

4 Direction Traffic Automation System

• Introduction

This system is a 4-way junction traffic automation solution designed to efficiently manage heavy traffic. When heavy traffic is detected, it **dynamically adjusts the algorithm** to prioritize the congested direction, allowing faster movement for that route while maintaining smooth flow for the other three directions.

Additionally, it can **identify heavy traffic across multiple lanes** and optimize their movement accordingly.

The system also includes an **emergency lane feature** to ensure seamless passage for emergency vehicles through the congested junction.

A figure is given below depicting the structural design of the automated system.

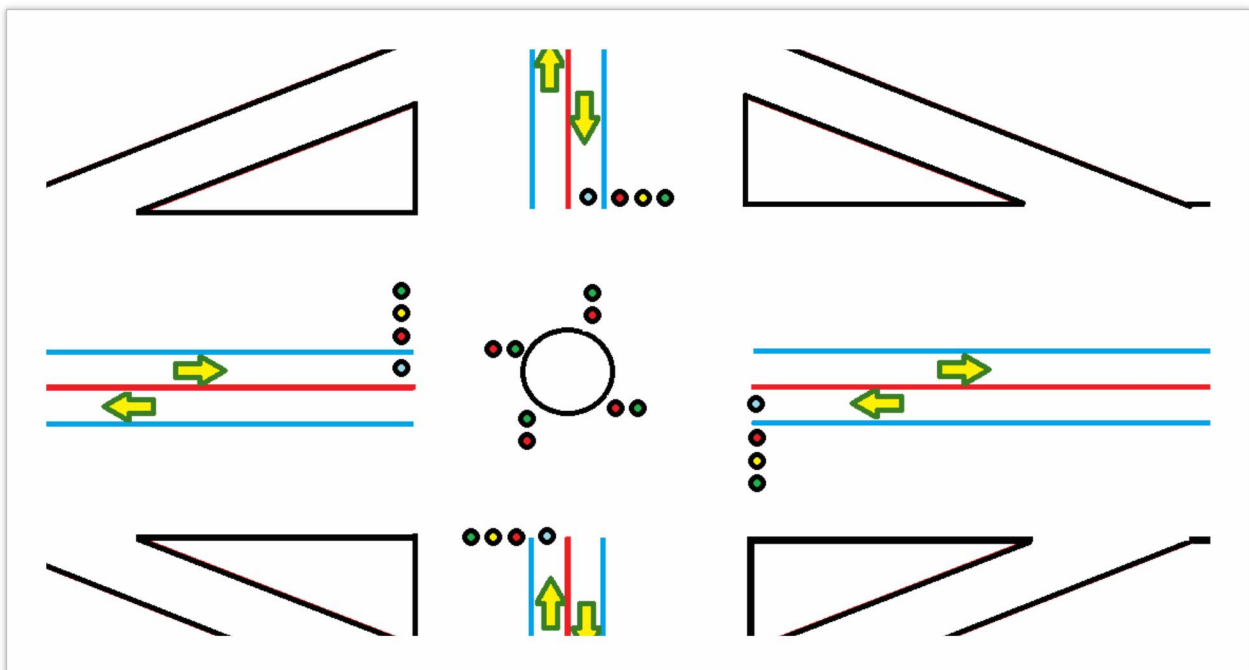
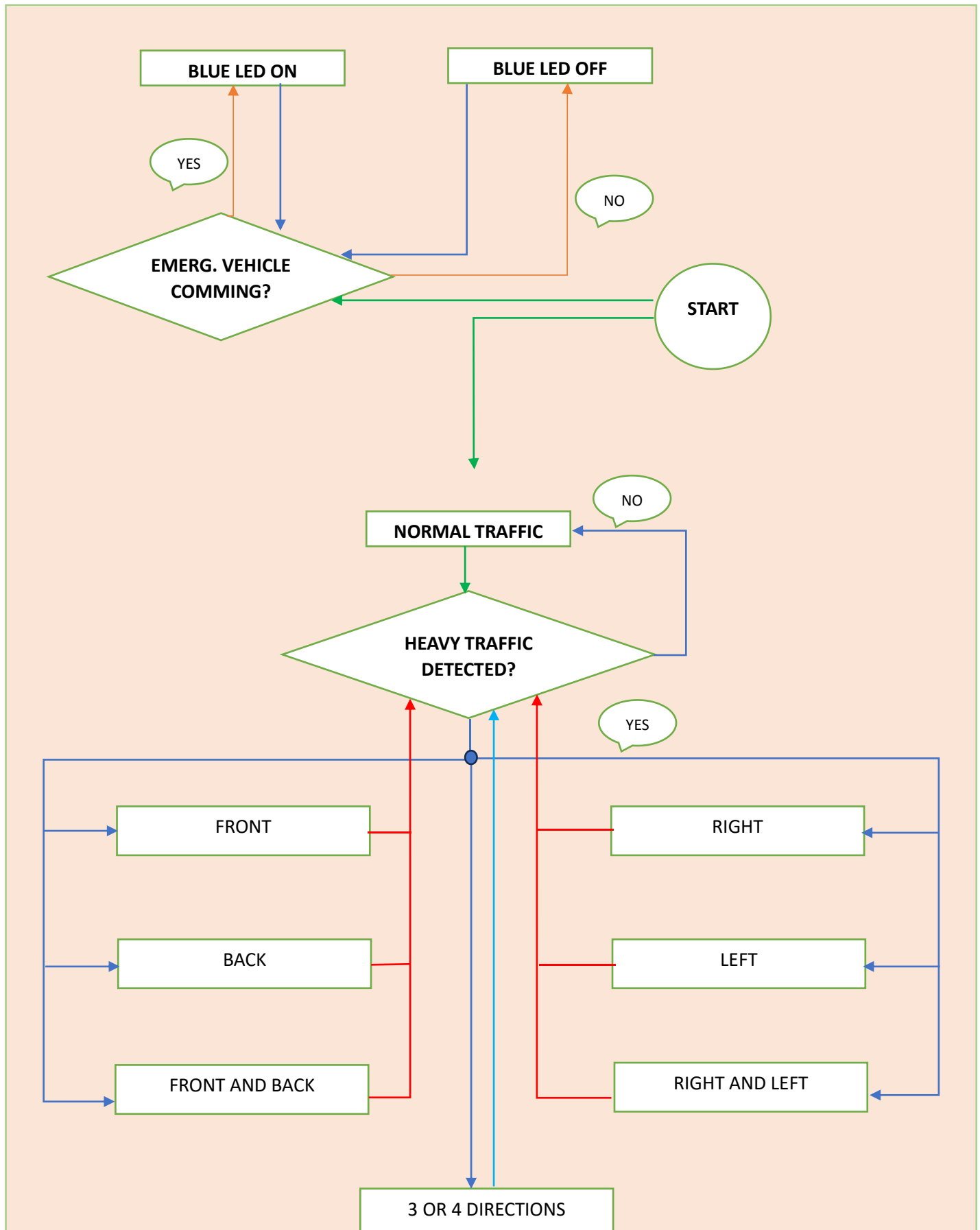


