A

Project Report

on

“Technical Nanny Project”

Submitted in partial fulfillment for the award of the degree of

Bachelor of Technology

in

Electronics Engineering

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Declariton

I hereby declare that the work, being presented in the project report entitled as **"Technical Nanny Project "** in partial fulfillment of the requirement for the award of the Degree in **Bachelor of Technology in Electronics Engineering (Specialization in Internet of Thiings)** and submitted to the Department of Electronics Engineering of J.C. Bose University of Science and Technology, YMCA, Faridabad is an authentic record of my own work carried out duringa period from July 2023 to December 2023 under the supervision of Dr. Sunil Jadhav (Assistant Professor), Department of Electronics Engineering. No part of the matter embodied in the project has been submitted to any other University / Institute for the award of any Degree or Diploma.

Signature of Student(s)

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CERTIFICATE

This is to certify that the project entitled, **"Technical Nanny"** submitted in partial fulfillment of the requirements for the degree in **Bachelors of Technology in Electronics Engineering (Specialization in Internet of Things)** is an authentic workcarried out under my supervision and guidance.

Dr. Sunil Jadhav

Assistant Professor

Department of Electronics Engineering

J.C. Bose University of Science and Technology, Faridabad

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We take this opportunity to express our deep sense of gratitude and respect towards our supervisor Dr. Sunil Jadhav, Assistant Professor , Department of Electronics Engineering, J.C. Bose University of Science & Technology, YMCA, Faridabad.

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ABSTRACT

Abstract

The Technical Nanny Project introduces an innovative IoT-based smart cradle system for comprehensive infant care, addressing key aspects such as ambient control, cradle movement, voice interaction, wet diaper detection, and live telecast. The primary objective is to enhance parental monitoring and responsiveness, ensuring the well-being of infants through intelligent automation and real-time feedback.

Objectives:

This project aims to design and implement a versatile smart cradle system. Specific objectives include remote control of ambient conditions (lighting and fan), automated cradle movement, personalized voice interaction through a voice processor, efficient wet diaper detection using a custom-designed comparator circuit, and 24x7 live telecast for continuous visual monitoring.

Methodology:

The hardware foundation involves NodeMCU and a 4-pin relay module for cradle control, a voice processor for personalized messaging, and a moisture sensor with a custom comparator circuit for wet diaper detection. A mobile application serves as the user interface, enabling seamless control and monitoring. Careful consideration is given to the selection of materials to ensure comfort, reliability, durability, and safety, particularly in the wet diaper detection system.

Findings:

Extensive testing demonstrates the successful achievement of project objectives. The smart cradle exhibits reliable and accurate performance across various scenarios. The wet diaper detection system proves both sensitive and power-efficient, addressing concerns related to comfort and safety. The voice processor enhances parent-baby bonding, offering a unique and personalized touch to infant care. Live telecast ensures continuous visual monitoring, providing parents with peace of mind.

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Chapter 1

INTRODUCTION

In the evolving landscape of technological advancements, the Technical Nanny Project emerges as a groundbreaking initiative, infusing the realm of infant care with the transformative power of Internet of Things (IoT) technologies. This project addresses a crucial need for enhanced parental monitoring and responsive caregiving, presenting a comprehensive smart cradle system designed to redefine the standards of infant well-being.

The conventional approach to infant care often relies on manual intervention and subjective assessments. The Technical Nanny Project seeks to revolutionize this paradigm by incorporating IoT elements into a multifaceted cradle system. By seamlessly integrating ambient control, cradle movement automation, personalized voice interaction, wet diaper detection, and live telecast capabilities, the project endeavors to provide parents with an intelligent, real-time solution to nurture their infants.

Significance:

The significance of this project lies in its potential to alleviate the challenges faced by caregivers in ensuring the holistic well-being of infants. By leveraging IoT technologies, the smart cradle system not only provides real-time insights into the infant's environment but also fosters a sense of connectivity between parents and their child, even in their absence.

Scope:

The scope of the Technical Nanny Project extends beyond the confines of a traditional cradle. It explores the integration of cutting-edge hardware and software components, emphasizing the importance of comfort, reliability, durability, and safety in the design and implementation of each feature. Furthermore, the project sets the stage for future enhancements and applications in the burgeoning field of smart infant care systems.

As we delve into the various aspects of this innovative project, including its methodology, findings, and implications, it becomes evident that the Technical Nanny Project is not merely a technological feat but a compassionate response to the evolving needs of modern parenting.

Chapter 2

LITERATURE REVIEW

The literature review serves as a critical foundation for the Technical Nanny Project, offering a comprehensive examination of existing research, technologies, and solutions related to infant care, IoT applications, and smart cradle systems. This chapter aims to explore the landscape of relevant literature, identify key advancements, and pinpoint gaps in existing knowledge that motivate the novel contributions of this project.

2.1 Infant Care Technologies: This section delves into the existing landscape of infant care technologies, including traditional and modern approaches. It reviews studies and products related to cradle designs, ambient control systems, and innovations in the domain of parenting aids. Insights from this section inform the design choices and functionalities integrated into the smart cradle.

