IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

An Experimental Study on Automatic Traffic Light System using IR Sensors

Dr. R. Premsudha[1], Bhukya Tharun[2], Bura Vaishnavi[3], Gottimukkula Shivani[4], Jella Udayasri[5]
Professor, Department of Civil Engineering[1]
Final Year UG Students, Department of Civil Engineering[1,2,3,4]
TKR College of Engineering and Technology, Hyderabad, India

Abstract: *Traffic jam turns out to be key crisis in these days. Traffic jam mainly occurs in urban areas. Due to traffic jam, there are several problems arise such as increase in noise pollution, air pollution, accidents and delay in travel time etc. The present traffic signals deployed in all parts of the cities are not enough to solve above mentioned problems because these have specific pre- determined time for red and green signals. In this view various attempts were done for traffic lights to behave smartly based on density of vehicles on the road. Therefore, many techniques have been used in traffic control systems. This paper summarizes different techniques of traffic control system that were used for the improvement of conventional traffic control system. Congestion is a serious issue due to vehicular traffic. One of the known causes of traffic congestion is the amount of time spend waiting for the red light to change to green. The changing of traffic light is hard-coded and it is not reliant on traffic volume. There is therefore need to simulate and optimize traffic control to better accommodate density based traffic rather than time based. This system attempts to lessen Possibilities of traffic jams brought about by traffic lights to a reasonable degree. This project, a density-based traffic control system is been implemented to solve this problem. The system entails programming an Arduino using Arduino integrated development environment to enable traffic lights give the right of access to the road by selecting the lane with the high number of cars. The traffic lights are modified to chip away at an auspicious premise until there is a signal identified by the infrared sensors. The sensor identifies an object (i.e., a vehicle, a motorcycle etc.) and signals the Arduino to control the traffic lights for its individual path. Once there is no sign identified by any of the four sensors the traffic lights keep on dealing with an auspicious premise. The mean response time of the sensor was found to be 0.39 seconds. Further research is recommended to produce the device on a large scale to be deployed to all roads in the country.*

Keywords: Arduino, IR Sensors, control systems, traffic, Resistors

I. INTRODUCTION

The organization, arrangement, guidance, and control of both static and moving traffic, includes pedestrians, bicycles, and all forms of vehicles, is called as traffic management. Its goal is to provide the safe, orderly, and efficient flow of people and commodities, as well as to protect and improve the quality of the public environment on and near roads.

The implementation of precise traffic control procedures over a road segment or an area, under a defined policy framework, to meet stated objectives set by national, state, or municipal governments, is known as traffic management. In contrast to a single traffic control operation implemented at a particular point, traffic management is characterized by its implementation over a large region or route. To achieve certain goals, a variety of traffic management rules, practices, and approaches may be applicable.

Traffic lights, which have been in use since 1912, are signalling devices used to control traffic flow at road junctions, pedestrian walkways, rail lines, and other areas. The green light permits traffic to move in the stated path, yellow light cautions motorists to prepare for a short stop, as well as the red signal prevents any traffic from advancing.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

1.1 Traffic Control System Impact and Role

The Everyday, the traffic signal has an impact on almost everyone. Stopping at traffic signals is a necessary part of any trip in the city or suburbs, even if the route is not busy. Schoolchildren wait patiently for a traffic signal to stop the flow of traffic so that they can cross a busy street. Drivers put their own while their passengers' protection in the hands of a signal's right-of-way allocation. To ensure safety and mobility, people accept and, in certain situations, demand traffic lights. Drivers typically think that the relevant agency can run signals efficiently, so they only report the most evident faults. Some motorists are irritated by the inefficient functioning, but there is no major public reaction. Inefficiencies, on the other hand, take funds from the people in the form of higher fuel costs and longer travel times. If a user perceives a signal as operating, they are more likely to believe it. Is They go red and green; when they're not working properly, 5 this becomes a problem rather than a crisis.

The efficiency of signal system upgrades in minimizing accidents has been demonstrated through research and application.

