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Smart Home Automation System using Bluetooth

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ABSTRACT: The **Smart Home Automation System using Bluetooth** is designed to make it easier to control household electrical appliances using a smartphone. In many homes, appliances like lights, fans, and other devices are still operated manually through wall switches. This can sometimes be inconvenient, especially when multiple devices need to be controlled.

This project provides a simple solution by allowing users to control home appliances through an **Android mobile application** using Bluetooth communication. The mobile application is developed using **Android Studio** and connects to a Bluetooth module installed in the hardware system.

The hardware unit includes a **microcontroller, Bluetooth module, and relay circuits**. When the user presses a button in the mobile application, a command is sent through Bluetooth to the microcontroller. The microcontroller then processes the command and turns the connected appliance ON or OFF using relays.

This system makes home appliance control more convenient and efficient. It also reduces the need for complex wiring and expensive automation systems. Since Bluetooth communication is used, the system is affordable and suitable for small home automation setups.

KEYWORDS: Smart Home Automation, Bluetooth Communication, Android Application, Bluetooth Module, Microcontroller, Relay Module, Wireless Control

I. INTRODUCTION

New technologies are constantly evolving and fresh inventions are being created all the time. In recent years, one of the biggest changes in automation, especially home automation, has been the ability for people to control their home appliances or devices either automatically or from a distance.

In most houses, things like lights, fans, and other electrical gadgets are turned on or off using switches by hand. This approach works well, but sometimes it can be a little frustrating. For instance, if a user wishes to activate or deactivate an appliance, they must physically visit the switchboard to perform the action.

Home automation systems help address this issue by allowing users to control home devices using their smartphones. These systems make things easier and help use electricity more smartly.

A smart home automation system that uses Bluetooth provides an easy and affordable way to control home devices. In this setup, an Android phone links up with a Bluetooth module that's part of the hardware system.

The hardware consists of a microcontroller, a Bluetooth module, and relay circuits used to control electrical devices. When a user sends a command via the mobile application, the Bluetooth module receives the signal and forwards it to the microcontroller. The microcontroller then switches the appliance on or off.

This project demonstrates how wireless communication and embedded systems can be used to create a basic and useful home automation system.

II. LITERATURE REVIEW

The Smart home automation has become an important area of research due to the increasing demand for convenient and intelligent living environments. Many researchers have developed systems that allow users to monitor and control

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household appliances using different wireless technologies. Various communication methods such as **Wi-Fi, ZigBee, GSM, and Bluetooth** have been used in home automation systems. Among these technologies, Bluetooth is widely used because it is inexpensive, consumes less power, and is available in almost all smartphones.

Several studies have shown that mobile-based automation systems can make it easier for users to manage home appliances. In many systems, a microcontroller is used along with a wireless communication module to receive commands from a smartphone application.

Bluetooth modules like **HC-05 and HC-06** are commonly used for this purpose. These modules allow smartphones to communicate with microcontrollers. The microcontroller receives the command and controls electrical devices using relay switches.

Some advanced home automation systems also use internet-based technologies that allow remote access from anywhere. However, these systems often require more complex setups and higher costs. For simple home automation needs, Bluetooth-based systems are more practical and affordable. Therefore, this project focuses on developing a **Bluetooth-based smart home automation system** that is easy to use and cost-effective.

III. PROBLEM DEFINITION

In many houses, people turn on and off electrical devices by using switches on the walls. While this method is simple, it can sometimes be inconvenient for users or may lead to accidents.

For example, users have to go to the switchboard every time they want to turn on or off an appliance. This can be tough for older adults or people who have physical disabilities.

If the switch is damaged, attempting to turn the appliance on or off may result in a short circuit.

