in the construction of the project circuit, because it had a built-in Wi-Fi module, which enabled the implementation of the IoT concept in the advanced system. The need for IoT was met through NodeMCU due to its simplicity and open source environment. The completed prototype was tested using a cell phone with a baby ringtone, inserted into the womb. When the mobile phone rang for a few seconds, the cradle began to sway from the system's assumption that the baby was crying because of the noise received. A notification has been sent to the user's cellphone to indicate that the child is crying. The temperature and humidity of the surrounding area were determined by the parents' ability to control the child using mobile applications. Monitoring of real-time vision was achieved with the help of a wireless camera. The user can monitor the child with the camera's mobile app and talk to the child via a microphone built into the wireless camera.

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