



System Design Specification

Project – ICT 3206

**Bachelor of Information and Communication Technology
(BICT)**

Degree Programme

Department of Information and Communication Technology

Faculty of Technology

Rajarata University of Sri Lanka Mihinthale

Details of the Research Project

Title : Smart Traffic Light Control System Using Arduino

Group Name : Trouble Makers

Group Number : 11

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1. Introduction

Traffic congestion becomes a serious issue in our day-to-day activities. It brings down the productivity of individual and thereby the society as lots of work hour is wasted in the signals.

Avoiding traffic jams for example is thought to be beneficial to both environment and economy, but improved traffic-flow may also lead to an increase in demand. It indirectly also adds to the increase in pollution level as engines remain on in most cases, a huge volume of natural resources in forms of petrol and diesel is consumed without any fruitful outcome.

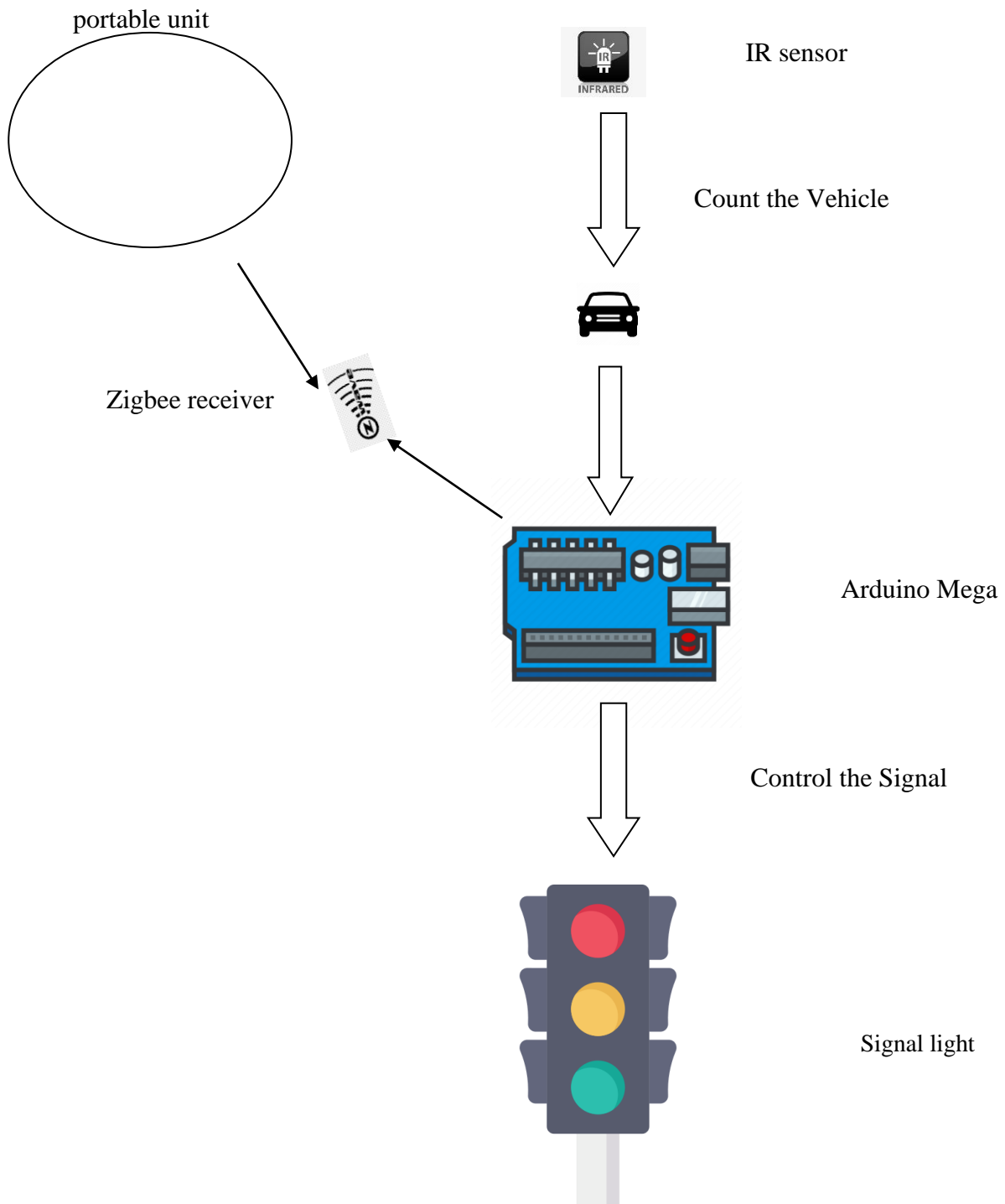
Another major problem is emergency vehicles such as ambulance, fire engines are affected by traffic jams and consequently many people could lose their lives because of an ambulance delay. Newer schemes need to be implemented by bringing in sensor-based automation technique in this field of traffic signaling system.