Stops**,** Fuel consumption **,** Emission of the pollutants **,** Accidents

In most signal systems, systematic optimization of signal timing schedules is an ongoing component of traffic control system management. For many modern traffic control systems, this optimization is time consuming and costly. As a result, the amount of timing strategies and the frequency with which they are updated are frequently constrained by the resources that are available to carry out these tasks. Certain traffic systems are said to as adaptive because they can modify signal timing automatically in response to both short- and long-term traffic fluctuations. Not only do these systems provide more effective traffic control, but they also demand fewer finances to update the database. They do, however, frequently necessitate a more extensive deployment for traffic detectors.

1.2 Principles

The overall goal of traffic management to make it easier to move traffic on the roads in a safe and efficient manner while also considering the needs of a variety of road users. A broad goal would be to achieve the highest possible levels of safety, accessibility, amenity, and environment protection in the area under investigation.

Each circumstance or location has its own set of challenges to address as well as distinct goals to achieve. Detailed aims can sometimes conflict with one another, necessitating compromise. From one location to the next, the emphasis given to specific objectives may differ. As community beliefs and government policies change, the balance among accessibility, safety, and environmental issues may vary.

1.3 Traffic Signals

- **RED:** Vehicle must stop **,**Come to complete stop at stop line or before cross walk
- **YELLOW:** Stop if you can do so safely **,**The light will soon be red
- **GREEN:** Go, but only if intersection is clear **,** If turning side, wait aimed at gap in oncoming traffic to complete turn.

1.4 Different Traffic Management System Techniques

Many traffic management techniques have previously been implemented in the real world. They've utilized a variety of methods to manage traffic flow. These methods are detailed further down.

- Manual traffic control management.
- Automatic Traffic Management Technique.
- Image Processing-based Intelligent Traffic Management Technique.
- A traffic management system employs wireless technologies.
- IRIS (Intelligent Roadway Information System).
- Types of problems at unsignalized intersection.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

1.5 Types of problems at Unsignalized Intersection

There are many problems that can occur at an unsignalized intersection. Problems could be specific to an individual intersection, occur along a section of road with successive unsignalized intersections, or be a systemic problem throughout a jurisdiction. The following represent common problems experienced at unsignalized intersections that are addressed in the Unsignalized Intersection Improvement Guide (UIIG):

- Inappropriate intersection traffic control
- Inadequate visibility of the intersection or regulatory traffic control devices.
- Inadequate intersection sight distance.
- Inadequate guidance for motorists.
- Excessive intersection conflicts within or near the intersection.
- Vehicle conflicts with non- motorists.
- Poor operational performance
- Misjudgement of gaps in traffic.
- Speeding.
- Non-compliance with intersection traffic control devices.

II. OBJECTIVE

- Our project intends to reduce traffic congestion and unwelcome long delays during traffic light changes, particularly when traffic is light. It is intended to be used in areas around intersections where traffic signals are installed in order to decrease congestion at these intersections. It keeps track of the number of vehicles on each route and modifies the time with each traffic signal accordingly.
- The plan should also provide the least impact upon surrounding residents in the area of the facilities while providing a safe, direct, vehicular access to new facilities.
- The establishment of appropriate traffic flow and access into and through the Town which maximizes road safety and local amenity.
- The establishment of a procedure from which necessary traffic management worksare undertaken in a cost effective and equitable manner.
- Integration of the traffic management policy into the Council's Strategic Plan.

III. MATERIALS AND METHODS

3.1 Materials used

- Arduino UNO
- IR sensor
- LED’s (Red, Green, Yellow)
- Resistors
- Connecting wires
- Power source
- 12v adapter

3.2 Arduino UNO

- The Arduino Uno fig.3.1: Arduino's ATmega328PP is an accessible microcontroller board based ATmega328PP. The board has digital and analogue input/output (I/O) pins that can be used to connect to different expansion boards (defences) and other circuits. The board contains 14 digital I/O pins (six of which can be used to generate PWM output) and 6 analogue I/O pins, and it can be programmed using the Arduino Software (Integrated Development Environment) and a type B USB connector.
- It can be supplied by a USB cable or an additional 9-volt battery, with voltages ranging from 7 to 20 volts. It resembles the Arduino Nano and Leonardo in appearance. The hardware reference design is free to use and

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

may be found on the Arduino website under a Terms of the creative commons 2.5 license. Layout There are also design and production files available for various hardware versions.

