

# Connecting Home Appliances via Bluetooth using IoT

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## Abstract-

Internet of Things (IoT) technology and business opportunities are rising, with standards for wireless communication between everyday objects and gadgets, often referred to as "things," expanding in importance. This study aims to examine and design a Bluetooth-based smart home system. To use conventional technology to create a product that will be beneficial to the lives of others is a significant act of philanthropy. In the prototype, the microcontroller utilized is an Arduino UNO with an inbuilt Bluetooth interface, which may control and manage the household electrical equipment.

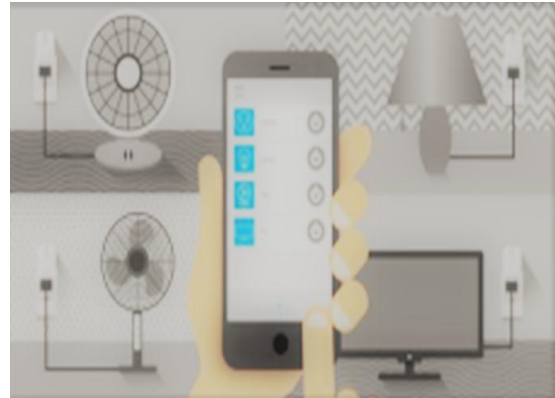


Figure 1: Demonstration

## 1. INTRODUCTION

The Internet of Things encompasses many consumer applications, including Home Automation. Wireless technologies such as Wi-Fi, Bluetooth, and others control smart homes. The android device will get control of the appliance from the user, and the microcontroller is linked to it. The user may use their smartphone to manage many home appliances by simply turning on and off the different devices indicated in Figure 1 linked to and controlled by the Arduino through Bluetooth. The user will be completely at ease since the appliances do not need a physical operation; it is similar to altering the temperature of your room's A.C. through remote. As a result, the problem of home security and automation may be solved simply by utilizing the same set of technologies. It is possible to gather and share data between PAN-linked objects. Devices and machinery may be remotely controlled and monitored by the user. Bluetooth's range is too small to operate the electrical appliances from a distant point. This means that operations such as turning on the fan from outside the home cannot be performed, but it is more secure.

In this work, we attempt to address the challenges that current home systems encounter when disclosing information on the use patterns of many users. Intelligent buildings and safe home automation are coupled in this article to create a better solution for the user while yet being simple. The study report will look at their many features and advantages when comparing and contrasting current systems with this Bluetooth Home Automation System.

The problems faced by ongoing home systems in providing information about the circumstances of having multiple users access to the system is tried to overcome in this paper. In this paper, both smart building and secured home automation systems are merged which make them more comfortable and provide a better solution to the user & combined with simplicity. This research paper will compare and contrast the existing systems with this Bluetooth Home Automation System and look at their various features and advantage over the existing systems.

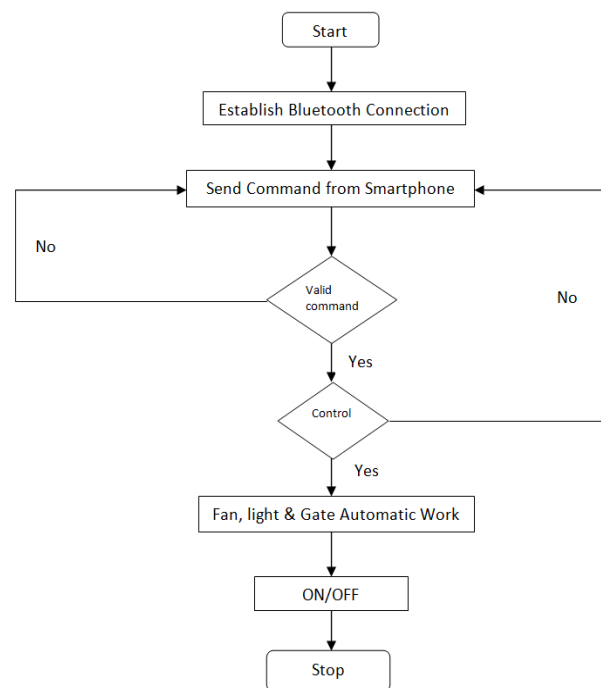


Figure 2: Flowchart

## 2. METHODOLOGY

Bluetooth links the Arduino UNO and the phone in this home automation system to control the LED, fan, and garage gate. In this case, the Arduino is directly linked to the household appliances, and a Bluetooth-based wireless connection is formed between the Arduino and the smartphone. The board's input/output or digital pins may connect devices.

Rx and Tx pins of the Bluetooth module HC-05 receive and transmit data signals from the app to the microchip. In order to control the appliances, Arduino is programmed in the Arduino IDE according to requirements. This, in turn, does various arithmetic and logical operations. It includes a library file called "Software serial" connecting the Arduino and Bluetooth module.

In order to program the Arduino, we utilize the void setup() and void loop() methods, which describe how the pins where appliances are attached should act as outputs and how the instruction to turn on or off the device should be set, respectively. The android app sends orders to the Arduino boards, which act as a guide.

## 3. ARCHITECTURE

A versatile, effective, safe, and secure architecture is the goal of this project. The ultimate goal is to automate as much of the process as feasible while minimizing the need for human interaction.