Present day traffic signaling system is fixed time based which may render inefficient if one lane is operational than the others. To optimize this problem, we have made a framework for a smart traffic control system. Sometimes higher vehicles at one side of the junction demands longer green time.

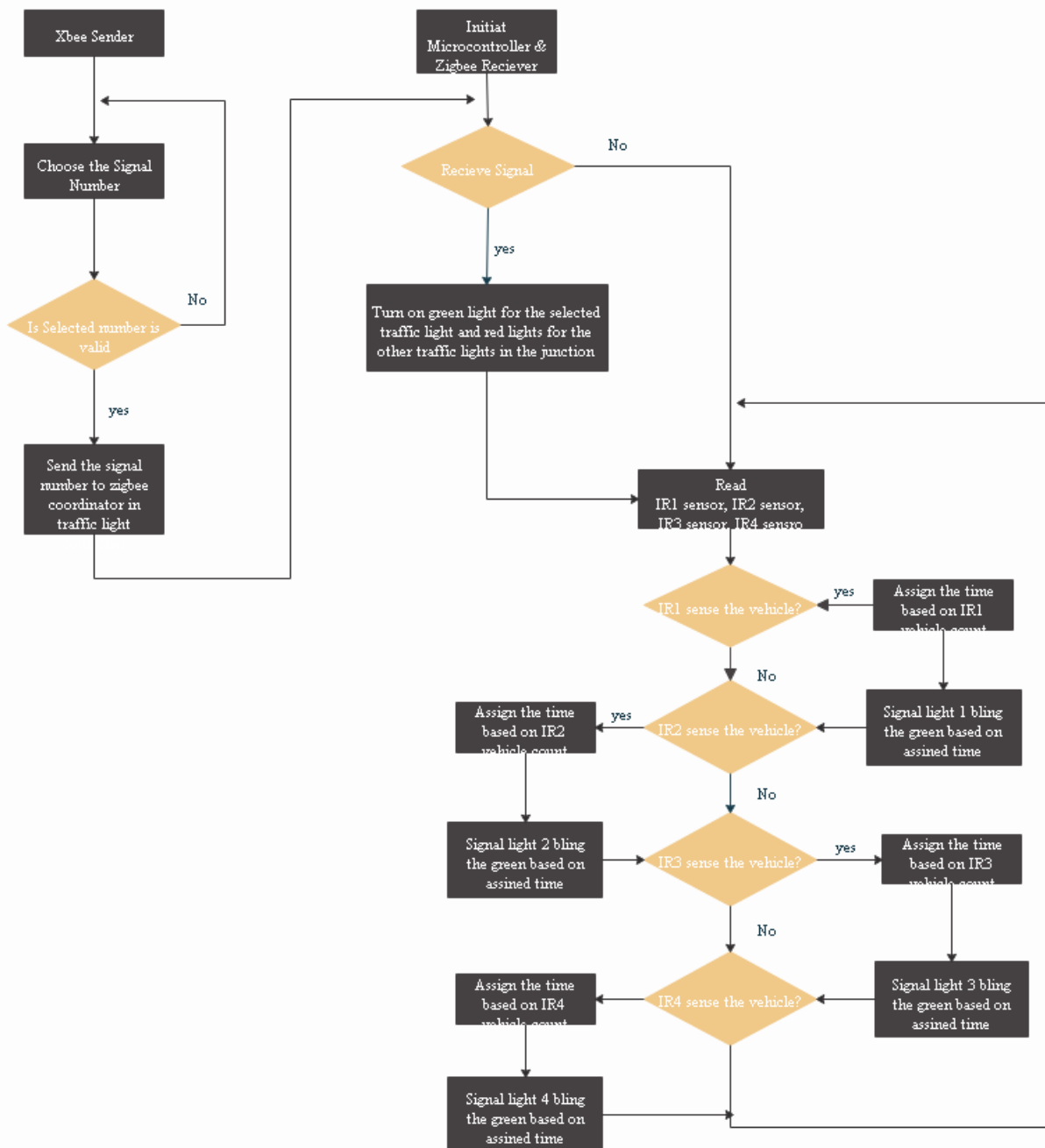
This research proposes a simple, low cost and real-time traffic light control system, aimed at removing many flaws and improving traffic management.