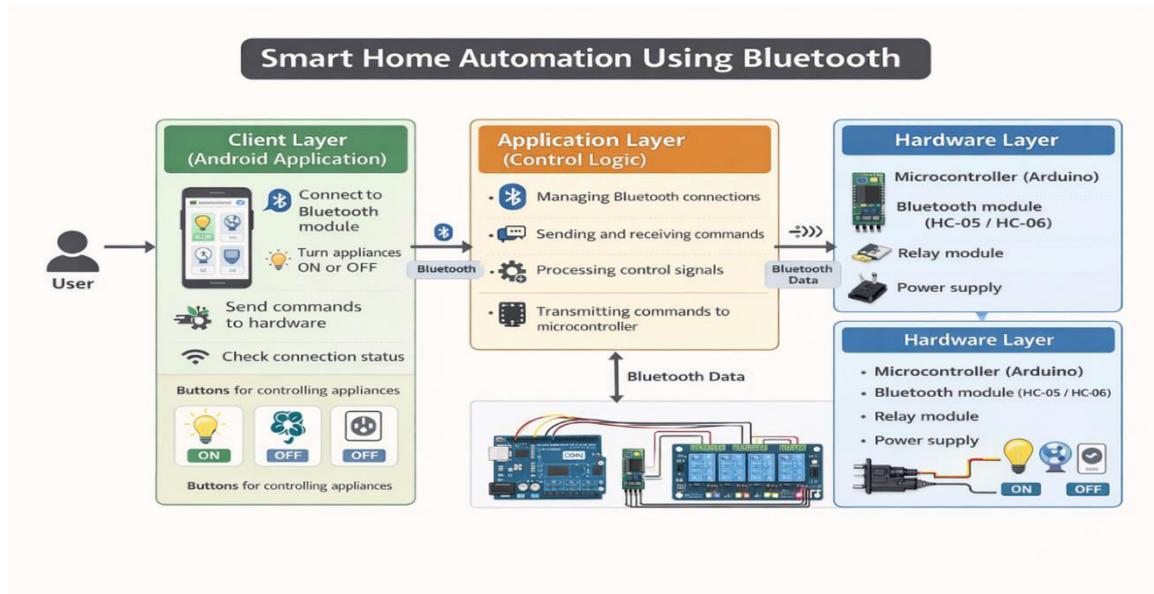
Another issue is that old systems don't have any automatic features. If someone leaves an appliance running, it can cause extra use of electricity.

Despite the availability of advanced home automation systems, many of them require internet connectivity, come with expensive hardware, and involve complex installation processes. Because of this, they might not work well for small projects or ones with limited money.

So, there's a need for an easy and cheap way that lets people control their home devices from their phone without any wires. The new Smart Home Automation System that uses Bluetooth is meant to fix this issue by offering a simple and affordable way to solve it.

IV. SYSTEM ARCHITECTURE

The Smart Home Automation System follows a three-layer client-server architecture, as shown in the diagram. The architecture is divided into the Client Layer (Android Application), Application Layer (Control Logic), and Hardware Layer. Each layer has a specific role in processing and managing data.



1. Client Layer (Android Application)

The Client Layer is the mobile app that was created using Android Studio.

Through this application, users can:

- Connect mobile-phone with the Bluetooth module
- Turn ON or OFF the appliances
- Send commands to the hardware system
- Check connection status

The user interface includes buttons for controlling various appliances.

2. Application Layer (Control Logic)

The Application Layer handles the interaction between the mobile app and the hardware system.

Its main functions include:

- Managing Bluetooth connections
- Sending and receiving commands
- Processing control signals
- Transmitting commands to the microcontroller

This make sure the commands sent from the mobile app reach the hardware correctly.