- The Italian word "uno" means "one" and was chosen to represent the first release of Arduino Programming.
- The Arduino Uno board is the first in a series of Dongle Arduino boards; it, along with version 1.0 of the Arduino Software, served as the standard version of Arduino, which has since been superseded by recent releases.
- The ATmega328 on the board is preprogramed with a bootloader, allowing it to be programmed with the use of an interactive element. 23 While the Uno communicates via the original Tournaments are held protocol, it does not use the Arduino ide USB-to-serial driver chip, unlike all previous boards. Instead, it employs a USB-to-serial converter based on the Atmega16U2 (Atmega8U2 up to version R2).

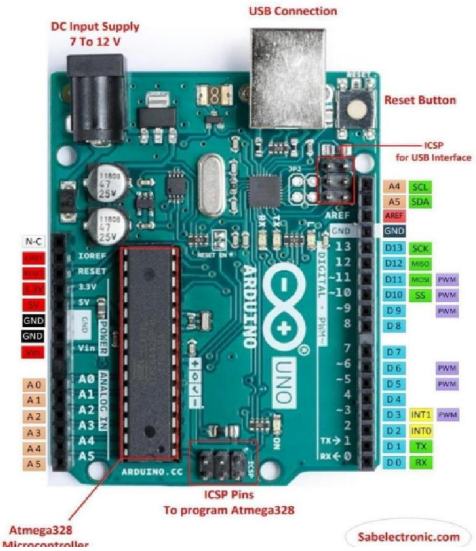

Fig. 1: Arduino UNO

3.3 IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

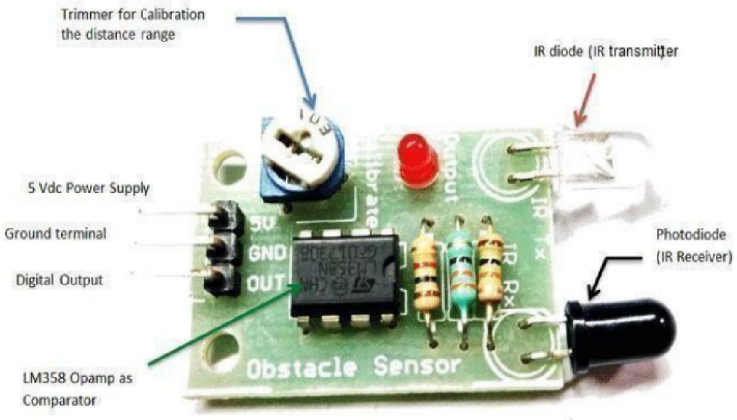

Fig. 2: IR Sensor

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light-emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects offof the object and is detected by the receiver. Active IR sensors act as proximity sensors, and theyare commonly used in obstacle detection systems.

3.4 Proto Board

Protoboard is an electrical prototyping construction basis. The name actually refers to a literal motherboard, a clean piece of wood used for slicing bread. The solderless breadboard (also known as a plugboard or a circuit array board) became popular in the 1970s, and the term "breadboard" is now often used to refer to these boards.

A breadboard is used to build and test circuits quickly before finalizing any circuit design. Thebreadboard has many holes into which circuit components like ICs and resistors can be inserted.

Some breadboards have power rails on either side of the main rows and breadboards are able tohouse large parts, including DIP 40 ICs. Most breadboards will have clips on the front, back, and sides that allow them to be connected to other breadboards to allow the construction of more complex circuits. While most engineers use breadboards for more basic circuits some have taken breadboards to the extreme and have built entire working computers complete with sound, a keyboard, and even graphical outputs. Like most technology, the first available breadboards were very expensive. Thanks to the Chinese market, breadboards are much more affordable. However,caution must be taken when purchasing such parts because cheaper breadboards are often made with inferior materials and the clamps can be loose resulting in faulty circuits. Although breadboards are incredibly useful in certain situations, it is not uncommon to see hobbyists and engineers alike using breadboards inappropriately. Learning when to use a breadboard or not can potentially save effort, time, and money

