International Journal of Advanced Research in Science, Communication and Technology



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International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal



Volume 5, Issue 8, March 2025

Home Automation using Arduino and Bluetooth Module

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Abstract: Home automation integrates technology to manage household systems, enhancing convenience and energy efficiency. Combining Arduino microcontrollers with Bluetooth modules facilitates costeffective and user-friendly solutions for remotely controlling appliances via Bluetooth-enabled devices. The Arduino serves as the central controller, receiving commands from smartphones and operating appliances through relay modules. Incorporating features like password protection and EEPROM storage enhances security and personalization. This integration offers an affordable approach to modernizing home automation systems.

Keywords: arduino uno, 1 channel relay(5v), bluetooth module hc05, power supply, load (bulb 220v), connecting wires, vero board, smartphone (bluetooth enabled)

I. INTRODUCTION

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. Have you ever wondered about home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using a remote control? Off-course, Yes! But, are the available options cost-effective? If the answer is No, we have found a solution to it. We have come up with a new system called Arduino based home automation using Bluetooth. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smartphone. Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system using Bluetooth . With the help of this system you can control your home appliances from your mobile phone. You can turn on/off your home appliances within the range of Bluetooth.

II. LITERATURE REVIEW

Integrating Arduino with Bluetooth technology enables the development of efficient home automation systems, allowing users to remotely control household appliances via smartphones or other Bluetooth-enabled devices. This setup typically involves an Arduino board as the central controller, a Bluetooth module (such as the HC-05) for wireless communication, relay modules to switch appliances on and off, and a smartphone application to send control commands.

III. METHODOLOGY

Integrating Arduino with Bluetooth technology enables the development of a home automation system that allows users to remotely control household appliances using a smartphone. The system comprises an Arduino board acting as the central controller, a Bluetooth module (such as HC-05) for wireless communication, relay modules to switch appliances on and off, and a smartphone application to send control commands. This setup offers convenience and flexibility in managing home devices

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DOI: 10.48175/IJARSCT-24578



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Volume 5, Issue 8, March 2025



Hardware component related information:.

1. Arduino Uno – The micro controller that processes data from the soil moisture sensor and controls the display.



2. Channel Relay – Relays are used wherever it is necessary to control a high power or high voltage circuit with a low power circuit, especially when galvanic isolation is desirable.



3. Bluetooth Module – HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module,designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication.



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4. 9V Rechargeable Battery – To operates the Soil Moisture Sensor successfully, it requires a current supply other than connecting it to computer. Thus, the 9V battery is used as the dry cell to supply the current.



IV. WORKING PRINCIPLE

- 1. Bluetooth Module (HC-05) connects to the smartphone for communication.
- 2. The smartphone sends control commands (e.g., 1 for ON, 0 for OFF) to the Bluetooth module.
- 3. The Arduino receives the commands via serial communication from the Bluetooth module.
- 4. The Arduino processes the commands and sends a signal to the relay.
- 5. The relay switches the connected high-voltage appliance (e.g., light, fan) ON or OFF.
- 6. The appliance is controlled remotely via Bluetooth commands from the smartphone.

V. RESULTS

1. Remote Control of Appliances: Appliances such as lights, fans, or other electrical devices can be turned ON/OFF remotely using Bluetooth commands from a smartphone.

2. Wireless Communication: Bluetooth allows wireless control, eliminating the need for physical switches.

3. Energy Efficiency: Appliances can be controlled more efficiently, potentially reducing energy consumption by turning them off when not needed.

4. Convenience: The system provides easy, convenient control of home appliances from a distance.

5. Safe Operation: The relay module provides electrical isolation, ensuring the Arduino can safely control high-voltage appliances.

6. Real-time Control: Commands from the smartphone are instantly executed by the system, ensuring real-time control over the appliances.

VI. CONCLUSION

The system as the name indicates, 'Home automation' makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we integrate mobile devices into home automation systems. A novel architecture for a home automation system is proposed using the relatively new communication technologies. The system consists of mainly three components is a BLUETOOTH module, Arduino microcontroller and relay circuits. WIFI is used as the communication channel between android phone and the Arduino microcontroller. We hide the complexity of the notions involved in the home automation system by including them into a simple, but comprehensive set of related concepts. This simplification is needed to fit as much of the functionality on the limited space offered by a mobile device's display. This paper proposes a low cost, secure, ubiquitously accessible, auto- configurable, remotely controlled solution. The approach discussed in the paper is novel and has achieved the target to control home appliances remotely using the WiFi technology to connects system parts, satisfying user needs

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DOI: 10.48175/IJARSCT-24578



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and requirements. WiFi technology capable solution has proved to be controlled remotely, provide home security and is cost-effective as compared to the previously existing systems. Hence we can conclude that the required goals and objectives of home automation system have been achieved. The system design and architecture were discussed, and prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

VII. ACKNOWLEDGMENT

We would like to express our sincere gratitude to Vishweshwarayya Abhiyantriki Padvika Mahavidyalaya, Almala, for providing us with the necessary resources and guidance to successfully complete this research on "HOME AUTOMATION USING ARDUINO & BLUETOOTH MODULE"

We extend our heartfelt appreciation to our mentor, Prof. Sugre D. D., for his continuous support, valuable insights, and expert advice throughout the development of this project. His encouragement and constructive feedback played a crucial role in shaping our research.

We are also grateful to our peers and faculty members for their valuable discussions and suggestions, which contributed to the improvement of our project.

Finally, we extend our special thanks to our families and friends for their unwavering support and motivation during the research and development process.

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DOI: 10.48175/IJARSCT-24578