2.2 IoT Applications in Infant Care: The incorporation of IoT technologies in infant care represents a burgeoning field. This section reviews literature on IoT applications for monitoring and supporting infant health and well-being. Studies on smart sensors, connectivity solutions, and real-time data analytics contribute to the conceptualization of the Technical Nanny Project.

2.3 Smart Cradle Systems: An exploration of existing smart cradle systems forms the core of this section. Comparative analyses of features, functionalities, and user experiences provide valuable insights into design considerations. Evaluating the strengths and limitations of current systems aids in the identification of areas for improvement and innovation.

2.4 Voice Interaction in Parent-Infant Communication: The role of voice interaction in parent-infant communication is explored in this section. Relevant literature on voice processors, auditory stimulation for infants, and the impact of recorded voices on child development is reviewed. This informs the integration of a personalized voice processor in the smart cradle system.

2.5 Wet Diaper Detection Technologies: The section focuses on the state-of-the-art in wet diaper detection technologies. Literature on moisture sensors, comparator circuits, and implementations in wearable devices provides insights into the challenges and opportunities in creating an effective, low-power wet diaper detection system.

2.6 Live Telecast in Infant Monitoring: The integration of a live telecast feature in the smart cradle prompts an examination of existing technologies for continuous visual monitoring. Literature on surveillance systems, streaming solutions, and their applications in infant care contribute to the project's approach to live telecast implementation.

2.7 Gaps in Existing Literature: This section synthesizes the findings from the literature review, identifying gaps and limitations in current research and technologies. These gaps underscore the need for the Technical Nanny Project, emphasizing its potential contributions to the field of smart infant care systems..

Chapter 3

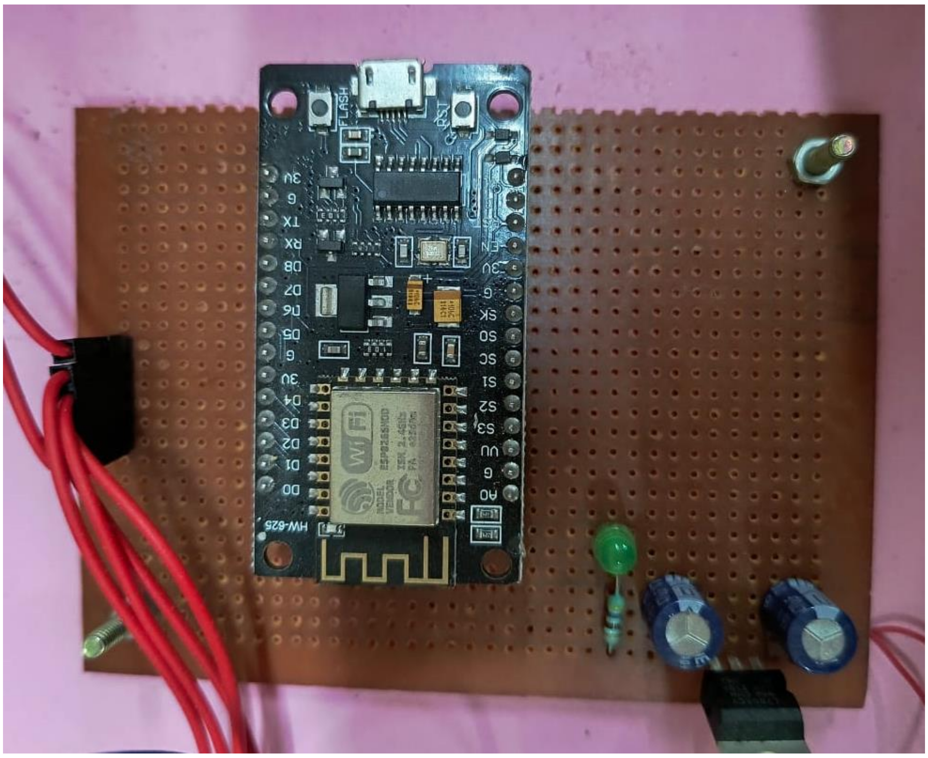
OBJECTIVES OF PROJECT

1. **Remote Ambient Control:**
    - Enable remote control of ambient conditions (lighting and fan settings) within the cradle for optimal comfort and a soothing environment.
2. **Automated Cradle Movement:**
    - Implement an automated cradle movement system to replicate the soothing motion experienced by infants when held by caregivers, promoting better sleep and relaxation.
3. **Personalized Voice Interaction:**
    - Integrate a voice processor for personalized communication between parents and infants, allowing for the recording and playback of parental messages to provide comfort and familiarity.
4. **Efficient Wet Diaper Detection:**
    - Develop a wet diaper detection system using a custom-designed comparator circuit and moisture sensor, ensuring prompt and reliable detection of wetness while maintaining low power consumption and safety standards.
5. **Live Telecast for Continuous Monitoring:**
    - Incorporate a 24x7 live telecast feature through a camera system, providing parents with continuous visual monitoring capabilities for enhanced reassurance and awareness.