The next attractive feature of the system is its preference given to the emergency vehicles. This is done by providing special communicating devices that can control the traffic lights so that lane opens and allow that vehicle to pass the signal.

2. Research Project Scope Overview Diagram

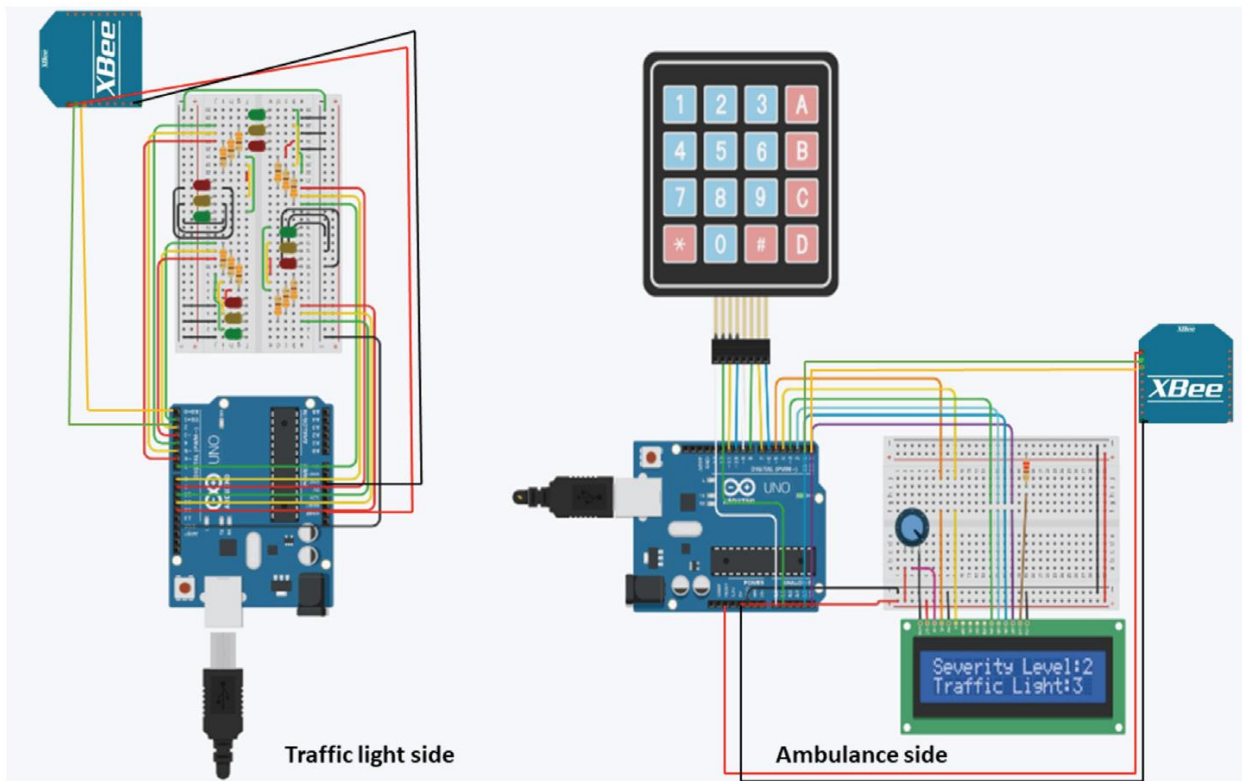


3. Research Process flow diagrams

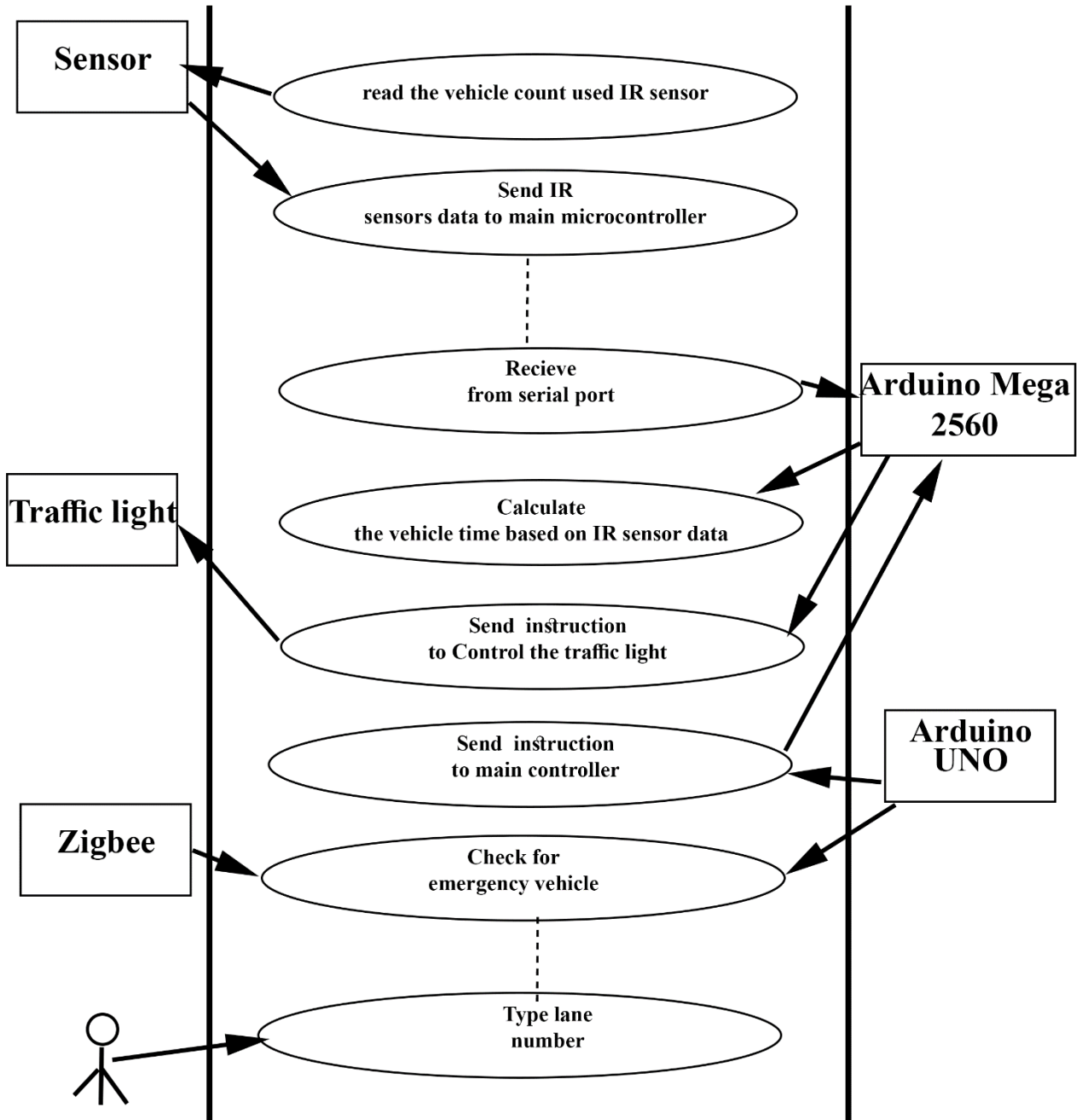


4. Implementation Designs

4.1. System Architecture



4.2. Use Case Diagram



4.2.1. use case Identify the vehicle

Table 1 Use Case Description

Use Case	Identify the vehicle
Actor	Infra Red Sensor, microcontroller
Pre Condition	The IR sensor should be transferring the real time vehicle count to microcontroller
Flow of Event	<ul style="list-style-type: none">i. Start IR sensorii. count the vehicleiii. send the real time count to microcontrolleriv. Check if microcontroller received the vehicle countv. If didn't receive the count , the traffic light will be yellow colorvi. If there is more than one IR counts received, It will analyze every lane has how much vehicles have.vii. Then green signal will be assigned to vehicle count and signal light work with clockwise.
Alternative Path	None
Post Condition	None

