St. Francis Institute of Technology

Department of Information Technology

SNL Mini Project (ITL604)

Academic Year 2020-21

Remote Access Home Automation

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Introduction

- A Wireless Sensor Network (WSN) can be defined as a network of small embedded devices, called sensors, which communicate wirelessly following an ad hoc configuration

- Wireless technologies are becoming more popular around the world and the consumers appreciate this wireless lifestyle.

Figure 1 Depicting the Home Automation

Introduction (Contd.)

- Home automations are one of the major applications of wireless technologies which involves the monitoring and control of activities such as lighting, heating, ventilation, air conditioning (HVAC) etc.

- For that the millions of people affected by disabilities and the elderly people, it can make a life changing difference.

- Any disabled person can control appliances in his house with ease.

- The project aims to develop a Home Automation system.

Literature Survey

Table-1 : Literature Survey

Ref. No.	Title	Abstract	Advantages	Disadvantages
[1]	Home Automation System with Pattern Recognition	In the system, Arduino will be interfaced with multiple sensors that can measure temperature & humidity, light, motion, and so on. The data collected by the various sensors is stored and a pattern analysis is done on the stored data.	The system is energy efficient as it will have the ability to automatically switch on/off appliances based on regular usage pattern.	This system is expensive to implement and maintain.
[2]	Smart Home Automation towards the Development of Smart Cities	The home automation system is indeed a system that offers a mobile application to monitor it through the smartphone or tablet. It can control home appliances like light, fans, air conditions, and smart security locks, etc. Bluetooth or **Wi-Fi** is used for remote control of things	Several operations were both, simple and extremely low-cost. The system will also: -Reduce manual power -Work efficiently and effectively. -Work in real-life time.	Relay driver is used which is costly and also needs a transistor connected across which increases cost.

Literature Survey

Table-2: Literature Survey

Ref. No..	Title	Abstract	Advantages	Disadvantages
[3]	Home Appliances Controlling using Raspberry Pi on Webpage	This Home automation system provides the user with remote control of various lights and appliances within their home using **Raspberry Pi**.. This system is designed to be low cost and expandable allowing a variety of devices to be controlled.	Low cost and expandable. Convenient as devices are controlled using smartphones Reduces electricity wastage	Internet/ Ethernet dependent.
[4]	Arduino Uno based Wireless Home Appliance Status Intimation Control and System.	This paper presents a cloud based low cost home automation system implemented using **NodeMCU** and Arduino Uno. The remote monitoring aspect of this project demonstrates the ability of being able to know what is going on with different systems at home which can be used for control and safety	Low costs,scalable system and can be controlled with mobile devices.	It uses wifi module and requires an active internet connection to work.

Literature Survey

Table-3 : Literature Survey

Ref. No..	Title	Abstract	Advantages	Disadvantages
[5]	Implementation of Arduino Based House Automation using Bluetooth, infrared	In **IR**-based House Appliances Control System is a control system using which the user can control different home appliances with a remote controller.	House automation with infrared (IR) makes the system more flexible and Provides attractive user interface compared to other home automation systems.	Less scalable and complex circuit with lot of cabling is major drawback of this system.
[6]	Arduino based Low-Cost Real-Time Home Automation and Smart Security System	This paper presents an IOT based real-time home automation and security system using Arduino UNO and **ESP8266 WiFi module** which makes the system cost-effective and portable. It is used for controlling and monitoring home appliances from anywhere in the globe using MQTT server.	This system is convenient for the physically disabled people to monitor and control the home appliances by computer technology	The system depends on Internet and may fail due to network issues. Also,the broker cannot perform intelligent routing.

Research Gaps

1. Cannot control more than 1 appliance.
2. Due to usage of Wifi module a network connection is required to access and control appliances.