3. Hardware Layer

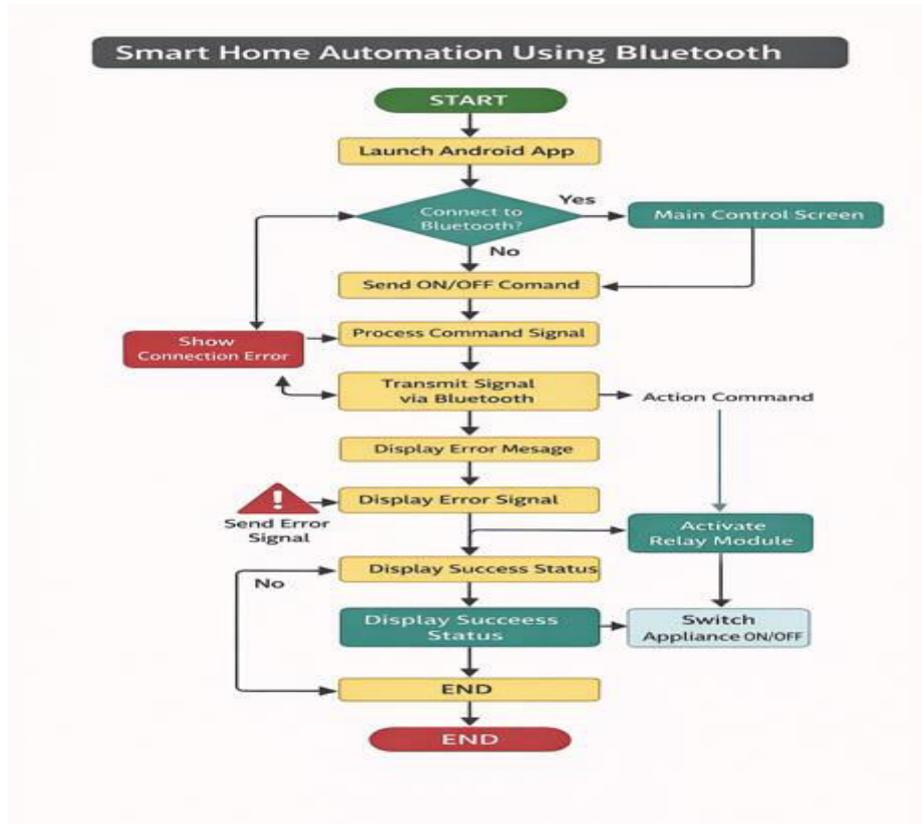
The Hardware Layer consists of the electronic components that control the appliances.

Main components used in this system are:

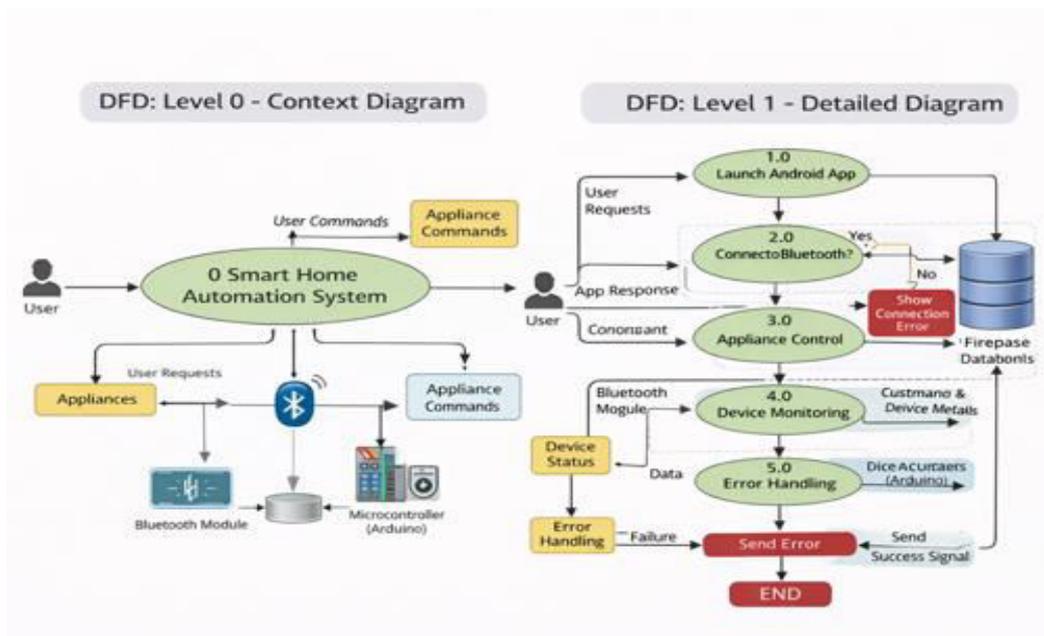
- Microcontroller (Arduino)
- Bluetooth module (HC-05 / HC-06)
- Relay module
- Power supply

The microcontroller gets instructions from the Bluetooth module and uses the relays to turn appliances ON or OFF.