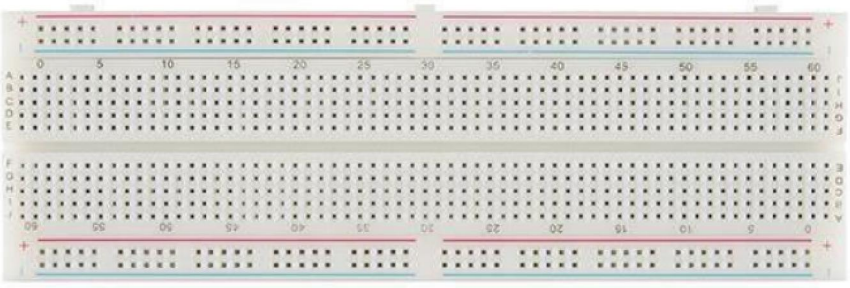

Fig. 3: Proto board.

3.5 LED Lights

The term "light emitting diode" refers to a device that emits light. In comparison to incandescent light bulbs, led light bulbs emit light up to 90% more effectively. A microchip receives an electrical current, which ignites the tiny light source known as LEDs, resulting in visible light. The heat generated by LEDs is absorbed into an absorber plate to prevent performance difficulties.

We will be using three colors of led lights they are:

- Green
- Red
- Yellow

Fig. 4: LED Lights.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

3.6 Resistor

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

Fig. 5: Resistor

3.7 Connecting Wires

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminium.

Fig. 6: Connecting wires.

3.8 Regulated Power Supply

A power supply is an electrical power supply. A power supply unit, or PSU, is adevice or system that provides electrical or other forms of energy to an output terminalsor group of loads. The phrase is most generally used to describe electrical energy sources, with mechanical energy sources being used less frequently and others being used only infrequently.

AA power supply can consist of a power system and also primary or secondary energy sources like:

- Conversion of one kind of electrical power to a different desirable form and voltage, such as converting AC line electricity to a very well lower-voltage DC for electronic equipment. DC power supply units with low voltage and low power are frequently incorporated with the equipment they supply, such as laptops and household gadgets.
- Batteries.
- Chemical fuel cells and other energy storage technologies.
- Solar power

3.9 Working Process

In this project, we are using IR sensors & Arduino to reduce traffic congestion problem and design a new type of traffic control system. IR sensor consist of IR transmitter &IR receiver. These IR transmitters and IR receivers will mounted on the sides of road at particular distance. When vehicle passes on road IR transmitter & IR receiver sensor detect the vehicle & send the information to microcontroller. Based on different densities of vehicles, microcontroller will assign pro glowing time to LED's. If the traffic density is higher, LED will glow for higher time as compared to standard allotted time or vice-versa. Initially traffic light is running at fixed delay of 10secondwhich in turn produces a delay of 40 second in the entire process. This entire embedded system is placed at that road. Arduino(microcontroller) is

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

interfaced with IR sensors & LED's. Total 4 IR sensors and 12 LEDs are required. These are connected to ports of microcontroller. IR transmitter and receiver pairs, proximity sensor is used.

As shown in the figure 7, IR sensors are placed at the red arrows at a junction where traffic congestion to be reduced**.**

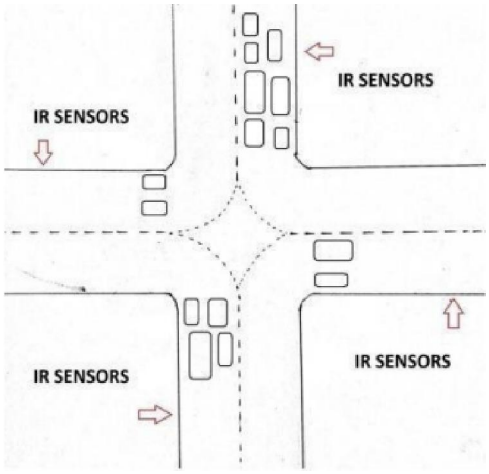

Fig. 7: Working process.

As shown in the block diagram IR sensors were installed on the sides of road near the traffic signal.

Here IR sensors detect the vehicles and gives input to the Arduino UNO.