Problem Statement and Objective

Problem Statement:

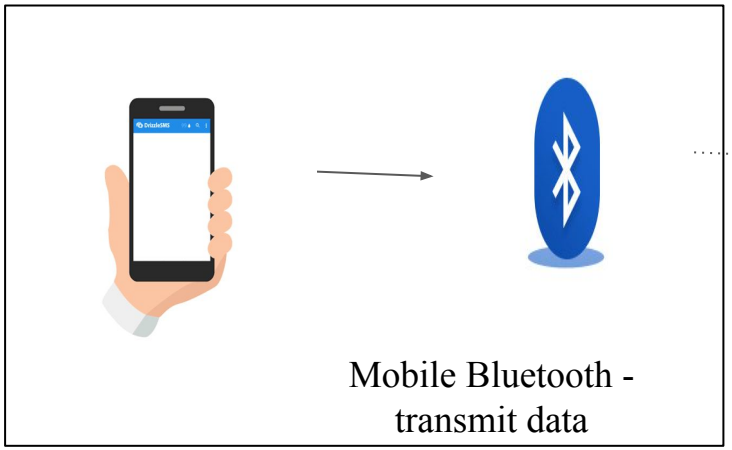
To develop a Bluetooth based Home Automation System to manage and control home appliances using an android based application.

Objective:

1. To interface bluetooth module and relay module with appliances .
2. To configure Arduino Bluetooth controller application to control appliances remotely.

