TRAFFIC MANAGEMENT SYSTEM

COMPONENTS REQUIRED:

- Radio signal detector
- Radio waves transmitter
- Ultra-sonic sensor/Hall Effect sensor
- Raspberry Pi
- Python programming
- Light Emitting Diode

Radio signal detector :

In a radio, the device that receives and takes the information from a modulated radio frequency current or voltage is called a detector.
While differentiating to the present-day radio stations which transmit sound (for instance: a sound signal) on an undisturbed bearing wave, radio stations in the early days at the outset transmitted data by radiotelegraphy. The transmitter was turned on and off to create short or extensive stretches of radio waves, illuminating messages in various codes, similar to that of Morse code. In this manner, the early radio recipients had just a single application or function that was to separate between the nearness or nonappearance of any radio sign. The gadget that played out this specific capacity was known
As a locator.
Fig.1 sensor working principle
The collector utilizes a receiving wire so it can catch

radio waves, process these waves to retain just those waves that are vibrating at the necessary recurrence, extricates the sound flag that were added to those waves, intensifies the sound sign, lastly plays them on a speaker.

The parts of a radio detector are: -

• Antenna: It helps in catching the radio waves. Commonly, the reception apparatus is basically a long wire. At the point when this wire is vulnerable to radio waves, the waves cause a little substituting current (AC) inside the receiving wire.

•RF enhancer: It is a sense speaker that enhances the exceptionally weak radio recurrence signal from the reception apparatus with the goal that the sign can be prepared by the tuner.

•Tuner: A circuit that can pull back sign of a specific recurrence from a blend of sign of various frequencies.

• Detector: This part is answerable for isolating the sound data from the transporter wave. For AM (Amplitude balance) flag, this can be satisfied with the assistance of a diode that just amends the rotating current sign.

• Audio speaker: The motivation behind this part is to enhance the powerless sign that originates from the identifier with the aim that it tends to be heard anybody. This can be satisfied utilizing a basic transistor intensifier circuit.

Hall Effect Sensor :

The Hall Effect is the most common method of measuring magnetic field and the Hall Effect sensors

are very popular and have many contemporary applications. For example, they can be found in vehicles as wheel speed sensors as well as crankshaft or camshaft position sensors.

If we bring some magnetic field near the plate we would disturb the straight flow of the charge carriers due to a force, called Lorentz Force. In such a case the electrons would deflect to one side of the plate and the positive holes to the other side of the plate. This means if we put a meter now between the other two sides we will get some voltage which can be measured.

The basic Hall Element of the Hall Effect magnetic sensors mostly provides very small voltage of only a few micro volts per Gauss, so therefore, these devices are usually manufactured with built-in high gain amplifiers.

Fig.2-Hall effect sensor

There are two types of Hall Effect sensors, one providing analog and the other digital output. The analog sensor is composed of a voltage regulator, a Hall Element and an amplifier. The digital output sensors provide just two output states, either "ON" or "OFF".

Advantages

- High speed operation over 100 KHz possible.

Whereas at high frequencies the inductive or capacitive sensor output begins to distort.

- Non contact operation so there is no wear and friction, hence unlimited number of operating cycles.
- When packed immune to dust, air, water

where as capacitive sensor may get triggered

by dust.

- It can measure zero speed.
- Highly repeatable operation.
- Capable of measuring large current.

Disadvantages

- It may be affected by external interfering magnetic field.
- Large temperature drift.
- Large offset voltage

Raspberry PI :

The Raspberry Pi is a small sized personal computer (PC) which is structured and fabricated by the Raspberry Pi Foundation (a non-benefit association) which is dedicated to making PCs and programming guidelines as effectively open as conceivable to the intended interest group.

Despite the fact that the first aim of the Raspberry Pi venture was to PCs with programming choices under the control of understudies, the Raspberry Pi has been taken by a various objective group of spectators. Software engineers over the world have taken the modest stage for ventures which are from reproducing retro formed cupboards to controlling robots and to setting up modest however amazing home media gadgets. Coming up next are the upsides of Raspberry Pi over PCs and comparable gadgets. Advantages

·It is a solitary board PC

·It is very cost effective.

