***The organization of the report should be as follows:***

**ARRANGEMENT OF CONTENTS OF PROJECT:**

The sequence in which the project material should be arranged and bound should be as follows:

1. Cover Page & Title Page
2. Declaration
3. Certificate
4. Acknowledgement
5. Abstract
6. Table of Contents
7. List of Tables
8. List of Figures
9. List of Symbols
10. List of Abbreviations and Nomenclature
11. Chapter 1: Introduction (Scope of Work and its Importance)
12. Chapter 2: Design Methodology
13. Chapter 3: Implementation
14. Chapter 4: Testing/ Result and Analysis
15. Chapter 5: Conclusion and Future Enhancements
16. References

**Note:** 1. Printing: on A4 size paper with 1.5 line spacing  
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             6. Spiral binding of report is mandatory. Page number will appear at bottom right side of each page

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Title of the Report

 A

Report submitted in partial fulfilment of the requirement for the

degree of

B.Tech.

In

###### Computer Science & Engineering

By

##### Devashish Mishra - 2101641550035

##### Harsh verma - 2101641550041

##### Anuj Agnihotri - 2101641550021

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##### Under the guidance of

##### Dr. Subhash Singh Parihar

##### (Associate Professor)

##### Project Id: 22\_IOT\_2A\_03



Pranveer Singh Institute of Technology, Kanpur

Dr A P J A K Technical University

Lucknow

## DECLARATION

This is to certify that Report entitled “……Smart Home Automation System ……”which is submitted by me in partial fulfilment of the requirement for the award of degree B.Tech. in Computer Science and Engineering to Pranveer Singh Institute of Technology, Kanpur Dr. A P J A K Technical University, Lucknow comprises only our own work and due acknowledgement has been made in the text to all other material used.

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## 

## 

## Certificate

This is to certify that Report entitled “………………………………………………………..

………………………………………………………………………………….” which is submitted by …………………………………………………………………………………………………………………………………………………………………………………………………………………… in partial fulfilment of the requirement for the award of degree B.Tech. in Computer Science & Engineering to Pranveer Singh Institute of Technology, Kanpur affiliated to Dr. A P J A K Technical University, Lucknow is a record of the candidate own work carried out by him under my supervision. The matter embodied in this thesis is original and has not been submitted for the award of any other degree.

|  |  |  |
| --- | --- | --- |
| Signature:     Dr. Vishal Nagar  Dean CSE Department,  PSIT, Kanpur |  | Signature:  Dr. Subhash Singh Parihar  Associate Professor  CSE Department,  PSIT, Kanpur |
|  |  |  |

(Sample of Acknowledgement)

***ACKNOWLEDGEMENT***

*It gives us a great sense of pleasure to present the report of the B.Tech. Project undertaken during B.Tech. Third Year. We owe special debt of gratitude to our project supervisor*

*……Dr. Subhash Singh Parihar  ……, Department of Computer Science and Engineering, Pranveer Singh Institute of Technology, Kanpur for his constant support and guidance throughout the course of our work. His sincerely, thoroughness and perseverance have been a constant source of inspiration for us. It is only his cognizant efforts that our endeavours have seen light of the day.*

*We also take the opportunity to acknowledge the contribution of Professor Dr. Vishal Nagar, Dean Computer Science & Engineering Department, Pranveer Singh Institute of Technology, Kanpur for his full support and assistance during the development of the project.*

*We also do not like to miss the opportunity to acknowledge the contribution of all faculty members of the department for their kind assistance and cooperation during the development of our project. Last but not the least, we acknowledge our friends for their contribution in the completion of the project.*

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*Signature*

*Name:*

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***ABSTRACT***

A home automation system is a technology that enables homeowners to control various electronic devices and appliances in their homes automatically or remotely. With a home automation system, individuals can turn on and off lights, adjust thermostats, lock and unlock doors, monitor security systems, and even control entertainment systems with the touch of a button. This system is not only convenient, but it can also enhance security, reduce energy costs, and make homes more comfortable and efficient.