System Design

Mobile App

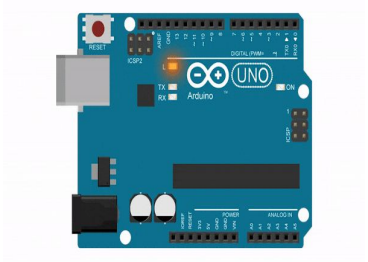


Mobile Bluetooth - transmit data

Remote Access to control Home Appliances

HC-05 Bluetooth Module - receive data

Arduino



Relay

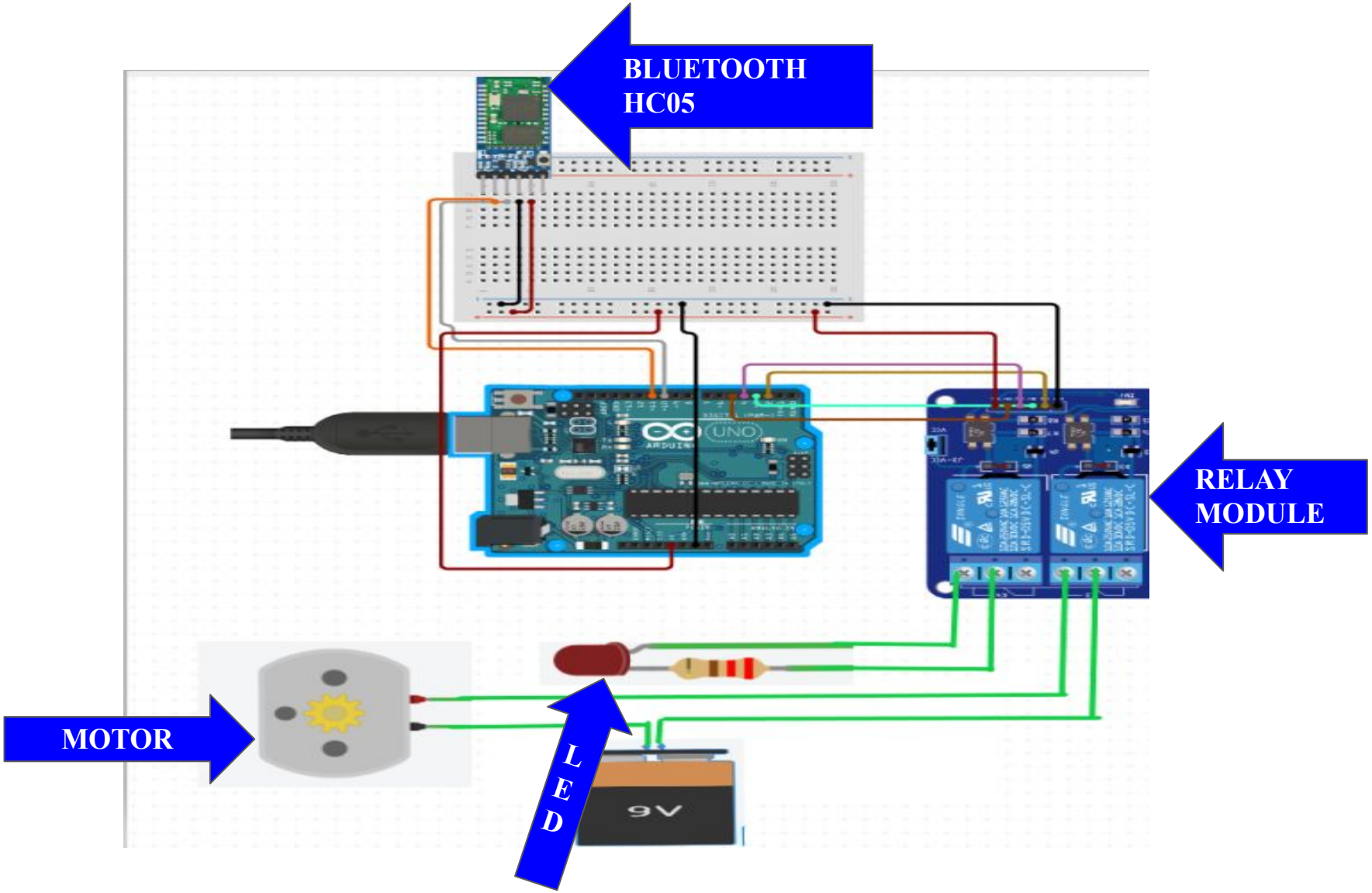
LIGHT

FAN

ROOM

HOME APPLIANCES

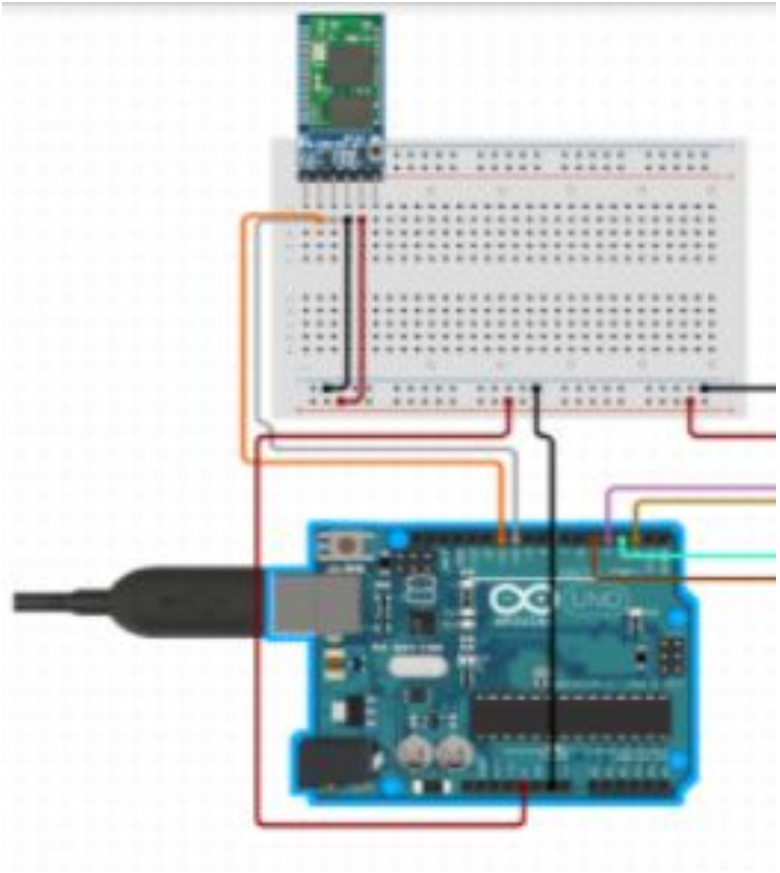
Circuit Diagram



Pin Configuration

Interface of arduino with bluetooth module HC-05

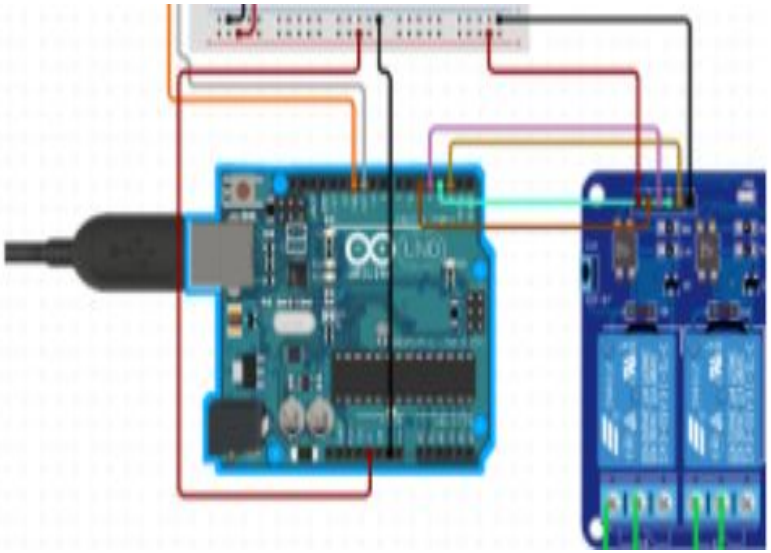
Bluetooth module pins	Arduino pins
Vcc	5v
GND	GND
Rx	Tx
Tx	Rx