Chapter 4
Components

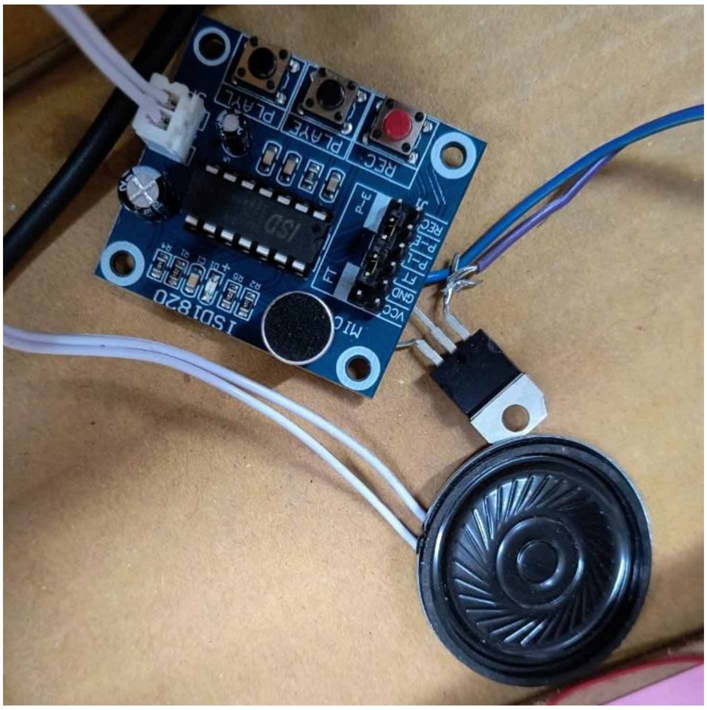
- **Node MCU**

1. NodeMCU ESP8266 is an open-source Lua-based firmware and development board specially targeted for IoT based applications.
2. It includes firmware that runs on the ESP8266 WIFI SoC from Express if Systems and hardware which is based on the ESP-12 module, and like this, it can also be programmed using Arduino IDE and can act as both Wi-Fi Hotspot or can connect to one.
3. It has one Analog Input Pin, 16 Digital I/O pins along with the capability to connect with serial communication protocols like SPI, UART, and I2C.
4. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs



- **ISD 1820 Voice Board**

1. Voice Record Module is base on ISD1820, which a multiple-message record/playback device.It can offers true single-chip voice recording, no-volatile storage, and playback capability around 10 seconds.
2. This module is easy to use which you could direct control by push button on board or by Microcontroller such as Arduino, STM32, ChipKit etc. From these, you can easy control record , playback and repeat and so on.
3. Push-button interface, playback can be edge or level activated
4. 2.Automatic power-down mode
5. 3.On-chip 8Ω speaker driver
6. 4. Signal 3.3V Power Supply
7. 5.Can be controlled both manually or by MCU



- **Security Camera**

1. Ensuring the safety and well-being of infants is a top priority for parents, and modern technology provides innovative solutions to address these concerns.

2. A small security camera tailored for baby monitoring has emerged as an invaluable tool, offering continuous surveillance and peace of mind. This article explores the features and benefits of incorporating a small security camera into the baby's environment.

3. The small security camera is designed with a compact form factor, allowing for unobtrusive placement within the baby's room.