·A completely fledged working framework and it very well may be utilized as an everyday PC.

·The availability of GPIO (General Purpose Input

Output pins) recognizes a Raspberry Pi from conventional PCs. These pins can be associated with sensors and other outside parts which help in interfacing with them automatically a language, for example, Python or Java. This enables you to manufacture and model or any Internet of Things gadgets that can detect this present reality

•Newer models have Wi-Fi and Bluetooth options worked in. This permit bringing ventures into remote mode effectively.

Light-Emitting Diode :

A light-producing diode is a semiconductor which has a light source that conveys light when current is permitted to move through it. Electrons in the semiconductor join with the electron gaps, along these lines discharging vitality as photons.

The shade of the light (comparing to the vitality obtained by the photons) is found by the vitality required for electrons to cross the vitality hole of the semiconductor. White light is gotten by utilizing a few different semiconductors. LEDs have numerous points of interest over other radiant light sources. They are:

•Lower vitality utilization

• Longer lifetime

•Improved strength

•Small in size

• Faster rate of exchanging

In a light discharging diode, the recombination of electrons and electron openings in a semiconductor creates light (or infrared radiation). This procedure is designated "electroluminescence". The wavelength of

the light is relied upon the hole of the vitality band in the kind of semiconductors utilized. Since these materials have a high list of refraction, plan highlights of the gadgets, for example, extraordinary optical coatings are important to emanate light effectively with low wastage.

III. METHODOLOGY

- This is the basic ideology behind controlling the timing of traffic lights with respect to present time traffic conditions.
- The sensor collects data of the real-time density of vehicles present on the road.
- The data from the sensors are collected and stored in the cloud.
- This information is fed to the microcontroller which determines the change in signal for each lane.
- During the case of an emergency, the data is directly fed into the microcontroller hence terminating previous loop and changing the signal immediately.

This traffic management control system consists of hall effect sensor, LED lights (red and green) and Raspberry Pi. The Raspberry Pi microcontroller contains the python programming code which controls time delay of led lights.
The Hall effect sensors placed on the road surface at regular intervals of distance to detect the presence of vehicles on the road till where it is placed. The government is suggested to place a radio wave

Ambulance> Fire Truck > Police trucks

In the condition in which there are two emergency vehicles approaching in one direction and single emergency vehicle in another direction, the preference is given to the direction in which there are 2 or more than 2 emergency vehicles are approaching[7].

IV. PROGRAMMING

Python Programming :

Python is an exceptionally significant level of programming and is an open-source programming language. It was made by a Dutch developer Guido van Rossum. It was first discharged route in 1991. Python's plan study accentuated on code meaningfulness and understandability with its calculable usage of huge whitespace. Its language utilizes object-situated methodology target to assist software engineers with composing clear and sensible codes for little, medium and enormous scale ventures. Python is otherwise called a multi-worldview programming language. This implies Python underpins both item and angle arranged programming. Item situated programming and organized writing computer programs are completely upheld, and a significant number of its highlights bolster utilitarian programming and viewpoint arranged programming. Numerous different ideal models are helped by means of augmentations, including configuration by contract and sensible programming. Python utilizes lively composing and a whole mix of reference checking and a cycle-identifying junk jockey for dealing with the memory size. It likewise comprises of dynamic name goals (late official), which joins names of technique

and variable during the execution of any program. Python writing computer programs is limitlessly expanding in applications as it is route more obvious and code when contrasted with other programming dialects. Preferences of Python over other programming languages: Presence of Third-Party Modules: The Python Package Index contains a few outsider modules that help in better collaboration