Pin Configuration (Contd.)

Interfacing relay module with arduino

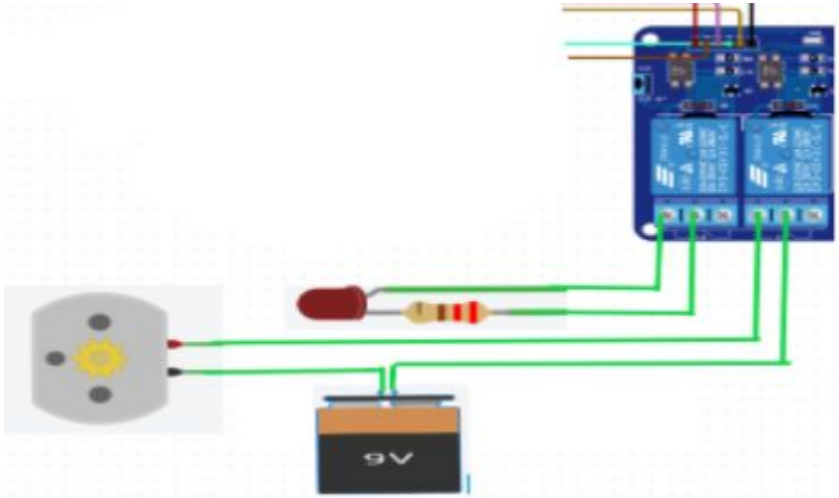
Relay module pins	Arduino pins
Vcc	5v
GND	GND
IN1	2
IN2	3



Pin Configuration (Contd.)

Connect desired appliances circuit to 2 way relay module

Relay module pins	Appliance circuit
COM1	One end of Led circuit
NC1	Another end of Led Circuit
COM2	One end of motor circuit
NC2	Another end of motor Circuit



Novelty

- The Remote access home automation system enables controlling of home appliances remotely using 802.15.1.
- The system can be implemented in any home or even old aged handicapped facilities.
- Instead of using GSM or Wifi module we used bluetooth module to control appliances remotely.
- We also incorporated relay module to control multiple appliances.

System Requirements

- ***Hardware***

Sr.No	Name of Component	Price per unit	No. of units	Total price
1	HC-05 Bluetooth module	98	1	98
2	Power supply 9v	100	1	100
3	Arduino UNo	437	1	437
4	Breadboard	200	1	200
5	Jumper wires	200	-	200
6	LED	20	1	20
7	Resistor	10	1	10
8	5v 1a Motor	120	1	120
Total Cost				INR 1185

System Requirements

- **Software**

Sr.No	Software	Cost
1.	OS: Windows 10	Open Sourced
2.	For Simulation: circuito.io	Open Sourced
3.	Arduino IDE 1.8.13	Open Sourced