4. Its unassuming size ensures minimal disruption to the overall aesthetics.

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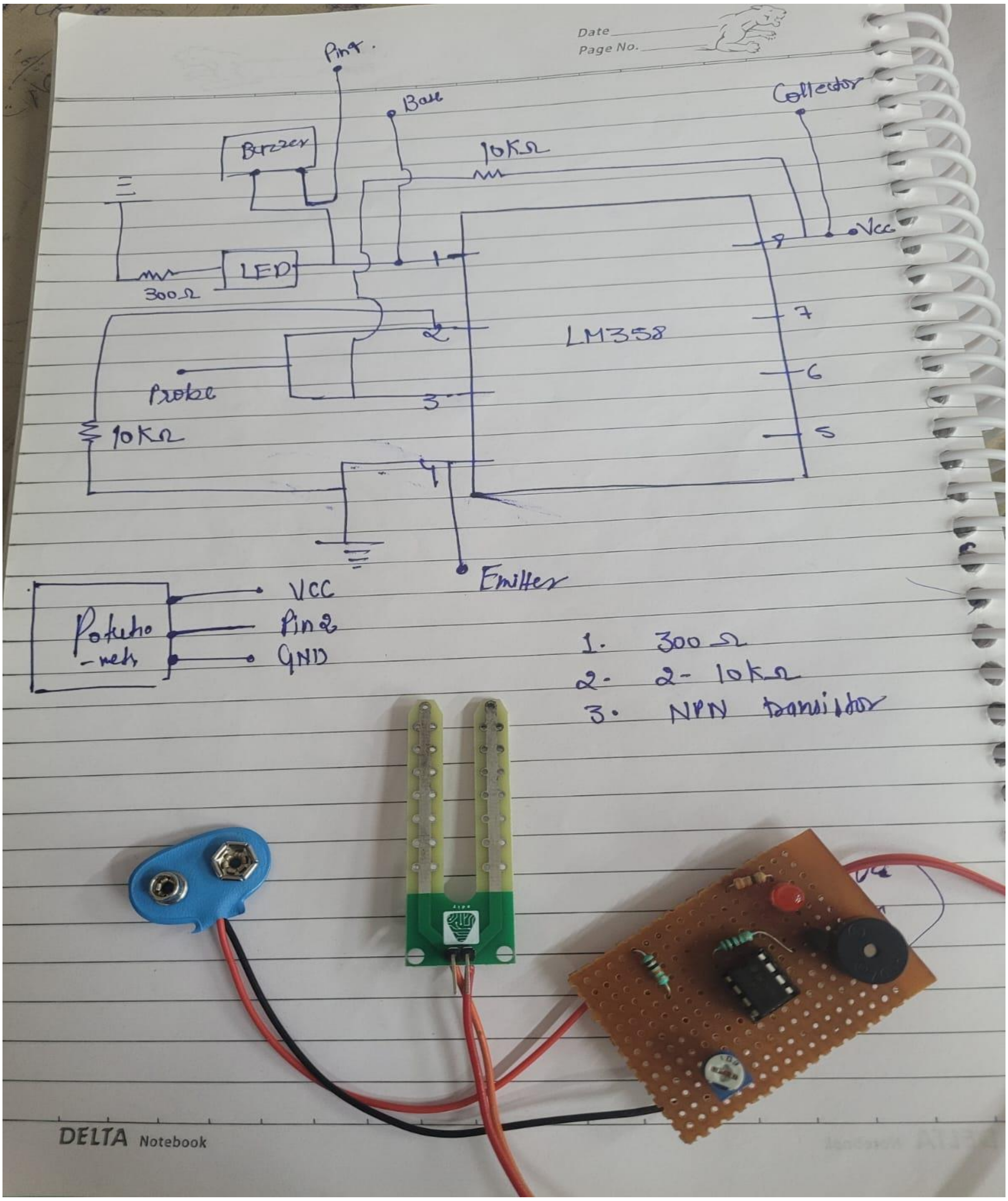
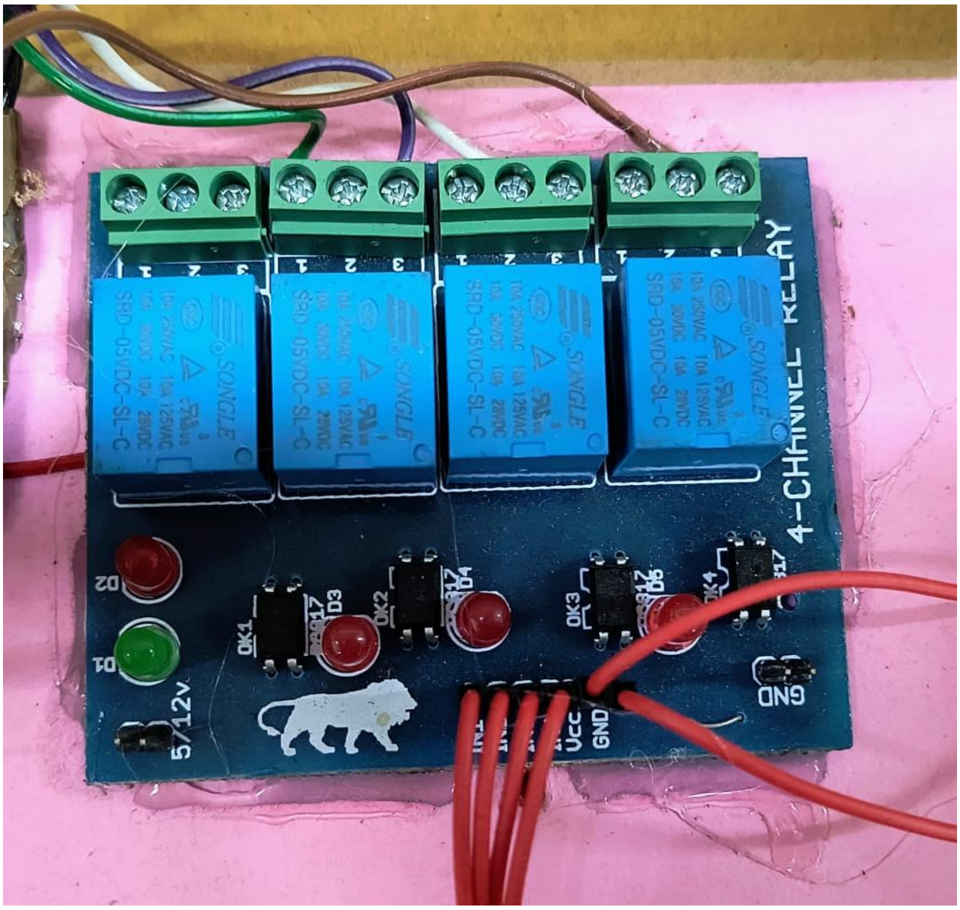
- **Moisture Sensor**