Fig. 1.1 Structural design of the System.

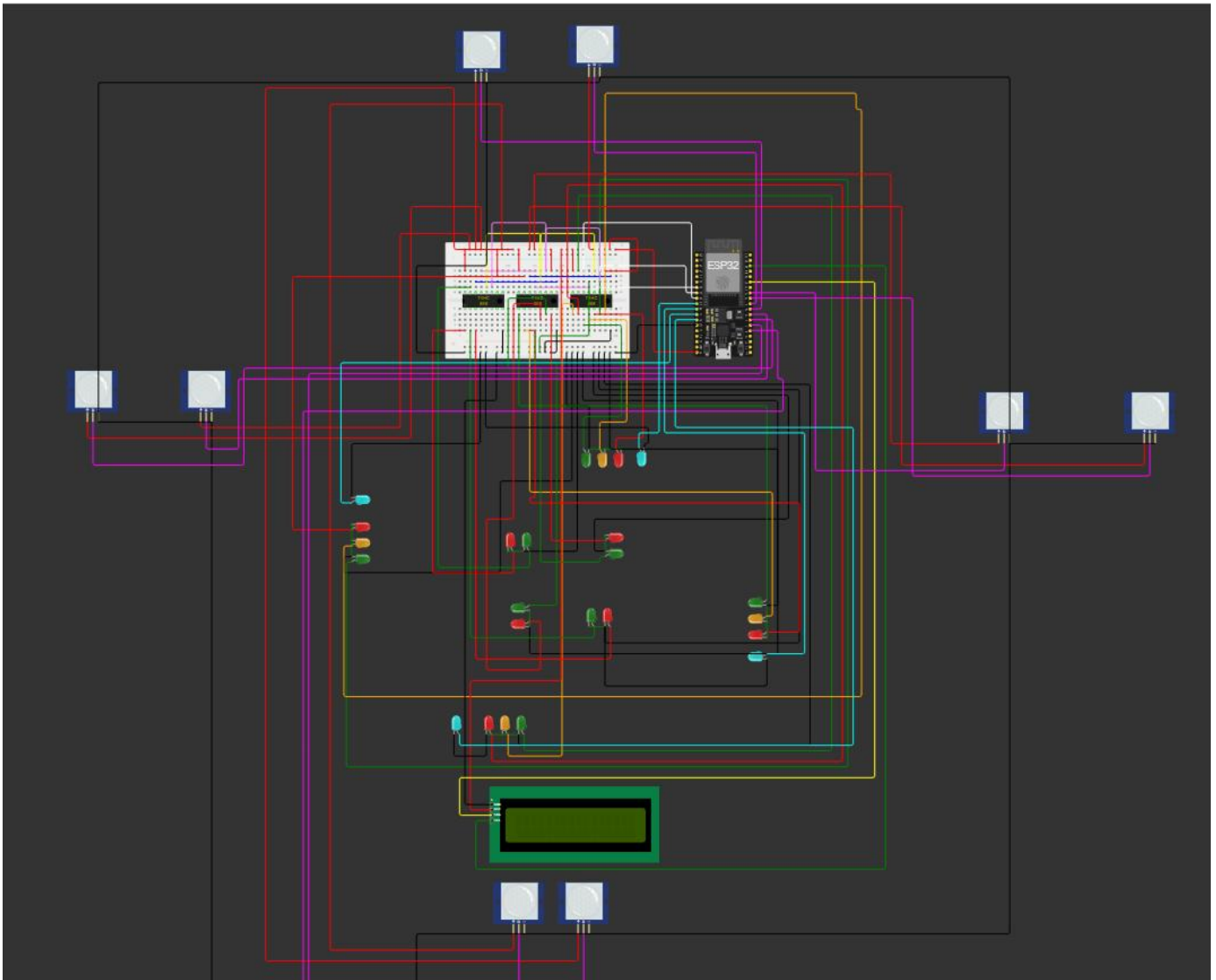
Red Line – Divider
Blue Line – Emergency Lane

This system has been designed using **ESP-32 microcontroller Dev Board**.

• Flowchart



- Circuit Diagram



• Hardware Used

Components	Quantity
ESP32 38 Dev. Board	1
Red Led 5mm	8
Green Led 5mm	8
Orange Led 5mm	4
IR Sensors- 3 pin module	8