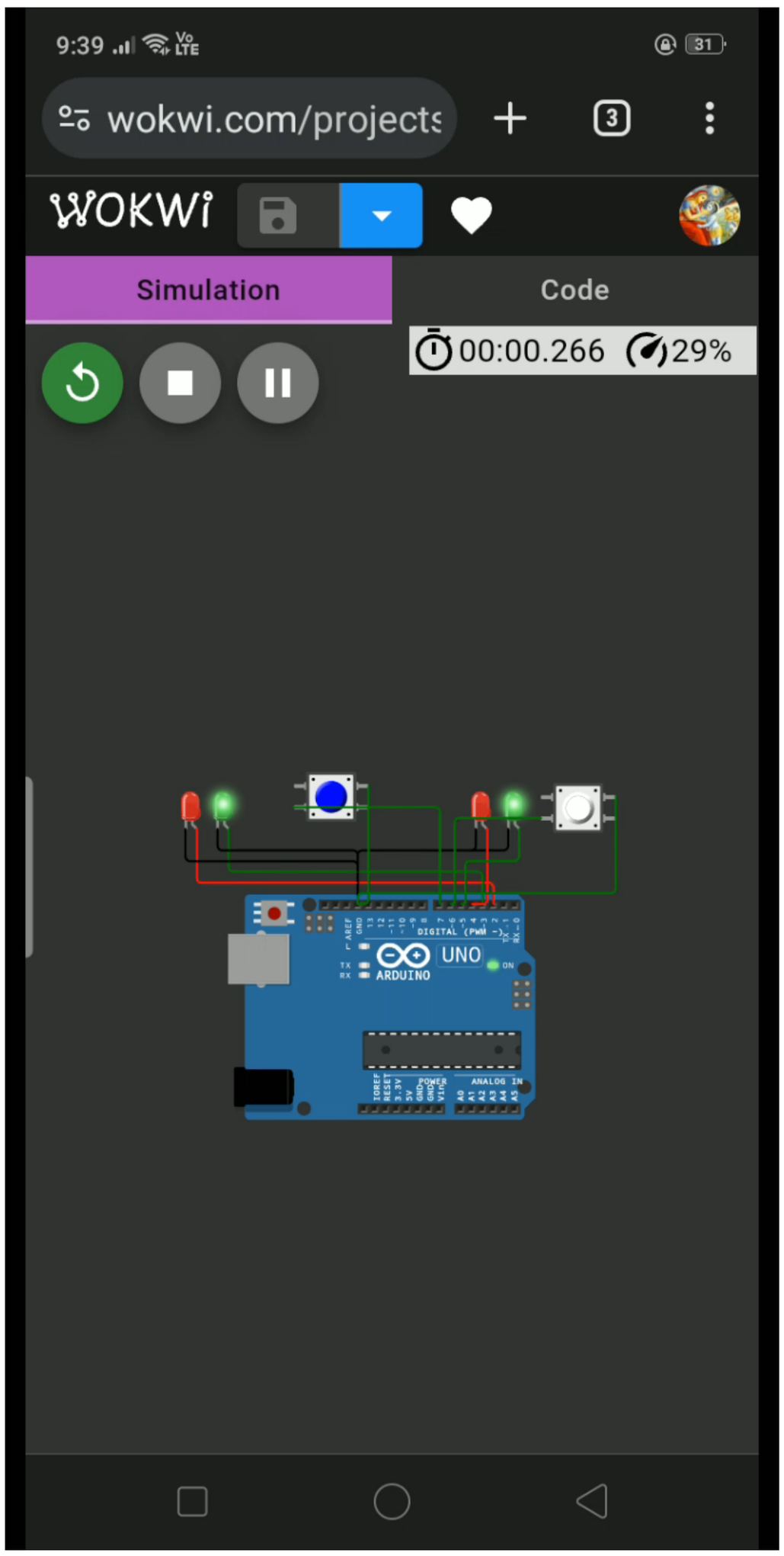
CODING:

```
const int mainRoadRedPin = 2;
const int mainRoadGreenPin = 3;
const int sideRoadRedPin = 4;
const int sideRoadGreenPin = 5;
const int mainRoadSensorPin = 6;
const int sideRoadSensorPin = 7;
void setup() {
  pinMode(mainRoadRedPin, OUTPUT);
  pinMode(mainRoadGreenPin, OUTPUT);
  pinMode(sideRoadRedPin, OUTPUT);
  pinMode(sideRoadGreenPin, OUTPUT);
  pinMode(mainRoadSensorPin, INPUT_PULLUP);
  pinMode(sideRoadSensorPin, INPUT_PULLUP);
}

void loop() {
  // Check if there are vehicles on the main road
  if (digitalRead(mainRoadSensorPin) == LOW) {
    // Main road has vehicles, so stop side road traffic
    digitalWrite(mainRoadRedPin, LOW);
    digitalWrite(mainRoadGreenPin, HIGH);
    digitalWrite(sideRoadRedPin, HIGH);
    digitalWrite(sideRoadGreenPin, LOW);

} else if (digitalRead(sideRoadSensorPin) == LOW) {
```

```
    // Side road has vehicles, so stop main road traffic
    digitalWrite(mainRoadRedPin, HIGH);
    digitalWrite(mainRoadGreenPin, LOW);
    digitalWrite(sideRoadRedPin, LOW);
    digitalWrite(sideRoadGreenPin, HIGH);
  }
else {
    // No vehicles, all lights are red (4-way stop)
    digitalWrite(mainRoadRedPin, LOW);
    digitalWrite(mainRoadGreenPin, HIGH);
    digitalWrite(sideRoadRedPin, LOW);
    digitalWrite(sideRoadGreenPin, HIGH);
  }
}
```