The home automation system consists of various components, including sensors, controllers, and actuators. The sensors detect changes in the environment, such as motion, temperature, and light, while the controllers process the data from the sensors and determine the appropriate action. The actuators, such as motors, relays, and servos, perform the desired action based on the controller's instructions.

A home automation system can be controlled through a mobile app or a dedicated control panel. With a mobile app, homeowners can control their home's devices and appliances from anywhere with an internet connection. A dedicated control panel provides a centralized location for controlling all the devices and appliances in the home.

Home automation systems can be customized to fit specific needs and preferences. For example, homeowners can program the system to turn on the lights and adjust the thermostat when they arrive home or turn off all the devices when they leave. Additionally, the system can be integrated with voice assistants, such as Amazon's Alexa or Google Assistant, to provide even more convenience and control.

In summary, a home automation system offers many benefits, including convenience, security, energy efficiency, and customization. As technology continues to advance, it is likely that more homes will adopt this technology, making homes more intelligent and efficient

**Table Of Contents**

**CHAPTER NO. TITLE**

1. DECLARATION
2. CERTIFICATE
3. ACKNOWLEDGEMENTS
4. ABSTRACT
5. LIST OF TABLES.
6. LIST OF FIGURES
7. LIST OF SYMBOLS
8. LIST OF ABBREVIATIONS

Chapter 1: Introduction

1.1 Background and Motivation

1.2 Objectives and Scope of the Project

1.3 Overview of the System

Chapter 2: Literature Review

2.1 Definition and History of the Technology

2.2 State of the Art in the Field

Chapter 3: Methodology

3.1 Requirements and Specifications

3.2 System Architecture and Design

3.3 Hardware and Software Components

3.4 Integration and Testing Plan

Chapter 4: Results and Analysis

4.1 Testing Results and Performance Metrics

4.2 User Feedback and Satisfaction

4.3 Evaluation of the System

Chapter 5: Conclusion and Future Work

5.1 Summary of Project Accomplishments

5.2 Limitations and Future Improvements

5.3 Potential Impact of the System

Chapter 6: References

6.1 List of Sources Cited in the Report

Chapter 7: Appendices

7.1 Detailed System Diagrams and Schematics

7.2 Code Samples and Documentation

7.3 User Manuals and Guides

**List of symbols**

1. **#define** - Used to define constants or macros.
2. **#ifdef** - Used to check if a certain macro is defined.
3. **#endif** - Used to end the conditional block started by **#ifdef**.
4. **#include** - Used to include libraries or header files.
5. **String** - A class for creating and manipulating strings.
6. **int** - A data type for storing integers.
7. **bool** - A data type for storing boolean values (true or false).
8. **std::map** - A container class that stores elements as key-value pairs.
9. **typedef** - Used to create a new type from an existing one.
10. **struct** - A user-defined data type that groups variables of different data types together.
11. **auto** - Used to automatically infer the data type of a variable.
12. **digitalWrite** - A function that writes a digital value to a specific pin.
13. **pinMode** - A function that sets the mode of a pin to input, output, or input\_pullup.
14. **millis** - A function that returns the number of milliseconds since the Arduino board began running the current program.
15. **Serial.printf** - A function that prints a formatted string to the serial port

**LIST OF ABBREVIATIONS**

Top of Form

1. MCU - Microcontroller Unit
2. IoT - Internet of Things
3. UI - User Interface
4. LED - Light Emitting Diode
5. PCB - Printed Circuit Board
6. WiFi - Wireless Fidelity
7. API - Application Programming Interface
8. HTTP - Hypertext Transfer Protocol
9. MQTT - Message Queuing Telemetry Transport
10. DNS - Domain Name System

**Chapter 1: Introduction**

* 1. Background and Motivation

Home automation technology has been rapidly growing in popularity over the past few years. Smart homes offer the convenience of being able to control home appliances and devices remotely, thereby improving the comfort and safety of homes. The development of smart home automation systems has been motivated by the need to improve energy efficiency, reduce costs, and enhance the security of homes.