74HC595 8-bit Serial-to-Parallel Register	3
16 Pin DIP Base IC	3
I2C LCD Display	1
Veroboard 9x15 cm (Green)	2
Male Single Row Header Strip	As per requirement
Female Single Row Header Strip	As per requirement
Connecting Wires	As per requirement

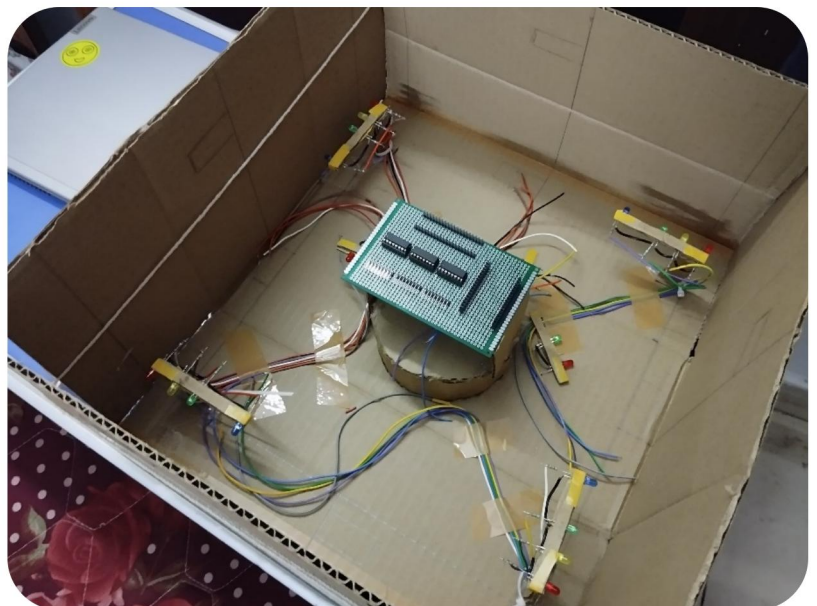
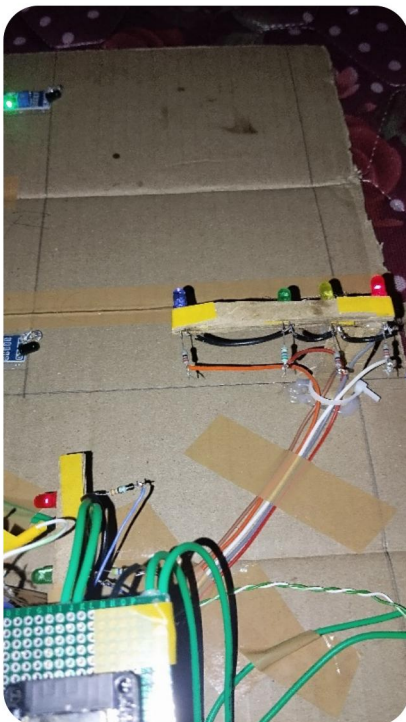
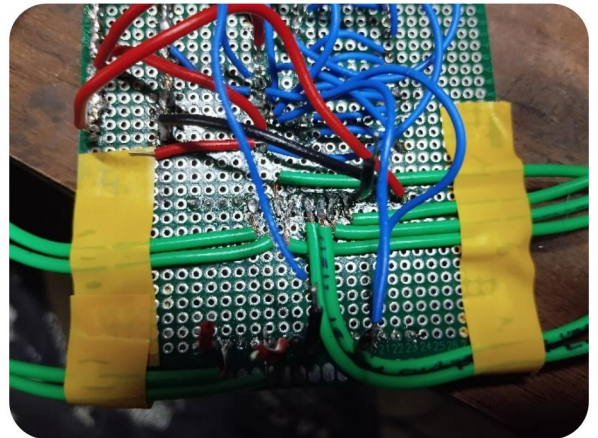
• Software Used