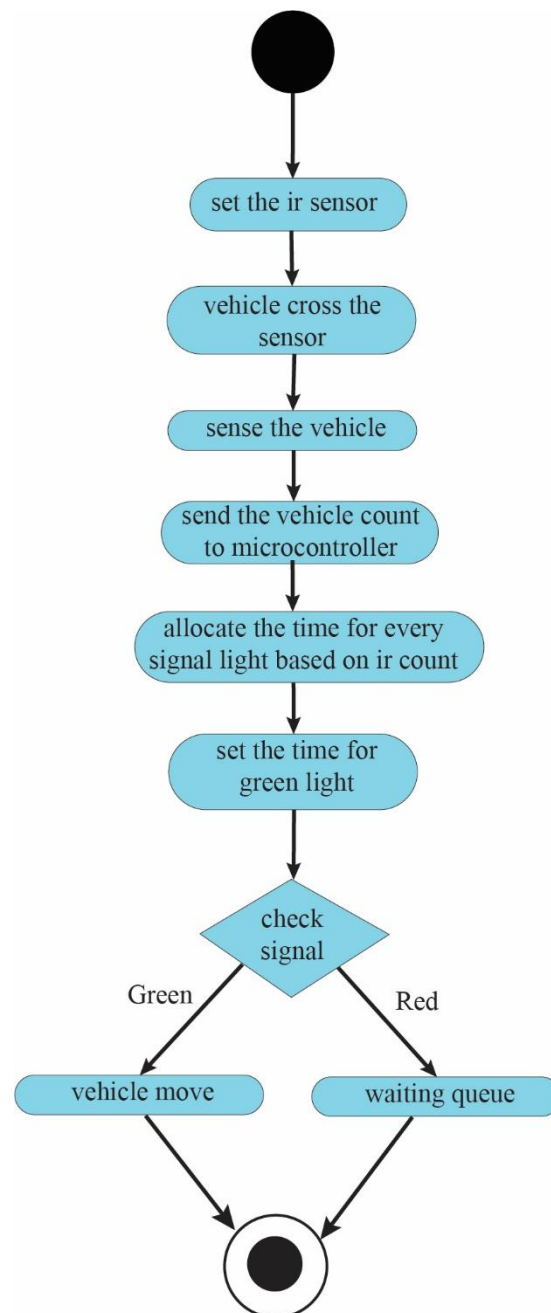
4.2.2. use case Identify the emergency vehicle

Table 2 Use Case Description

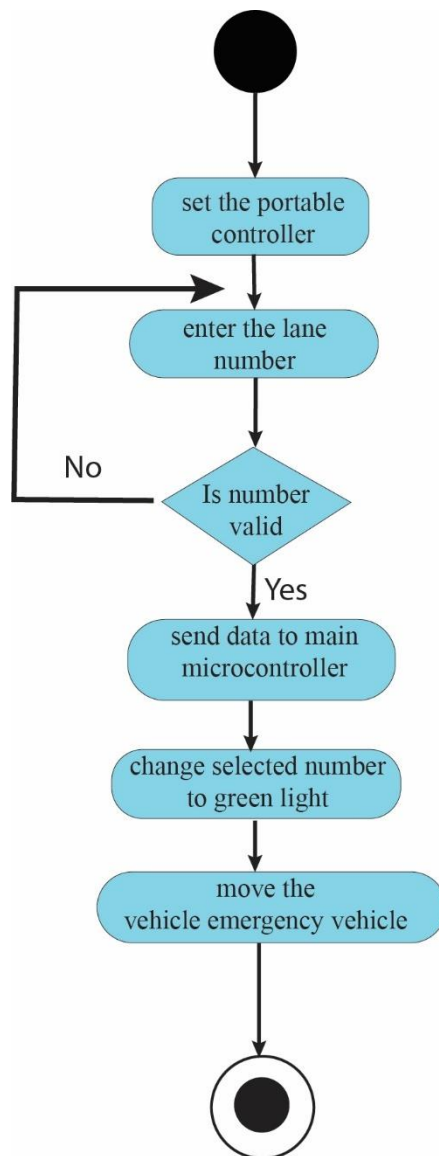
Use Case	Identify the emergency vehicle
Actor	Portable Controller
Pre-Condition	The zigbee should be transfer the lane number to microcontroller
Flow of Event	<ul style="list-style-type: none">i. Start Zigbee senderi. The driver will choose the traffic light numberii. The portable microcontroller will check the number is validiii. If the number is larger than 5, it will ask the driver to enter it againiv. If the number is less than 6, it will save the valuev. Zigbee coordinator receive the signalvi. If Xbee did receive a signal, check the which signal light number receivedvii. Turn on green light for the selected traffic lightviii. After that see if there is another signal
Alternative Path	None
Post Condition	None