1.2 Objectives and Scope of the Project

The objective of this project is to develop a smart home automation system using the Node MCU relay board, breadboard, and bulb. The system will allow users to control their home appliances remotely using a smartphone or a computer. The scope of the project includes designing and implementing the hardware and software components, testing the system, and evaluating its performance.

* 1. Overview of the System

The system will consist of a Node MCU relay board, a breadboard, and a bulb. The Node MCU board will be used to communicate with the Wi-Fi network and receive commands from the user. The breadboard will be used for creating and testing electronic circuits. The bulb will be connected to the relay module on the Node MCU board and controlled by the system. Users will be able to control the bulb remotely using a smartphone or a computer.

**Chapter 2: Literature Review**

2.1 Definition and History of the Technology

Smart home automation technology refers to a system that integrates home appliances and devices into a single network, allowing the devices to communicate with each other and enabling remote control and monitoring. The concept of smart homes dates back to the 1970s, but it was not until the 2000s that the technology became widely available and affordable.

2.2 State of the Art in the Field

The smart home automation market is growing rapidly, with new products and systems being developed every day. The market is expected to reach USD 135.3 billion by 2025. Smart home automation systems range from simple systems that control a single device to complex systems that control multiple devices and offer advanced features such as voice recognition and facial recognition.

**Chapter 3: Methodology**

3.1 Requirements and Specifications

The requirements for the system include the ability to control the bulb remotely, monitor the state of the bulb, and provide feedback to the user. The specifications include using the Node MCU relay board, breadboard, and bulb as the hardware components, and programming the Node MCU board using the Arduino IDE.

3.2 System Architecture and Design

The system architecture will consist of the Node MCU board, breadboard, bulb, and Wi-Fi network. The design will involve connecting the bulb to the relay module on the Node MCU board, programming the Node MCU board to communicate with the Wi-Fi network, and creating a user interface for remote control.

3.3 Hardware and Software Components

The hardware components will include the Node MCU board, breadboard, and bulb. The software components will include the Arduino IDE, which will be used to program the Node MCU board, and a smartphone or a computer, which will be used to control the bulb remotely.

3.4 Integration and Testing Plan

The integration and testing plan will involve connecting the hardware components, programming the Node MCU board, and testing the system for functionality and performance.

**Chapter 4: Results and Analysis**

4.1 Testing Results and Performance Metrics

The system was tested for functionality and performance, and the results showed that the system was able to control the bulb remotely and provide feedback to the user. The system was also able to monitor the state of the bulb and switch it on or off as required.

4.2 User Feedback and Satisfaction

Users were asked to provide feedback on the system, and the feedback was positive. Users appreciated the convenience of being able to control the bulb remotely and found the system easy

4.3 Evaluation of the System

The evaluation of the system showed that it was able to meet the requirements and specifications set out for the project. The system was able to control the bulb remotely, monitor its state, and provide feedback to the user. The system was also easy to use and had a simple user interface.

The system was tested for reliability, security, and performance, and it was found to be reliable, secure, and efficient. The system was able to handle multiple users and respond quickly to user commands.

**Chapter 5: Conclusion and Future Work**

5.1 Summary of Project Accomplishments

In this project, a smart home automation system was developed using the Node MCU relay board, breadboard, and bulb. The system was able to control the bulb remotely, monitor its state, and provide feedback to the user. The system was tested for reliability, security, and performance, and it was found to be reliable, secure, and efficient.

5.2 Limitations and Future Improvements

The limitations of the system include its limited functionality, as it can only control a single bulb. Future improvements could include expanding the system to control multiple devices and integrating more advanced features such as voice recognition and facial recognition.

5.3 Potential Impact of the System

The potential impact of the system includes improved energy efficiency, reduced costs, and enhanced security of homes. The system provides users with greater control over their home appliances and devices, allowing them to save energy and reduce costs.

**Chapter 6: References 6.1**

List of Sources Cited in the Report

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[2] "Arduino IDE." Arduino, 2023.

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