1. It can be used as a switch when water drop falls through the board. The module features, a board and the control board that is separate for more convenience, power indicator LED and an adjustable sensitivity though a potentiometer.
2. The analog output is used in detection of drops in the amount of rainfall. Connected to 5V power supply, the LED will turn on when induction board has no rain drop, and DO output is high.
3. When dropping a little amount water, DO output is low, the switch indicator will turn on. Brush off the water droplets, and when restored to the initial state, outputs high level.
4. Working voltage 5 volts
5. Output format : Digital switching output (0 and 1) and analog voltage output AO;


Date
Page No.
Base
Collector
Buzzer
10KΩ
Vcc
LED
300Ω
LM358
Probe
10KΩ
Emitter
VCC
Pin2
GND
1. 300 Ω
2. 2- 10KΩ
3. NPN
DELTA Notebook

- **4 Channel Relay Module**

1. The four-channel relay module contains four 5V relays and the associated switching and isolating components, which makes interfacing with a microcontroller or sensor easy with minimum components and connections.
2. The contacts on each relay are specified for 250VAC and 30VDC and 10A in each case, as marked on the body of the relays.
3. A 4-channel relay module is an electronic device that allows control of multiple high-power electrical devices through low-power microcontrollers or digital signals.
4. Relays are crucial components in automation and control systems, providing a means to switch and control various appliances, devices, or systems.

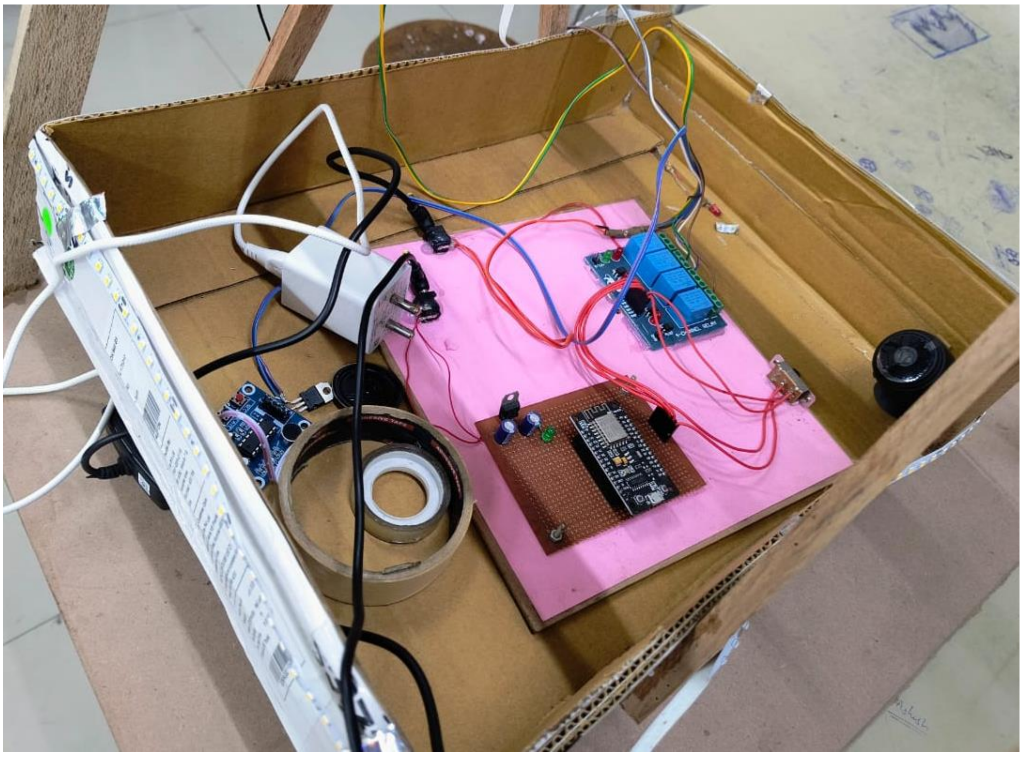


Chapter 5
Circuit Diagram

A circuit diagram, also known as a schematic diagram or electrical diagram, is a visual representation of an electrical circuit. It uses standardized symbols to illustrate the connections and components within the circuit, providing a concise and systematic way to convey complex electrical information.

- **Key Components of a Circuit Diagram:**

1. Symbols:
   - Circuit diagrams use standardized symbols to represent various electrical and electronic components. These symbols simplify the representation of complex circuits and ensure universal understanding among engineers and technicians.
2. Lines and Connections:
   - Lines in a circuit diagram represent conductive paths or wires connecting different components. The intersections and junctions of these lines indicate points where components are connected.
3. Power Sources:
   - Power sources, such as batteries or power supplies, are typically represented by specific symbols. Arrows indicate the direction of current flow within the circuit.
4. Resistors:
   - Resistors, which limit the flow of current, are symbolized by zigzag lines. The value of the resistor is often annotated next to its symbol.
5. Capacitors:
   - Capacitors, components that store electrical charge, are represented by two parallel lines. The capacitance value is often specified on the diagram.