V. SYSTEM FLOWCHART



Module Work Flow



VI. APPLICATION**1. Home Appliance Control**

Users can use their smartphone to manage various household appliances like lights, fans, and other electrical devices. The system allows:

- You can turn appliances on or off from a distance using Bluetooth, as long as you're within the Bluetooth range.
- Controlling multiple devices from a single application
- Reducing the need and risks to manually operate switches

2. Energy Management

The system helps in managing electricity usage efficiently. It allows users to:

- Turn OFF unused appliances easily
- Reduce unnecessary power consumption
- Improve overall energy efficiency in the home

3. Convenience and Accessibility

This system is very useful for improving daily work. It helps:

- Elderly people who may find it difficult to reach switches
- Physically challenged individuals
- Users who want quick and easy control of devices

4. Wireless Communication

The system uses Bluetooth technology for communication between the mobile application and hardware. It provides:

- Simple and fast connection
- No need for internet or Wi-Fi
- Low-cost wireless control solution

5. User-Friendly Mobile Application

The Android application is designed with a simple interface so that users can:

- Easily connect to the Bluetooth module
- Control appliances using buttons
- View connection status

6. Home Safety and Control

The system improves safety by allowing better control of electrical devices. It helps in:

- Quickly turning OFF appliances when not needed
- Reducing chances of electrical accidents
- Managing devices efficiently

7. Low-Cost Smart Home Solution

This system is suitable for small homes because:

- It uses affordable components like Bluetooth modules and relays
- It does not require expensive infrastructure
- It is easy to install and maintain

Sample Dataset And Performance Analysis

The evaluation of the Smart Home Automation System was carried out by testing the system over a period of time in a home environment. The system performance was compared with the traditional manual method of controlling appliances.

The proposed system shows improvement in terms of response time, convenience, energy efficiency, and overall control of devices.

Parameter	Manual System	Proposed System
Device Control	Manual Switch	Mobile Application
Response Time	5–10 seconds	1–2 seconds
Energy Efficiency	Low	High
Convenience	Limited	High
Operation Effort	More (Physical movement required)	Less (Controlled via smartphone)
Data/Control Accuracy	Moderate	High
System Flexibility	Low	High

VII. CONCLUSION

The Bluetooth-based Smart Home Automation System provides an efficient and user-friendly way to control household appliances. It replaces traditional manual methods with a wireless solution using a smartphone. The system is built using an Android application, Bluetooth communication, and microcontroller-based hardware. It improves convenience, reduces energy consumption, and offers a cost-effective solution. In the future, the system can be enhanced by integrating Wi-Fi, voice control, and IoT technologies. This will allow users to control appliances remotely from anywhere.

REFERENCES

- [1] K. Rose, S. Eldridge, and L. Chapin, "The Internet of Things: An Overview," Internet Society (ISOC), 2015. <https://ieeexplore.ieee.org/document/7879168>
- [2] N. Thombare et al., "IoT Based Smart Home Automation System using Bluetooth," *International Journal of Scientific Research in Science and Technology*, 2025. <https://ijsrst.com/index.php/home/article/view/IJSRST2513116>
- [3] J. Etxaniz and G. Aranguren, "Bluetooth Low Power Modes Applied to Home Automation Systems," *Sensors Journal*, 2017. <https://pmc.ncbi.nlm.nih.gov/articles/PMC5469350/>
- [4] A. R. Al-Ali and M. Al-Rousan, "Java-Based Home Automation System," *IEEE Transactions on Consumer Electronics*, vol. 50, no. 2, pp. 498–504, 2004. <https://ieeexplore.ieee.org/document/1304399>
- [5] K. Gill, S. H. Yang, F. Yao, and X. Lu, "A ZigBee-Based Home Automation System," *IEEE Transactions on Consumer Electronics*, vol. 55, no. 2, pp. 422–430, 2009. <https://ieeexplore.ieee.org/document/5046834>
- [6] M. Collotta and G. Pau, "A Novel Energy Management Approach for Smart Homes Using Bluetooth Low Energy," *IEEE Journal*, 2015. <https://ieeexplore.ieee.org/document/7113787>
- [7] R. Want, B. Schilit, and S. Jenson, "Enabling the Internet of Things," *Computer Journal*, vol. 48, no. 1, pp. 28–35, 2015. <https://ieeexplore.ieee.org/document/7014024>
- [8] D. Cook and S. Das, *Smart Environments: Technology, Protocols and Applications*, Wiley, 2004. <https://ieeexplore.ieee.org/document/1231195>
- [9] H. Ardam and I. Coskun, "A Remote Controller for Home and Office Appliances by Telephone," *IEEE Transactions on Consumer Electronics*, vol. 44, no. 4, pp. 1291–1297, 1998. <https://ieeexplore.ieee.org/document/735135>



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