This output used only in two roads.

WOKWI project link:
https://wokwi.com/projects/379571034449458177



Program 2:

COMPONENTS:

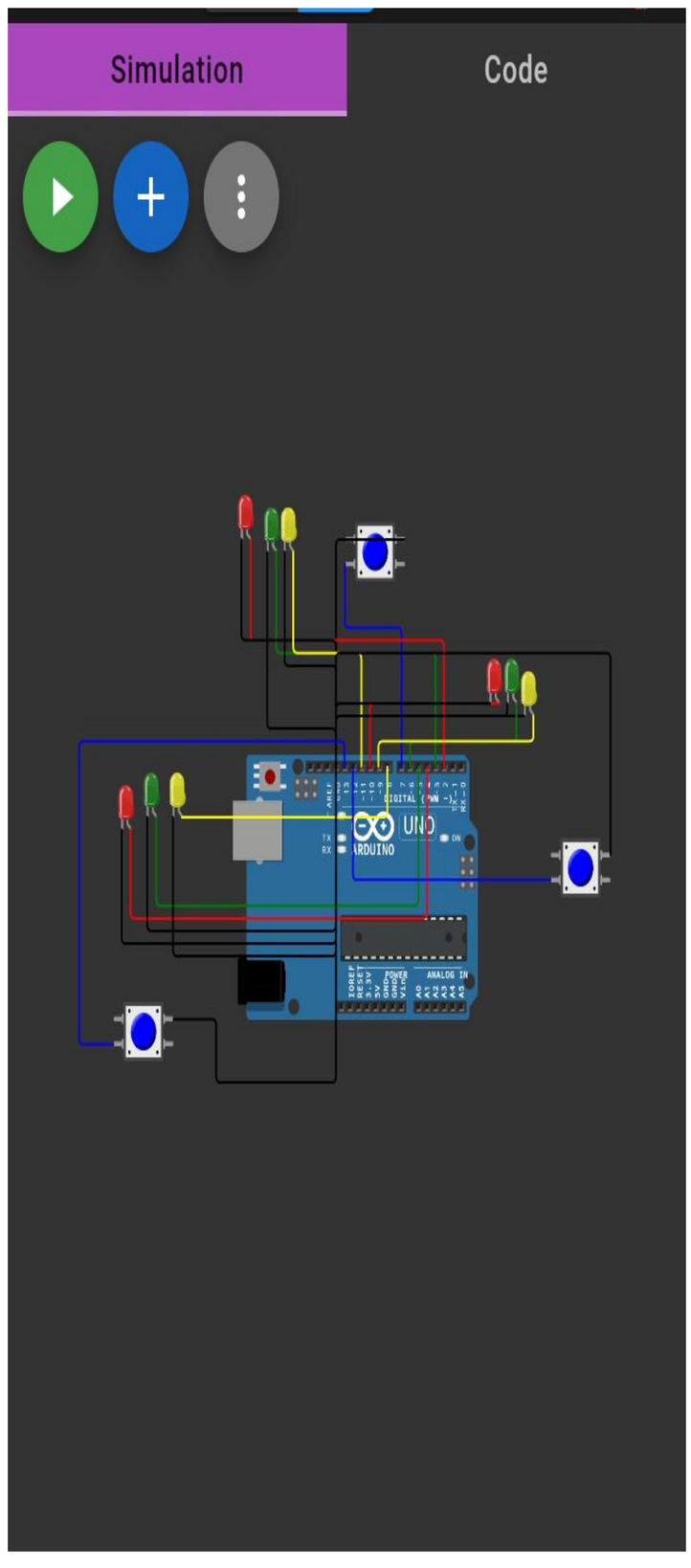
*Arduino uno
*4 LED's
*2 PushButton
*Wires

```
const int mainRoadRedPin = 2;
const int mainRoadGreenPin = 3;
const int mainRoadYellowPin=11;
const int leftRoadRedPin = 4;
const int leftRoadGreenPin = 5;
const int leftRoadYellowPin=8;
const int rightRoadRedPin = 10;
const int rightRoadGreenPin = 6;
const int rightRoadYellowPin =9;
const int mainRoadSensorPin = 7;
const int leftRoadSensorPin =13;
const int rightRoadSensorPin =12;

 }

void loop() {
  // Check if there are vehicles on the main road
  if (digitalRead(mainRoadSensorPin) == HIGH) {
    // Main road has vehicles, so stop side road traffic
    digitalWrite(mainRoadRedPin, HIGH);
    digitalWrite(mainRoadGreenPin,LOW);
    digitalWrite(mainRoadYellowPin, LOW);
    digitalWrite(leftRoadRedPin, LOW);
    digitalWrite(leftRoadGreenPin,LOW);
    digitalWrite(leftRoadYellowPin, HIGH);
    digitalWrite(rightRoadRedPin, LOW);
    digitalWrite(rightRoadGreenPin, HIGH);
    digitalWrite(rightRoadYellowPin, LOW);