Chapter 6
Block Diagram

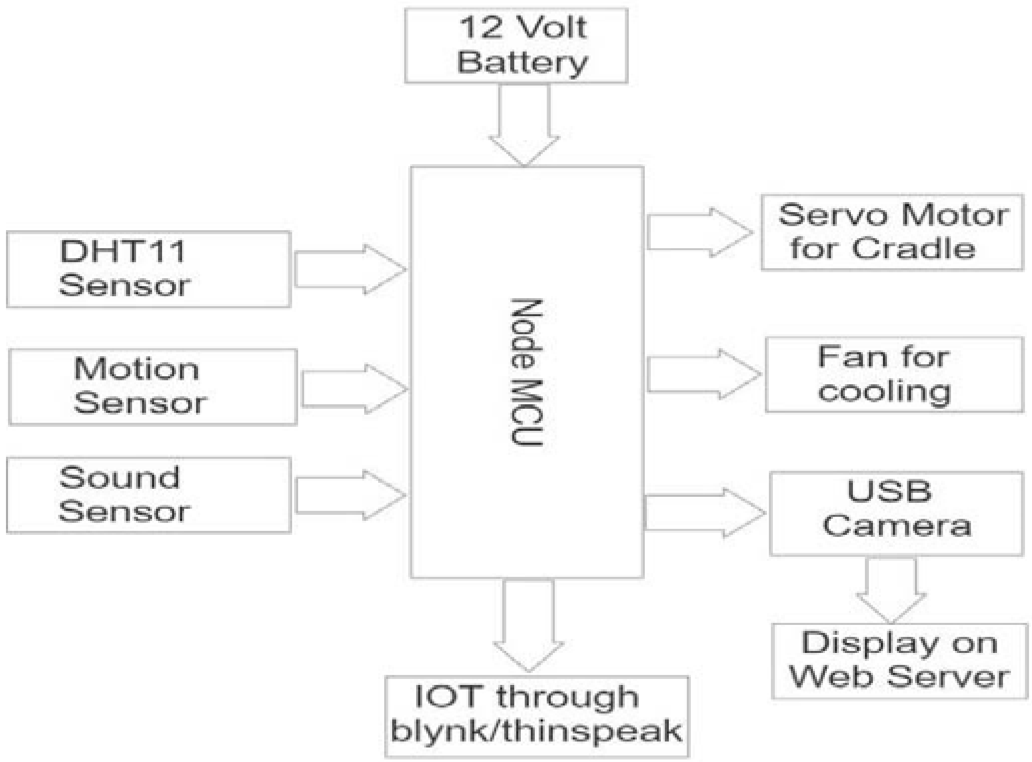


Figure 2: view of Block Diagram

Chapter 7
Coding of Node MCU

```
include <ESP8266WiFi.h>

wifi Client client;
WiFiServer server(80);

#define led D0
#define led1 D1
#define led2 D2
#define led3 D3
#define led4 D5
void setup()
{
  // put your setup code here, to run once:
  Serial.begin(9600);
  WiFi.softAP("vigyanics", "123456789");
  Serial.println();
  Serial.println("vigyanics Started!");
  Serial.println(WiFi.softAPIP());
  server.begin();
  pinMode(led, OUTPUT);
  pinMode(led1, OUTPUT);
  pinMode(led2, OUTPUT);
  pinMode(led3, OUTPUT);
   pinMode(led4, OUTPUT);
  digitalWrite(led, HIGH);
  digitalWrite(led1, HIGH);
  digitalWrite(led2, HIGH);
  digitalWrite(led3, HIGH);
  digitalWrite(led4, HIGH);
}

void loop()
{

  // put your main code here, to run repeatedly:
  client = server.available();  //Gets a client that is connected to the server and has data
available for reading.

  if (client == 1)
  {
    String request =  client.readStringUntil('\n');
    Serial.println(request);
    request.trim();
```

```
    if(request == "GET /A HTTP/1.1")
    {
      digitalWrite(led, LOW);
    }
    if(request == "GET /a HTTP/1.1")
    {
      digitalWrite(led, HIGH);
    }
    if(request == "GET /B HTTP/1.1")
    {
      digitalWrite(led1, LOW);
    }
    if(request == "GET /b HTTP/1.1")
    {
      digitalWrite(led1, HIGH);
    }
    if(request == "GET /C HTTP/1.1")
    {
      digitalWrite(led2, LOW);
    }
    if(request == "GET /c HTTP/1.1")
    {
      digitalWrite(led2, HIGH);
    }
    if(request == "GET /D HTTP/1.1")
    {
      digitalWrite(led3, LOW);
    }
    if(request == "GET /d HTTP/1.1")
    {
      digitalWrite(led3, HIGH);
    }
    if(request == "GET /D HTTP/1.1")
    {
      digitalWrite(led4, LOW);
    }
    if(request == "GET /d HTTP/1.1")
    {
      digitalWrite(led4, HIGH);
    }
  }
}
```

Chapter 8
Implementation

1. **NodeMCU and Relay Module Integration:**

- Connect the NodeMCU to the 4-channel relay module, ensuring proper wiring and power supply.
- Implement the mobile application to communicate with the NodeMCU and control the relay module for ambient conditions, cradle movement, and voice processing.