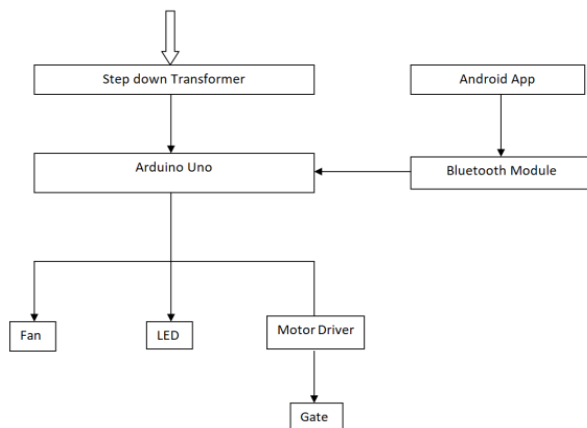


Figure 3: Architecture

The user requires an android app for controlling appliances with a Bluetooth connection. This allows for the simultaneous operation of many devices. The following are the three essential components of this home automation model:

- a) Arduino Uno
- b) Bluetooth HC-05
- c) Motor Driver

## 4. DESCRIPTION OF HARDWARE

### 4.1. Arduino UNO:

This model's primary component is an Arduino Uno microchip, a type B USB interface, a power jack, and a reset button. The board's digital pins, specified during encoding, link HC-05, and other devices. It is often written in C or C++ in the Arduino IDE.

### 4.2. HC-05:

The HC-05 serial port protocol Bluetooth module is utilized to link Arduino to Android apps. Upon receiving an instruction from the user, the microchip processes it. It contains Rx and Tx pins for receiving and transmitting serial data from the user. Using the Enable key pin, you may toggle between the low (Data mode) and high (Power mode) settings (AT command mode).

### 4.3. Motor Driver:

Compared to the motor, the microcontroller runs on a much lower current. As a result, an external 9V power supply is employed to boost a low current signal into a greater recent call, allowing the Gate's motor to run smoothly. Figure4 shows a prototype model that includes all components and household appliances, such as LED, Fan, and a Gate.

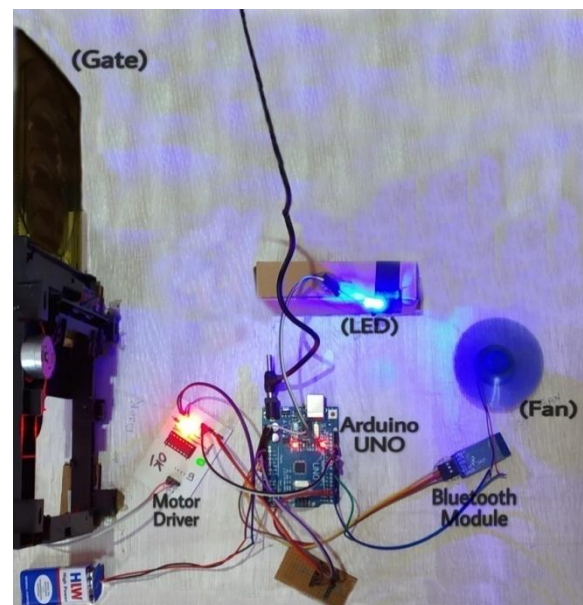


Figure 4: Prototype Model

### 5. COMPARISON WITH EXISTING SYSTEMS (WIFI BASED)

<u>Factors of comparison</u>	<u>Wifi Module</u>	<u>Bluetooth Module</u>
Range	50-100 meters	0-10 meters
Networking topologies	Point to hub	Ad-hoc, very small networks
Operating frequency	2.4 and 5 GHz	2.4 GHz
Power consumption	High	Medium
Cost	High	Low
Flexibility	Multiple users	Limited users

Figure 5: Comparison table

Due to Bluetooth's low range, only a few people may access the appliances. Still, anybody with the Wi-Fi module's password can control the device, making the Bluetooth system more secure than the Wi-Fi system. In the worst-case situation, an attacker with access to the Wi-Fi network may take control of the appliance and create problems for the user, while only one device can be linked to a Bluetooth module at a time. Data breaches and leaks over the internet are a possibility with Wi-Fi-based systems; however, Bluetooth doesn't need internet access. As a result, a Bluetooth-based home automation system is more secure in these situations.

### 6. RESULT

The outcome of this research is a smart, automated house system based on the planned plan. Using an app, users can quickly operate common household items like fans, lights, and garage gates without any personal interaction. The primary goal of this project is to create a safe home automation system that prevents unauthorized users or intruders from accessing the system. The Arduino UNO, HC-05, and Motor Driver are among the hardware components described in this article.

### 7. CONCLUSION

The general public learns more about home automation as it grows in popularity. In addition to being friendly to users, this approach also makes things simpler for everyone. There will be many changes even if home automation becomes the norm in the next few years. This project introduces a new approach to smart home technology that many manufacturers will use. Rather than a single piece of technology, smart homes are a collection of many technologies and apps that may be utilized to protect and manage a home with ease. The Arduino microcontroller was used to operate Bluetooth-based Android apps that controlled lights, fans, and a garage gate as part of this project.

### 8. FUTURE SCOPE

Many more possibilities for a highly secure home system and numerous other features, such as controlling a garage gate without getting out of your automobile, may be implemented using this suggested system. People who are in a rush would benefit from this. People with physical disabilities or who work in hazardous environments may benefit from a modified approach to fit their needs.

In addition to allowing consumers to operate their electrical equipment from afar, smart home as a service may also help them keep track of their energy use. There has also been an effective increase in the market for home automation because of the rising need for up-to-date security and surveillance systems.

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