- ✓ Arduino IDE (language used C++).
- ✓ ESP32 Library by Espressif Systems.

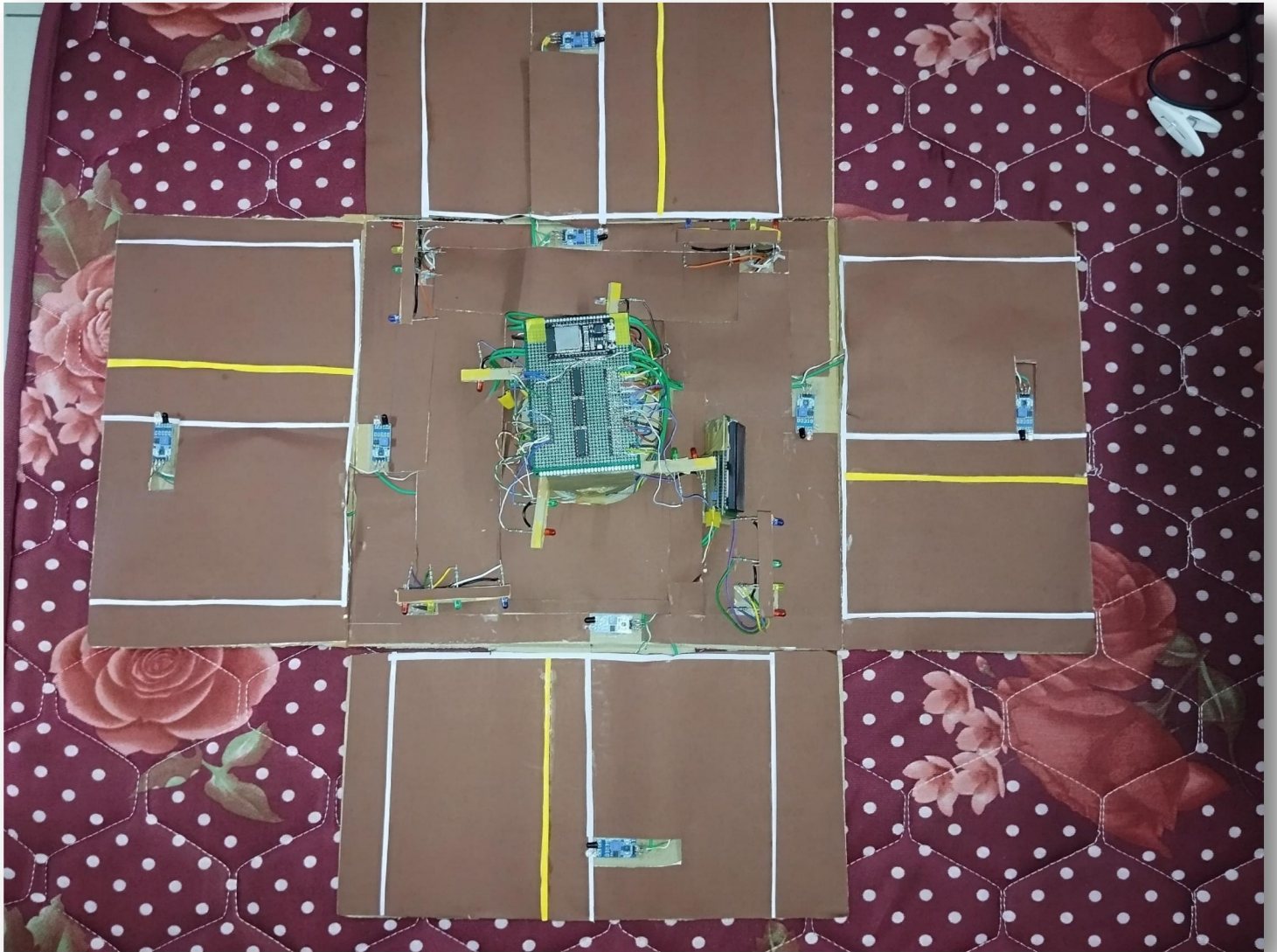
• Basic Idea

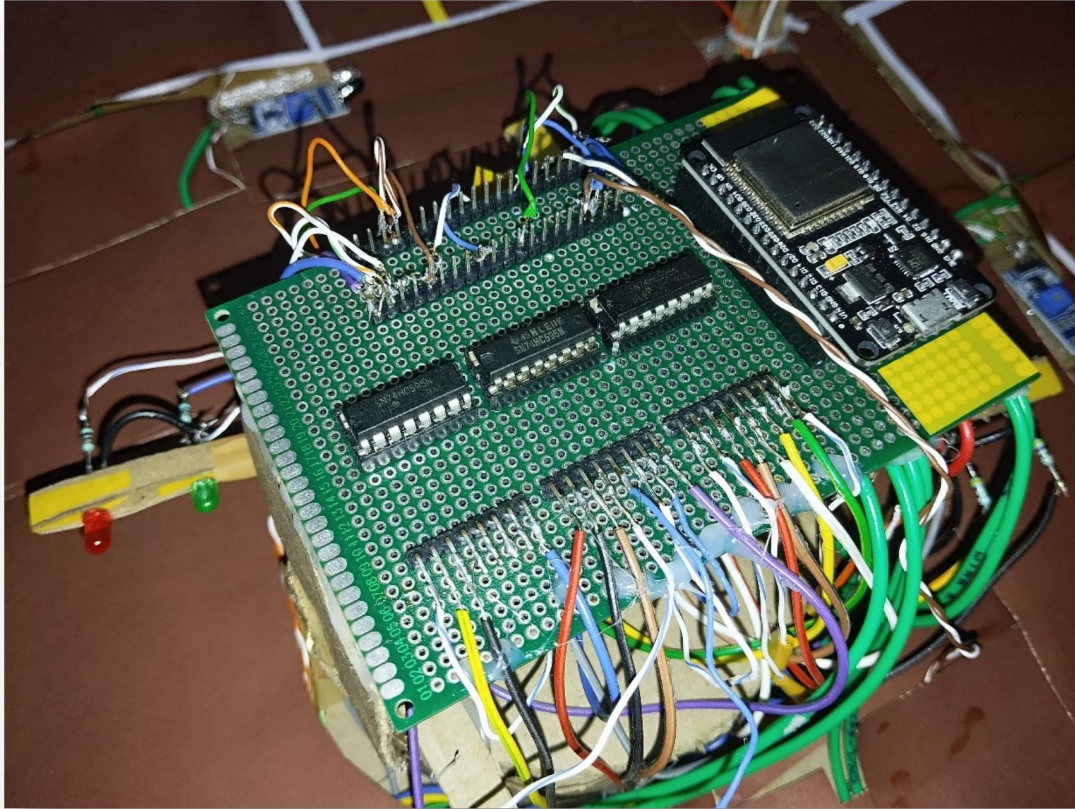
In every direction, two IR sensors are employed to detect vehicles at a distance. When the signal is red and both sensors are activated—indicating the presence of vehicles for a certain duration—it is interpreted as heavy traffic.

- Early Stages of Creation



- Final Stage





- ## Working Demonstration

Please follow the link below

https://drive.google.com/drive/folders/1dOnpQrv83P1iMkSE_CNqw3Wu1tMf0ceT?usp=sharing

- ## Arduino Code

- Txt file
- Ino file

Please follow the link below

https://drive.google.com/drive/folders/1zil_lucgUyOEAAfa6OhgVF47oP2r3HcZ?usp=sharing