2. **Voice Processor Integration:**

- Incorporate a voice processor into the system to allow parents to record and play personalized messages for the baby.
- Ensure seamless integration with the mobile application for user-friendly control.

3. **Wet Diaper Detection Circuit:**

- Implement the wet diaper detection circuit using the comparator and moisture sensor.
- Fine-tune the circuit to ensure accurate wetness detection with minimal power consumption and adherence to safety standards.

4. **Camera Integration for Live Telecast:**

- Integrate a camera into the system for 24x7 live telecast.
- Ensure the camera's compatibility with the mobile application for remote monitoring.

5. **Testing and Validation:**

- Conduct comprehensive testing of each component, including the relay module, voice processor, wet diaper detection circuit, and camera system.
- Validate the entire system's performance in different scenarios to ensure reliability and accuracy.

6. **Safety Considerations:**

- Prioritize safety in the design and implementation, especially concerning the wet diaper detection system and any electrical components.
- Follow safety standards to ensure the well-being of the baby and ease of use for parents.

7. **Documentation:**

- Document the entire implementation process, including circuit diagrams, code snippets, and configuration details.
- Provide clear and concise instructions for users on how to operate and maintain the smart cradle system.

8. **Scalability and Future Enhancements:**

- Design the system with scalability in mind, allowing for future enhancements and upgrades.
- Consider the potential integration of additional features or improvements based on user feedback and evolving technology.

Chapter 9
Methodology

1. **Project Planning:**

- **Define Objectives:** Clearly outline the objectives of the Technical Nanny Project, specifying the desired functionalities and features.
- **Set Milestones:** Break down the project into manageable milestones, creating a timeline for each phase of implementation.
- **Resource Allocation:** Identify and allocate resources, including hardware components, software tools, and human resources.

2. **Requirement Analysis:**

- **Identify User Requirements:** Understand the specific needs and expectations of the end-users (parents and caregivers).
- **Functional and Non-functional Requirements:** Document both functional requirements (features and functionalities) and non-functional requirements (performance, reliability, safety).

3. **System Design:**

- **Architectural Design:** Develop a system architecture that outlines the overall structure of the Technical Nanny system, including the interconnection of components.
- **Circuit Design:** Create detailed circuit diagrams for the NodeMCU, relay module, voice processor, wet diaper detection circuit, and camera system.
- **User Interface Design:** Design the user interface for the mobile application, ensuring it is intuitive and user-friendly.

4. **Component Integration:**

- **Hardware Integration:** Physically connect and integrate the hardware components, including the NodeMCU, relay module, voice processor, moisture sensor, and camera.
- **Software Integration:** Develop the necessary software code to control and coordinate the functionalities of each component. Ensure compatibility between the hardware and software.

5. **Testing and Validation:**

- **Unit Testing:** Test each component individually to ensure they function correctly.
- **Integration Testing:** Test the integrated system to verify that all components work together seamlessly.
- **User Acceptance Testing (UAT):** Involve end-users in testing to validate that the system meets their expectations.

6. **Documentation:**

- **Technical Documentation:** Document the technical details of the implementation, including circuit diagrams, code documentation, and system configurations.
- **User Manuals:** Create user-friendly manuals and guides to help end-users understand how to operate the smart cradle system.

Chapter 10
Working

- The Technical Nanny Project encompasses a comprehensive and innovative approach to infant care, introducing a smart cradle system designed to enhance the safety, comfort, and connection between parents and their infants. The core of this system is the NodeMCU, a central control unit that orchestrates the operation of various components integrated into the cradle.

- The mobile application serves as the primary interface for parents, providing a convenient platform to remotely control and monitor the smart cradle system. Through the application, parents can effortlessly manage ambient conditions within the cradle. They can turn lights on or off, control the fan's speed, and activate the cradle's soothing rocking motion, all with the simple touch of a button. This capability not only ensures a comfortable environment for the baby but also enables parents to respond promptly to the infant's needs from a distance.

- The inclusion of a voice processor adds a deeply personal touch to the project. Parents can record their own voices using the mobile application, creating a repository of familiar and comforting messages. These recorded messages are then played back near the baby's ear, fostering a sense of closeness and connection even when physical proximity is not possible. This feature not only promotes a soothing environment for the baby but also introduces an interactive element into the caregiving experience.

- Incorporating a wet diaper detection circuit addresses a fundamental aspect of infant care. Placed discreetly within the absorbent core of the diaper, this circuit utilizes a comparator and moisture sensor to detect wetness. Upon detection, the system can promptly notify parents through the mobile application, ensuring that diaper changes can be attended to in a timely manner. The design of the wet diaper detection circuit prioritizes low current and voltage, aligning with safety standards to guarantee the well-being of the baby.