Outputs

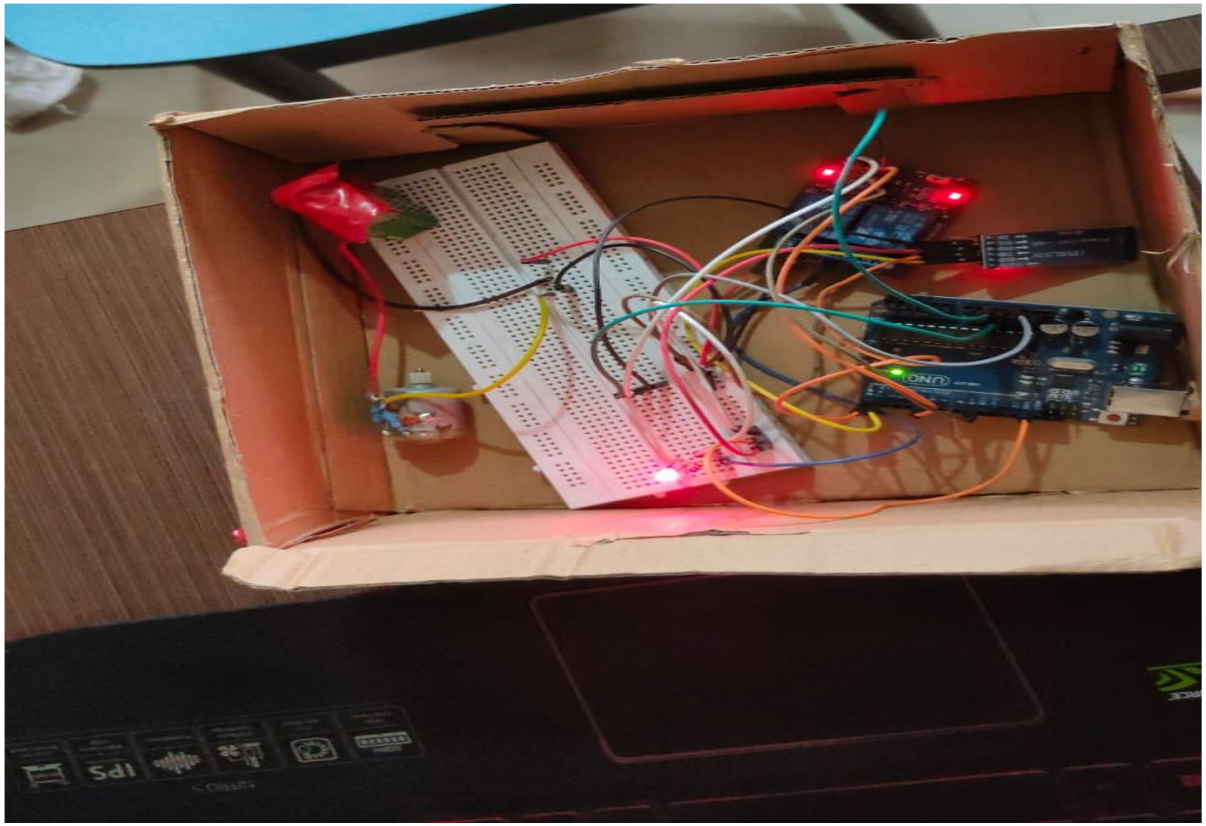


Fig.2 LED and Motor ON

Outputs

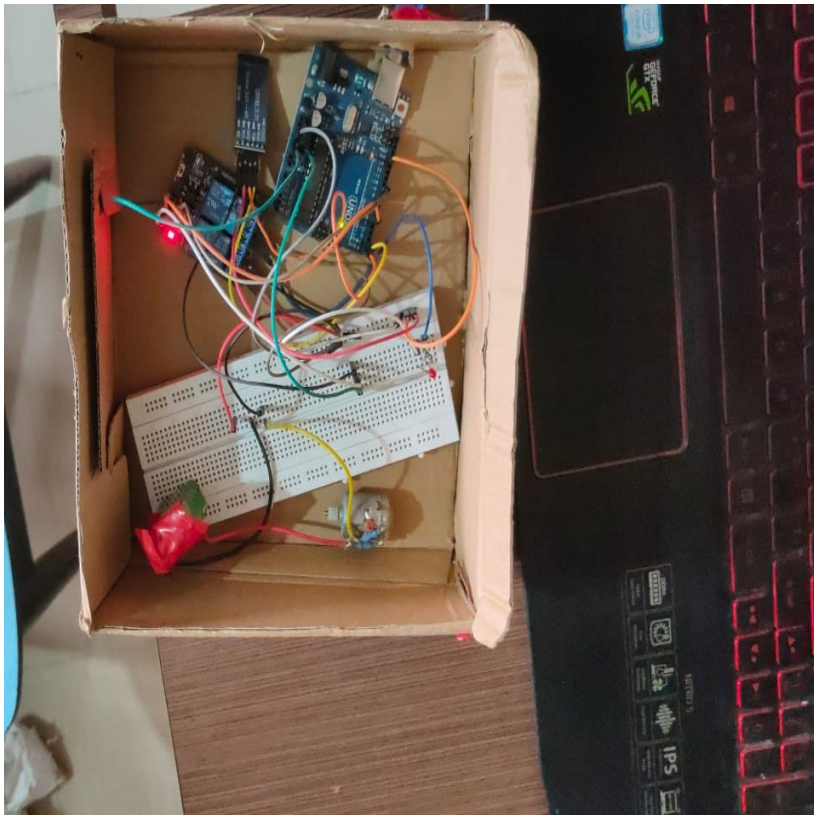


Fig.3 LED OFF and Motor ON

Outputs

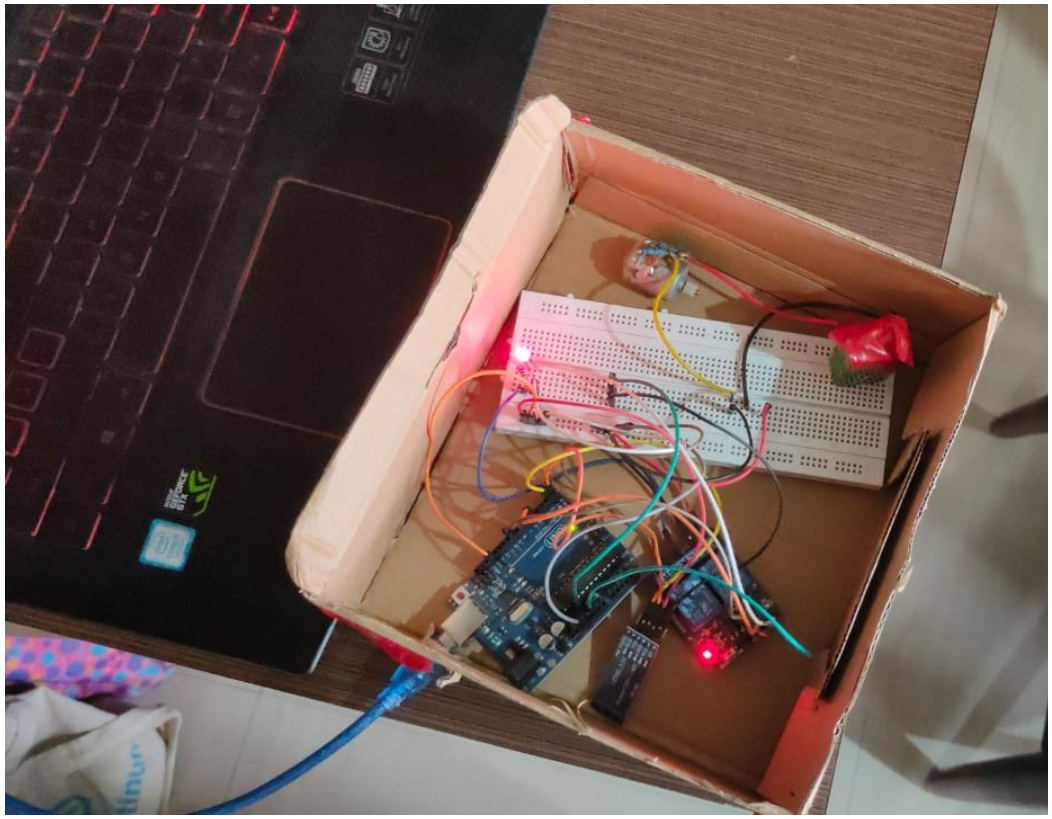


Fig.4 LED ON and Motor OFF

Video

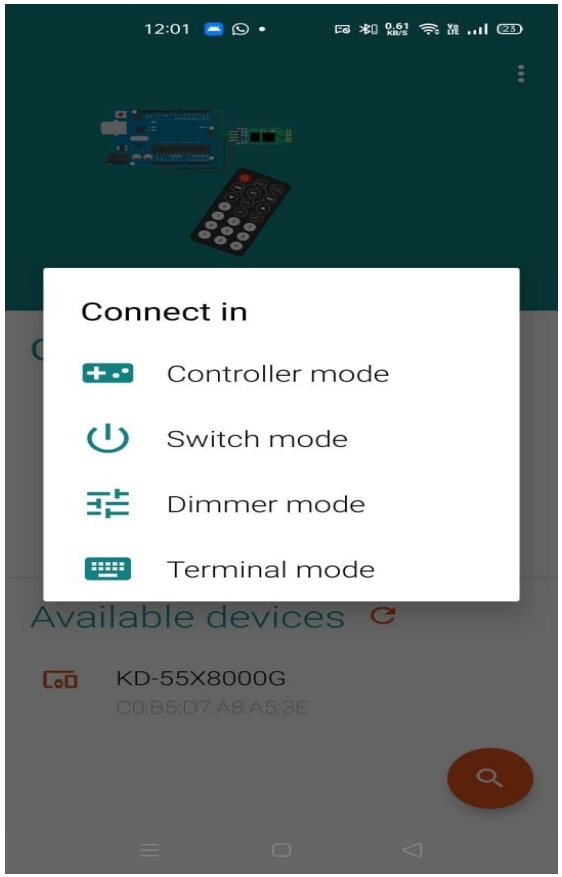
Future Scope and Application Areas

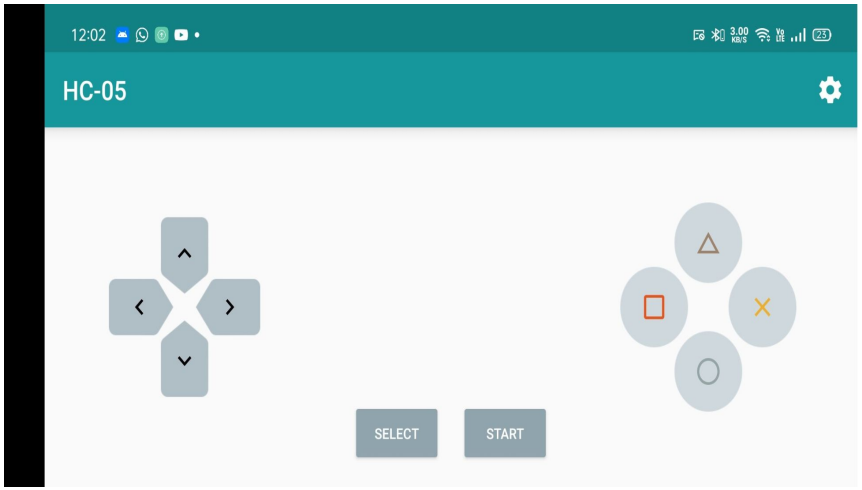
- This System can be used in homes to control appliances remotely in an easy and efficient way.

- For the handicapped and physically challenged who may find it difficult to manually press a switch.

Implementation Snapshots

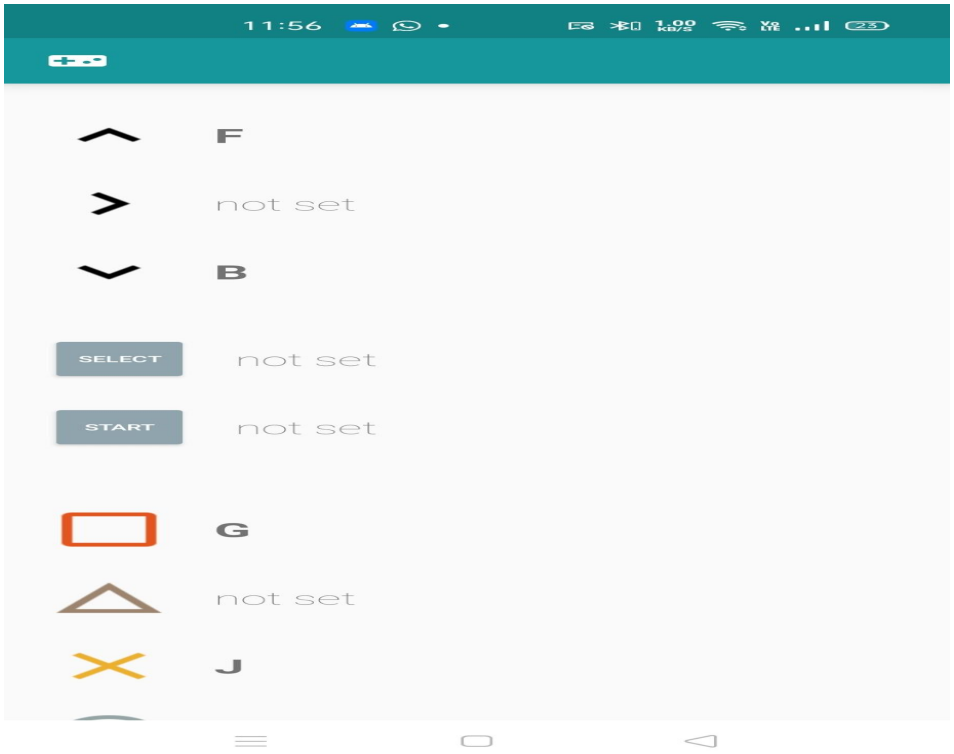
Connecting to bluetooth module from app (controller mode)



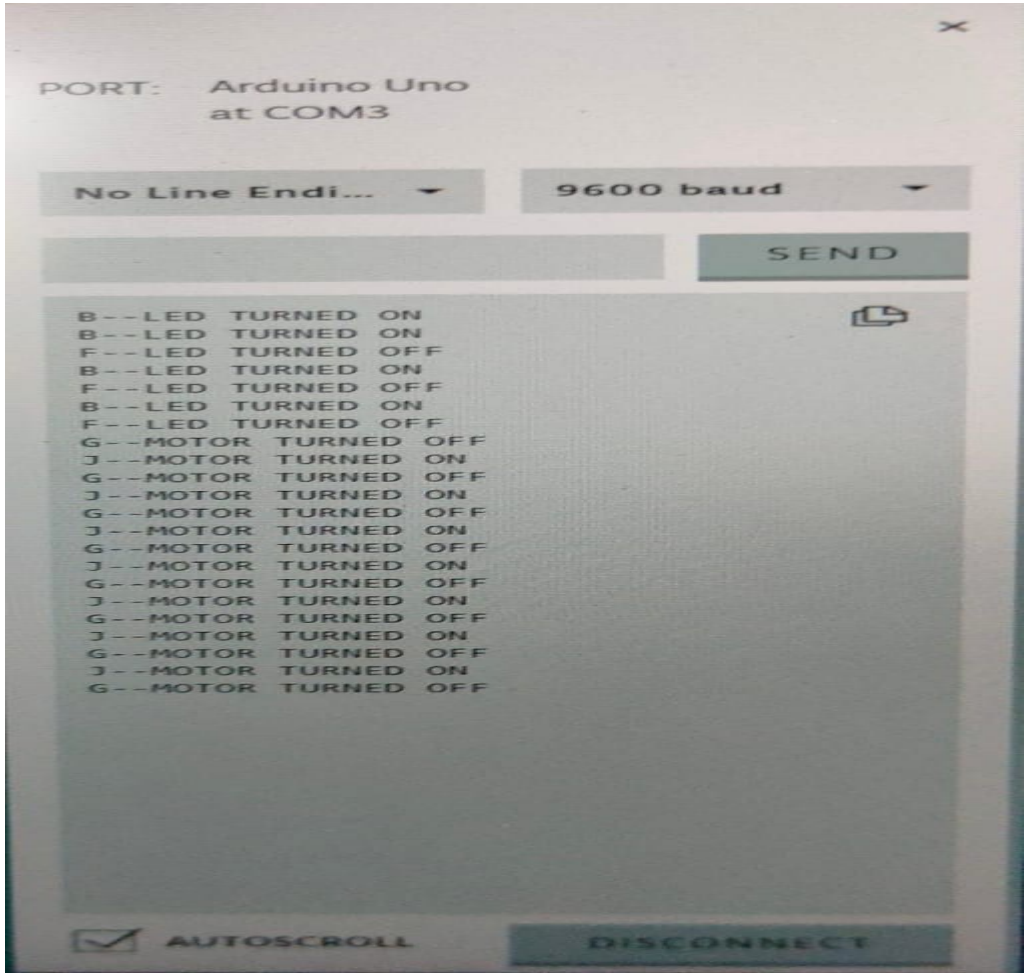


Implementation Snapshot

Configure the app buttons to send desired commands to HC-05



Output Snapshot



Serial Monitor output

Conclusion

The project aims to develop a Remote Access Home Automation system using bluetooth technology and Arduino Uno which enables to control the turning on/off various home appliances from an android app i.e. Lights, Fans, etc using a mobile device.

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THANK YOU!

QUESTIONS??