5. Activity Diagram

5.1. Activity diagram for vehicle

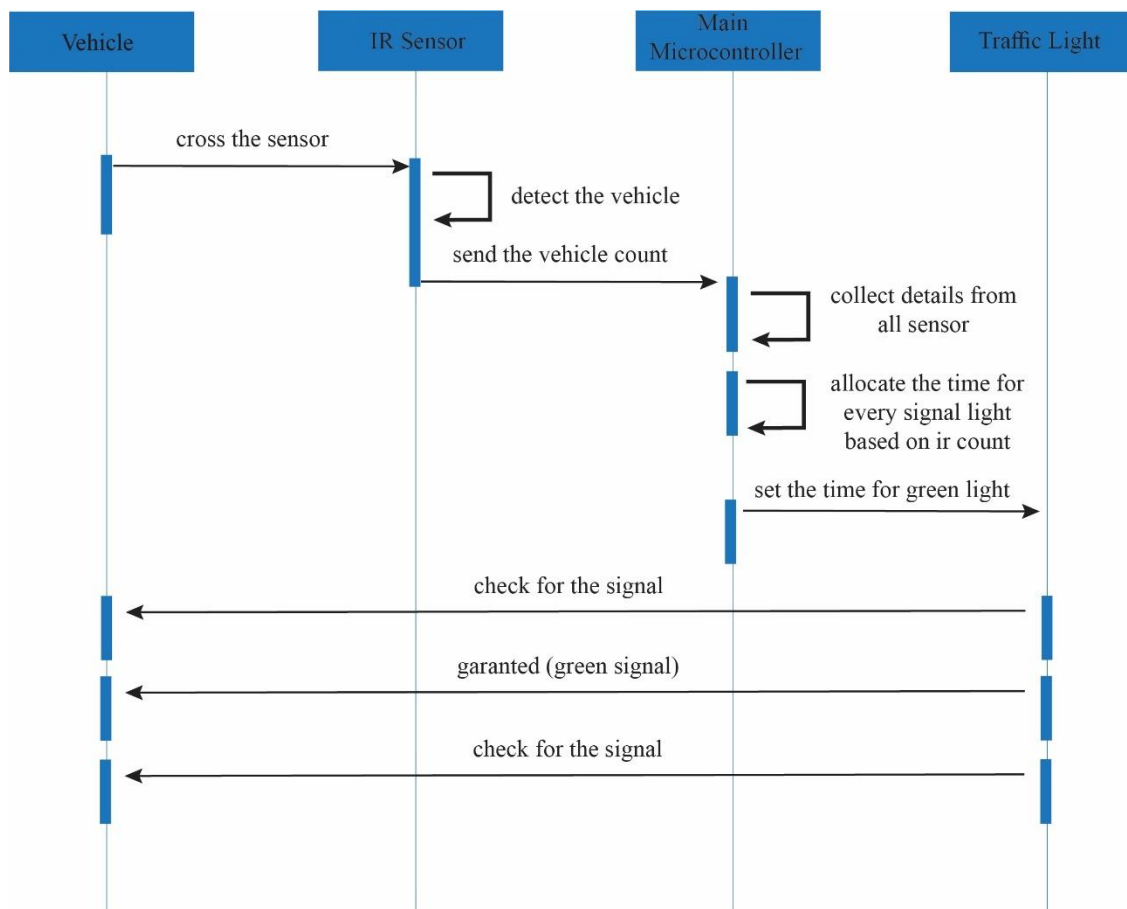


5.2. Activity diagram for emergency vehicle

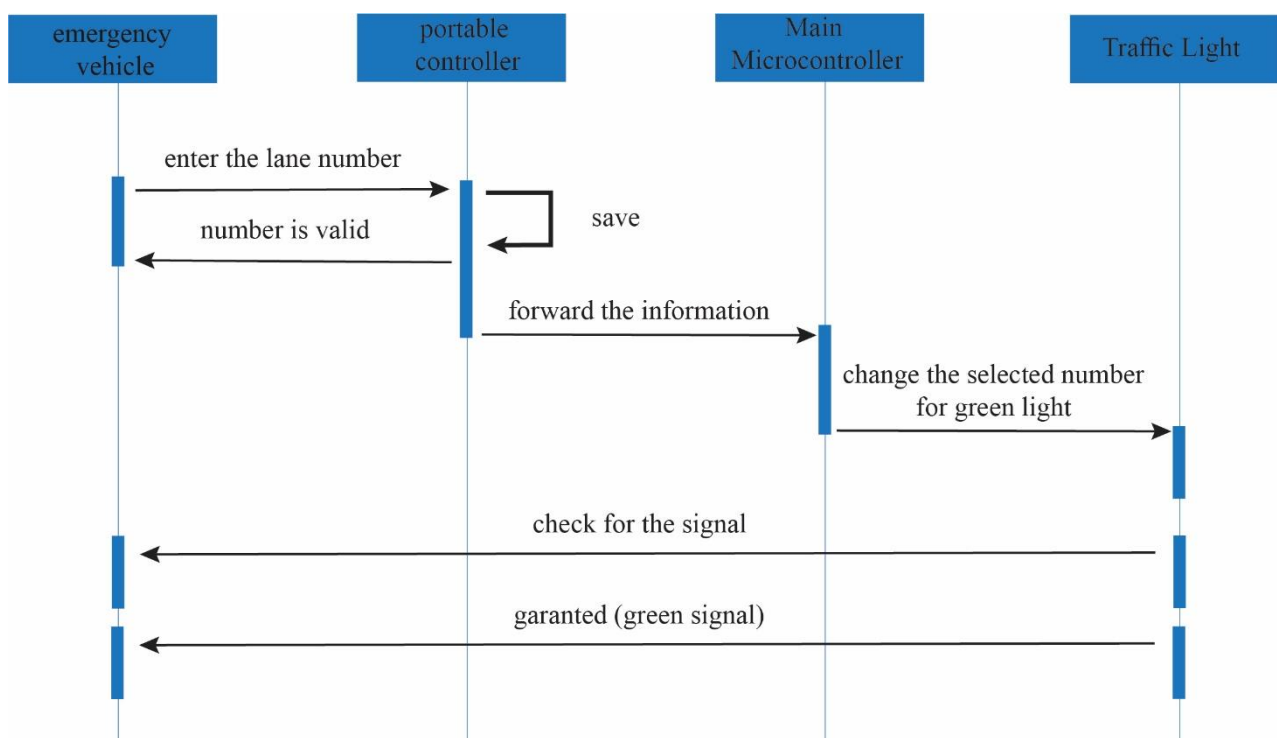


6. Sequence Diagram

6.1. Sequence Diagram for vehicle