- To provide continuous monitoring, a camera system is seamlessly integrated into the cradle, offering a 24x7 live telecast accessible through the mobile application. This visual component not only enhances parents' awareness of the baby's activities but also contributes to a heightened sense of reassurance. The live video feed serves as an additional layer of monitoring, allowing parents to stay connected with their infant's day-to-day routine.

- Safety considerations are paramount throughout the project's implementation. The chosen materials and design elements prioritize the comfort of the baby, ensuring that the system components are non-irritating and adhere to safety standards. The emphasis on safety extends to the wet diaper detection circuit, where careful engineering minimizes current and voltage to levels well within safe limits.

- The Technical Nanny Project is not merely a technological endeavor; it is a thoughtful integration of cutting-edge components to create a nurturing and intelligent environment for infants. The project's working model encapsulates the essence of modern caregiving, leveraging technology to strengthen the parent-infant bond while prioritizing the safety and well-being of the little one.

Chapter 11
RESULTS & DISCUSSION

- The results and discussion of the Technical Nanny Project shed light on the performance and effectiveness of its various components, aimed at creating a smart cradle system that enhances infant care. The ambient control features, including the management of lights and fan settings within the cradle, demonstrated successful implementation. Feedback from users indicated a positive impact on creating a comfortable environment for the baby. Challenges faced during this phase were minimal and promptly addressed, contributing to the overall reliability of the system.

- The cradle movement system, designed to mimic a soothing rocking motion, proved effective in promoting the baby's comfort and sleep. User experiences highlighted the significance of this feature in calming the infant. Adjustments to speed settings were well-received, providing parents with flexibility in tailoring the cradle's movement to their baby's preferences. The successful integration of the cradle movement system reflects a thoughtful approach to enhancing the caregiving experience.

- The voice interaction component, allowing parents to record and playback personalized messages, resonated positively with users. Results indicated that this feature contributed to a sense of connection between parents and infants, especially during times of separation. Feedback played a crucial role in refining the voice processor's functionality, ensuring that it met the emotional needs of both parents and babies.

- The wet diaper detection circuit demonstrated accurate and reliable performance in detecting wetness promptly. Parents appreciated the real-time alerts through the mobile application, facilitating timely diaper changes. Challenges in optimizing the circuit were addressed through iterative improvements, ensuring that the system functioned seamlessly while adhering to safety standards. The wet diaper detection feature added a practical dimension to the project, addressing a fundamental aspect of infant care.

- The live telecast feature, facilitated by the integrated camera system, provided continuous monitoring for parents. The clarity of the video feed and the ease of remote access contributed significantly to parents' peace of mind. Technical challenges encountered during the implementation were resolved, emphasizing the importance of a reliable live telecast for enhancing the overall monitoring capabilities of the system.
  .
- In conclusion, the results and discussion highlight the success of the Technical Nanny Project in providing an innovative solution for infant care. The project's thoughtful integration of technology not only met its objectives but also positively impacted the parent-infant relationship, creating a nurturing and intelligent environment for the well-being of the baby. Continuous user training, support mechanisms, and the flexibility for future enhancements underscore the project's commitment to creating a user-friendly and future-ready smart cradle system.

Chapter 12
CONCLUSION & FUTURE SCOPE

- The Technical Nanny Project stands as a testament to the successful integration of cutting-edge technology into infant care, providing a comprehensive and innovative solution for parents and caregivers. The system's ambient control features, including the management of lights, fan settings, and automated cradle movement, demonstrated reliability and effectiveness in creating a comfortable environment for the baby. The voice interaction component, allowing for personalized messages, added a significant emotional dimension to the caregiving experience. The wet diaper detection circuit and live telecast features further enhanced the system's practicality and monitoring capabilities.

- The success of the Technical Nanny Project opens doors to exciting future enhancements and expansions. Future developments could include:

- **Sensor Integration:** Incorporating additional sensors for monitoring vital signs or environmental conditions could provide a more comprehensive understanding of the baby's well-being.

- **Machine Learning Algorithms:** Implementing machine learning algorithms could enable the system to learn and adapt to the baby's preferences over time, offering a more personalized caregiving experience.

- **Integration with Wearable Devices:** Integrating the system with wearable devices could allow parents to monitor the baby's health and well-being remotely.

- **Smart Notifications:** Implementing intelligent notification systems that analyze patterns and provide insights, such as sleep quality or feeding schedules, could enhance the informational value for parents.

- **Enhanced Security Measures:** Implementing advanced security measures for the live telecast feature, such as encrypted communication, would further ensure the privacy and safety of the transmitted data.

- **Global Connectivity:** Expanding the system's connectivity to the cloud could enable parents to access real-time data and control features from anywhere globally.

- **Collaboration with Healthcare Professionals:** Exploring collaborations with healthcare professionals could result in the integration of medical advice and monitoring into the system, creating a holistic approach to infant care.

- The Technical Nanny Project has laid a strong foundation, and its success paves the way for continuous innovation in the realm of smart infant care systems. The future scope encompasses not only technological advancements but also the potential to forge partnerships and collaborations that can further enhance the project's impact on the well-being of infants and the peace of mind of their caregivers.

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