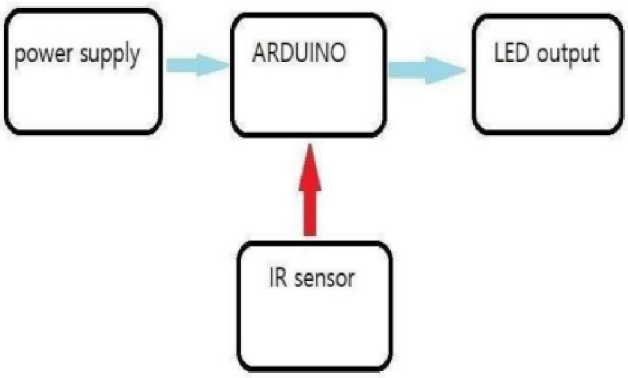

Fig. 8: Flowchart showing working principle.

Above figure shows Block diagram of Density based automatic traffic light control system. It can be seen that the main heart of traffic system is Arduino. IR sensors receivers are connected totheanalog pins of Arduino(microcontroller) and digital pins are connected to the traffic lights. If there is large traffic on the road, then the particular sensor output becomes high. High output from the sensor will activate green signal on that particular road side & other road sides are madeto be red and yellow depend on the density of the road. Switching system is used to connect two nodes that are not in direct proximity to each other. This ability to quickly & accurately distribute the right information to the proper node so that is reaches the end user in sustaining way.

- The above is the block diagram of how Arduino UNO takes the input from the IRsensors and give output through the LED lights.
- Arduino the microcontroller by taking power supply and receiving the inputfromthe IR sensors gives out the output accordingly.
- As shown in the figure if traffic is at all signals, then it runs normally as time based.
- If traffic is at only third signal, then it skips other two signals.
- If there is no traffic then it runs normally.
- If there is traffic at two signals and the other one is free then it skips the onewhich is with low traffic.
- If the traffic is more at two junctions and medium at one junction then it will giveamount of time to the ways which has more traffic congestion.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

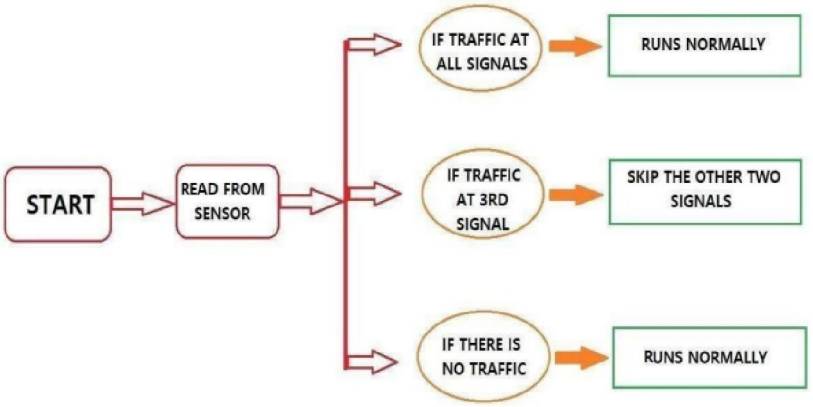

Fig 9: working model of prototype

IV. RESULTS AND DISCUSSIONS

4.1 Project Code

Code by using Python

```
int ir1 = 0;
int ir2 = 1;
int ir3 = 2;
int ir4 = 3;
int led1_green = 8;
int led1_yellow = 9;
int led1_red = 10;
int led2_green = 11;
int led2_yellow = 12;
int led2_red = 13;
int led3_green = A0;
int led3_yellow = A1;
int led3_red = A2;
int led4_green = A3; int led4_yellow = A4;
int led4_red = A5;
{
if(digitalRead(ir1) == HIGH)
{
digitalWrite(led1_green, LOW);
digitalWrite(led1_yellow,HIGH);
digitalWrite(led1_red,HIGH);
digitalWrite(led2_green, HIGH);
digitalWrite(led2_yellow, HIGH);
digitalWrite(led2_red,LOW);
digitalWrite(led3_green, HIGH);
digitalWrite(led3_yellow, HIGH);
digitalWrite(led3_red,LOW);
digitalWrite(led4_green, HIGH);
digitalWrite(led4_yellow, HIGH);
digitalWrite(led4_red,LOW);
if(digitalRead(ir2) == HIGH)
```