  }
  else if (digitalRead(rightRoadSensorPin) == HIGH) {
    // right road has vehicles, so stop main road traffic
    digitalWrite(mainRoadRedPin, LOW);
    digitalWrite(mainRoadGreenPin, LOW);
    digitalWrite(mainRoadYellowPin, HIGH);
    digitalWrite(leftRoadRedPin,HIGH);
    digitalWrite(leftRoadGreenPin, LOW);
    digitalWrite(leftRoadYellowPin, LOW);
    digitalWrite(rightRoadRedPin, LOW);
    digitalWrite(rightRoadGreenPin, HIGH);
    digitalWrite(rightRoadYellowPin, LOW);
  }


  else {
   // No vehicles, all lights are red (4-way stop)
   digitalWrite(mainRoadRedPin, LOW);
   digitalWrite(mainRoadGreenPin, HIGH);
```

```
digitalWrite(mainRoadYellowPin, LOW);
digitalWrite(leftRoadRedPin, LOW);
digitalWrite(leftRoadGreenPin, HIGH);
digitalWrite(leftRoadYellowPin, LOW);
digitalWrite(rightRoadRedPin, LOW);
digitalWrite(rightRoadGreenPin, HIGH);
digitalWrite(rightRoadYellowPin, LOW);
```

OUTPUT(IMAGE):

This is the output for 3 roads



WOKWI PROJRCT 2 LINK:

https://wokwi.com/projects/379571034449458177

USING RASPBEERY PI 3:

Components:

- Raspbeery pi 3
- IR sensors
- 4 sets of 3 LED's
- wires

OUTPUT IMAGE: