Voice-Controlled IR Blaster System

Group 37 (Friday)

Introduction

In this Tinkering Lab (GE107) project, we will present a voice controlled, WiFi-enabled IR blaster system using the ESP32S Wroom microcontroller. It allows users to control infrared (IR) remote based devices, such as TV set top boxes. It works with the help of simple HTTP requests sent from a phone or any browser. For our demonstration, we have used a phone. The core idea is to send IR signals via an IR Transmitter, which can allow us to perform functions like power toggle, channel switching, and volume control

It completely eliminates the need for physical remote. By making use of the ESP32's WiFi capabilities and the IRremoteESP8266 library, the we can deliver an accessible, low-cost smart home solution for remote control automation

Components List

- ESP32 Microcontroller

It serves as the central controller with inbuilt Wi-Fi, processing HTTP requests and triggering IR signals according to voice commands through the HTTP Shortcuts app

- IR Transmitter Module (Vishay TSOP38238)

This module triggers exact infrared signals to devices, emulating a remote control to trigger actions such as power or volume control

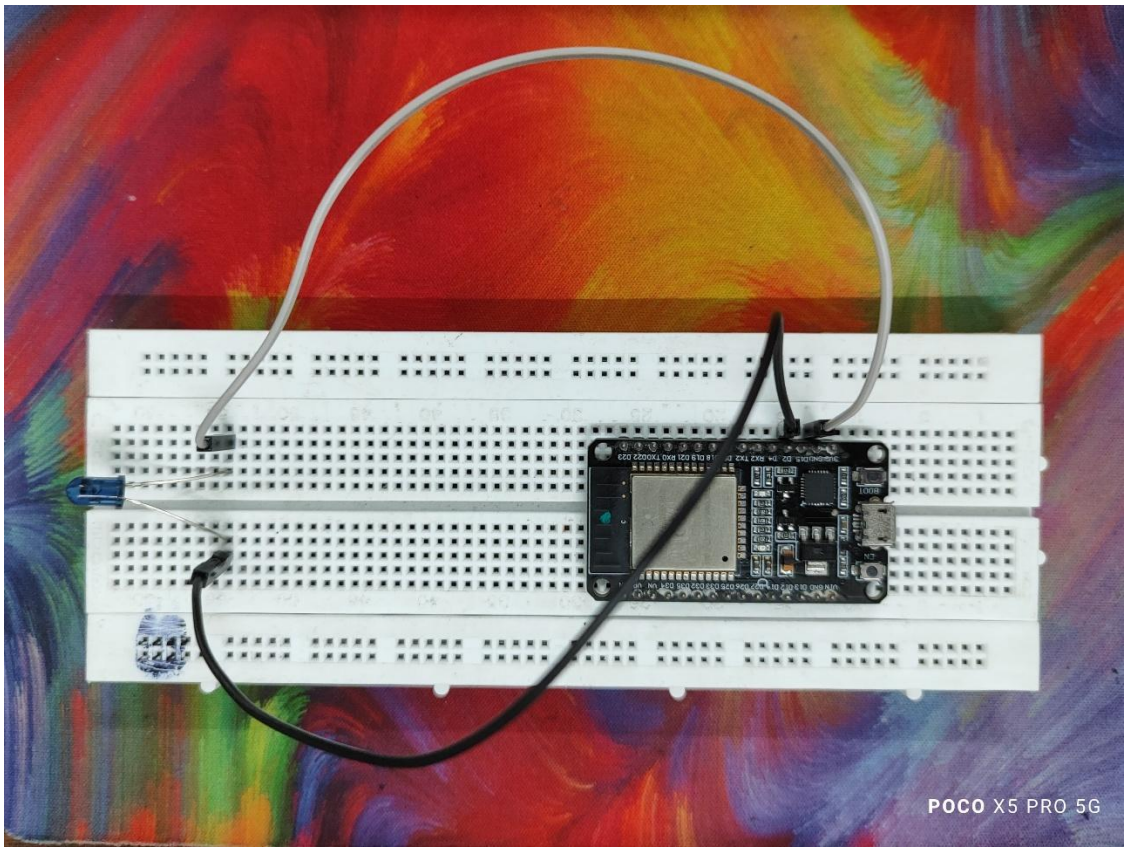
- Jumper Wires (Male-to-Male)

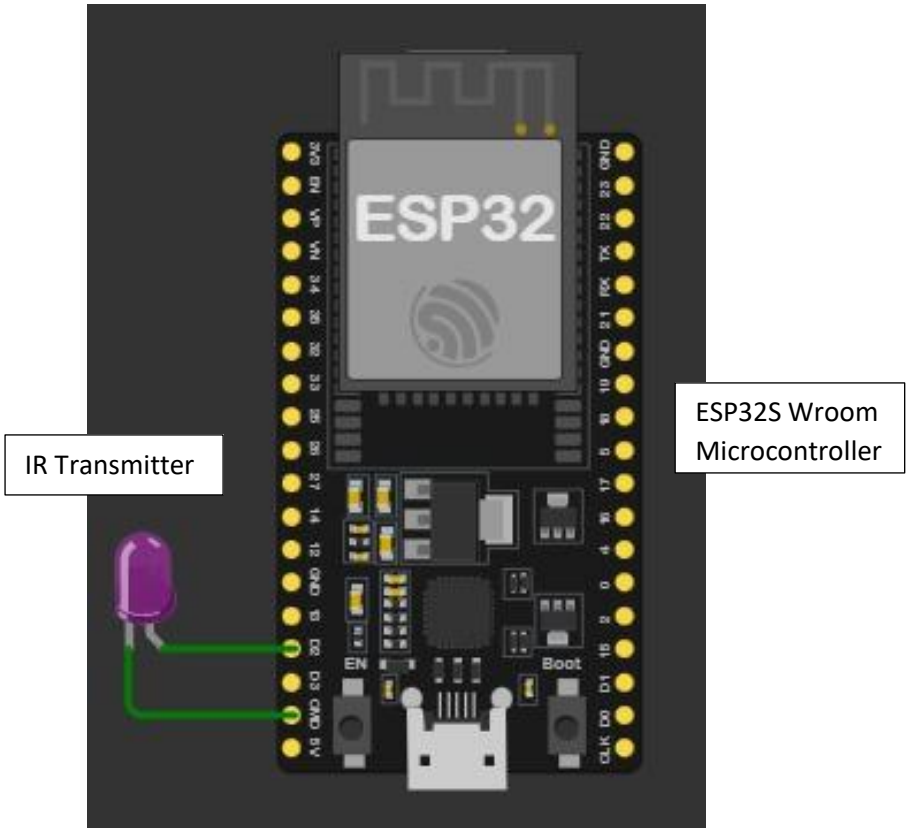
They were used to provide speedy and temporary electrical connections among devices on the breadboard

- Resistors

They regulate current flow within the circuit. It helps to safeguard components and ensure voltage stability

Circuit Diagram





Challenges faced and how they were addressed

Challenge 1: Initial Setup of ESP32

- We faced difficulty in identifying correct port and required libraries for ESP32
- We researched about it and then installed the correct ESP32 drivers (CP210x_Universal_Windows_Driver) and IRremoteESP8266 library

Challenge 2: Verifying IR Transmission

- We did not have access to any IR controlled device initially. So, it was impossible to tell if the IR LED was transmitting with the naked eye. It was hard to test
- We learnt that we could see the IR LED through a phone camera. It can detect the faint flash of IR light and that helped us confirm

Challenge 3: Unavailability of Buck Converter in the Lab

- We initially planned to use 7.4V battery pack (using two 3.7V Lithium ion batteries) and a buck converter
- However, there was no availability of a buck converter (LM2596) in the lab, despite multiple requests
- We were forced to use our laptop as a power source (as shown in the video)

Future plans

- We will extend this system to control multiple devices and multiple functions on each device, using the same remote
- We must replace the temporary power setup with a proper buck converter when there is one available in the lab