6.2. Sequence diagram for emergency vehicle



7. Hardware Interfaces (Intended to design)

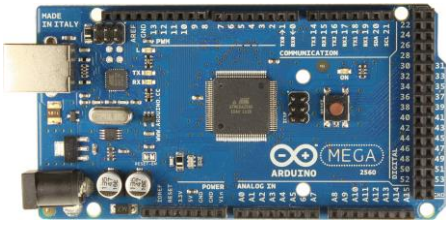


Figure 1 Arduino mega 2560



Figure 2 Arduino UNO



Figure 3 LED



Figure 4 Zigbee Module

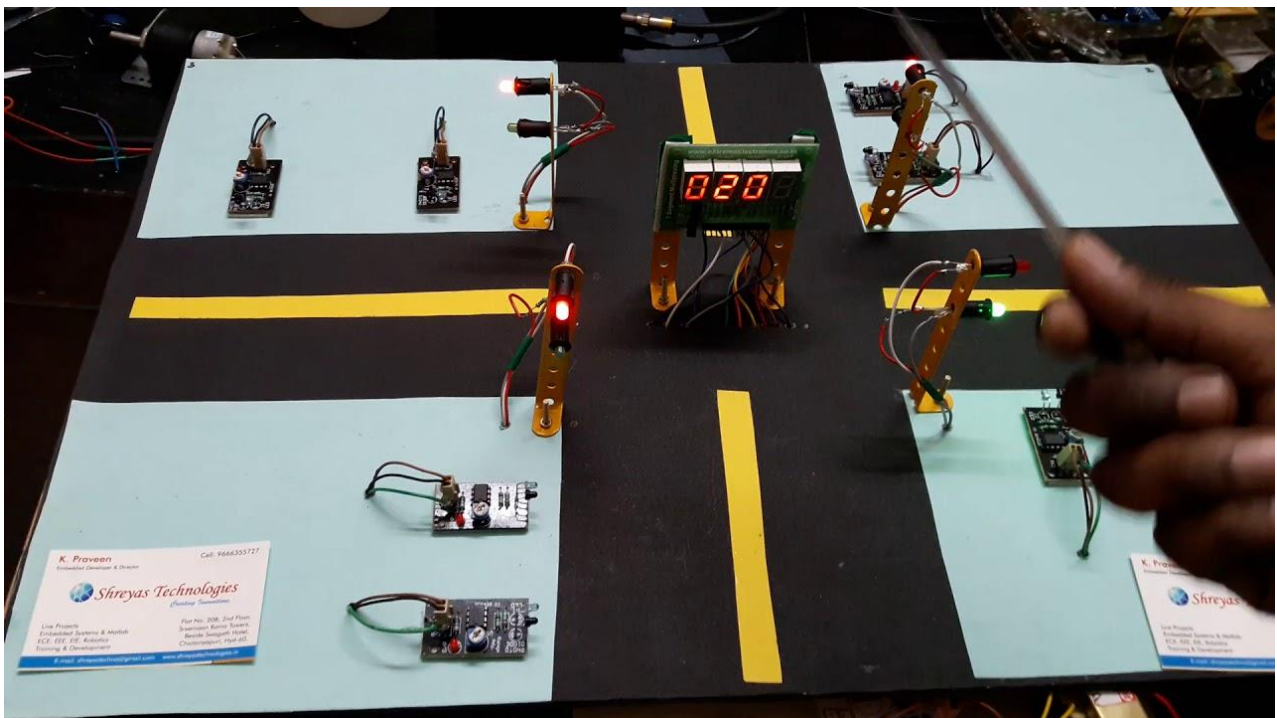


Figure 5 Display



Figure 6 Keypad

Figure 7 Sample implementation



8. Software Interfaces (Intended to design)

Figure 7 Arduino IDE

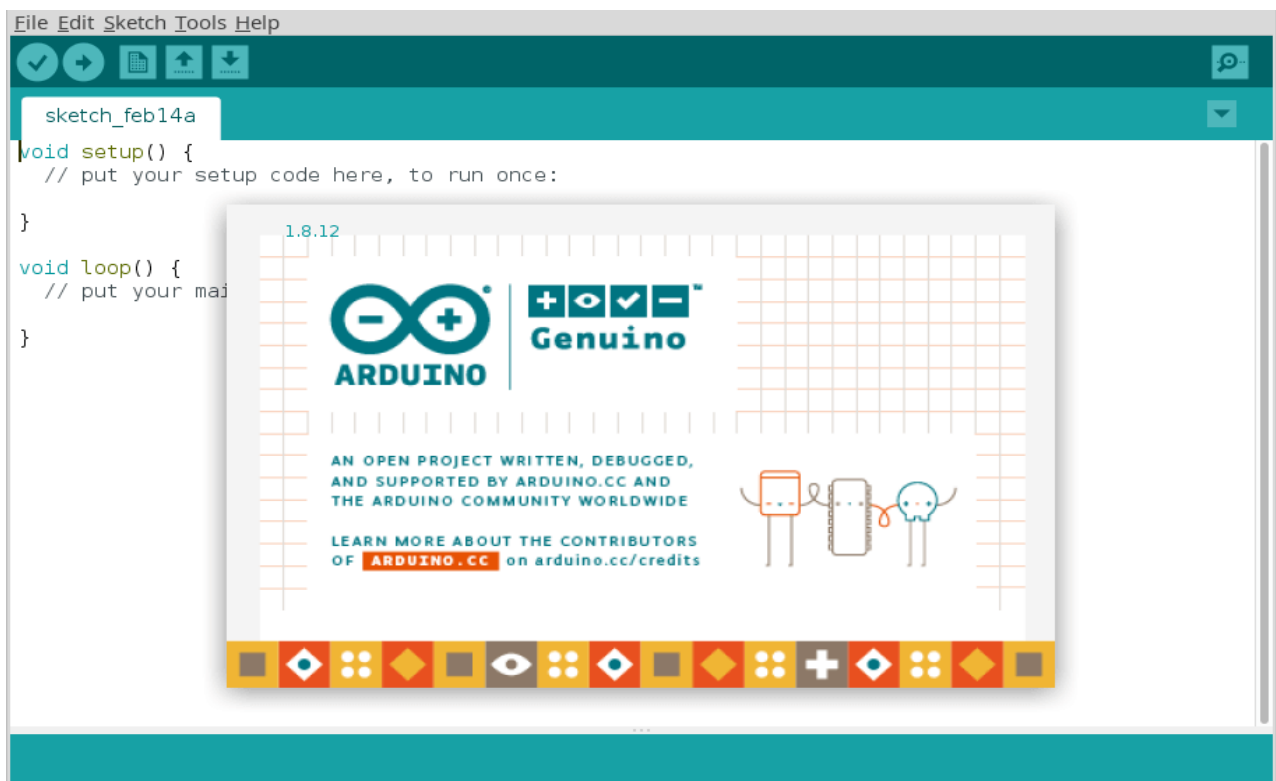


Figure 2 Zigbee Module IDE