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

```
{
digitalWrite(led1_green, HIGH);
digitalWrite(led1_yellow, HIGH);
digitalWrite(led1_red,LOW);
digitalWrite(led2_green, LOW);
digitalWrite(led2_yellow, HIGH);
digitalWrite(led2_red,HIGH);
digitalWrite(led3_green, HIGH)
;digitalWrite(led3_yellow, HIGH);
digitalWrite(led3_red,LOW);
digitalWrite(led4_green, HIGH);
digitalWrite(led4_yellow, HIGH);
digitalWrite(led4_red,LOW);
if(digitalRead(ir3) == HIGH)
{
digitalWrite(led1_green, HIGH);
digitalWrite(led1_yellow, HIGH);
digitalWrite(led1_red,LOW);
digitalWrite(led2_green, HIGH);
digitalWrite(led2_yellow, HIGH);
digitalWrite(led2_red,LOW);
digitalWrite(led3_green, LOW);
digitalWrite(led3_yellow, HIGH);
digitalWrite(led3_red,HIGH);
digitalWrite(led4_green, HIGH);
digitalWrite(led4_yellow, HIGH);
digitalWrite(led4_red,LOW);
}
if(digitalRead(ir4) == HIGH)
{
digitalWrite(led1_green, HIGH);
digitalWrite(led1_yellow, HIGH);
digitalWrite(led1_red,LOW);
digitalWrite(led2_green, HIGH);
digitalWrite(led2_yellow, HIGH)
;digitalWrite(led2_red,LOW);
digitalWrite(led3_green, HIGH);
digitalWrite(led3_yellow, HIGH);
digitalWrite(led3_red,LOW);
digitalWrite(led4_green, LOW);
digitalWrite(led4_yellow, HIGH);
digitalWrite(led4_red,HIGH);
Serial.write("AT+CIPSEND=0,11\r\n");delay(2000);
Serial.write("Rd-4 Dens\r\n");delay(3000);
}
}
}
void okcheck()
{
```

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

```
unsigned char rcr;do{
rcr = Serial.read();
}while(rcr != 'K');
}
void link()
{
unsigned char rcr;do{
rcr = Serial.read();
}while(rcr != 'L');
}
void setup()
{
pinMode(ir1, INPUT);
pinMode(ir2, INPUT);
pinMode(ir3, INPUT);
pinMode(ir4, INPUT);
pinMode(led1_green, OUTPUT);
pinMode(led1_yellow, OUTPUT);
pinMode(led1_red,OUTPUT);
pinMode(led2_green, OUTPUT);
pinMode(led2_yellow, OUTPUT);
pinMode(led2_red,OUTPUT);
pinMode(led3_green, OUTPUT);
pinMode(led3_yellow, OUTPUT);
pinMode(led3_red,OUTPUT);
pinMode(led4_green, OUTPUT);
pinMode(led4_yellow, OUTPUT);
pinMode(led4_red,OUTPUT);
digitalWrite(led1_green, HIGH);
digitalWrite(led1_yellow, HIGH);
digitalWrite(led1_red,HIGH);
digitalWrite(led2_green, HIGH);
digitalWrite(led2_yellow, HIGH);
digitalWrite(led2_red,HIGH);
digitalWrite(led3_green, HIGH);
digitalWrite(led3_yellow, HIGH);
digitalWrite(led3_red,HIGH);
digitalWrite(led4_green, HIGH);
digitalWrite(led4_yellow, HIGH);
digitalWrite(led4_red,HIGH);
// set up the LCD's number of columns and rows:
//lcd.begin(16, 2);
// Print a message to the LCD.
//lcd.print("Self Allignment-Smooth");
digitalWrite(led1_green, LOW);
digitalWrite(led1_yellow, LOW);
digitalWrite(led1_red,LOW);
digitalWrite(led2_green, LOW);
digitalWrite(led2_yellow, LOW);
```

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

```
digitalWrite(led2_red,LOW);
digitalWrite(led3_green, LOW);
digitalWrite(led3_yellow, LOW);
digitalWrite(led3_red,LOW);
digitalWrite(led4_green, LOW);
digitalWrite(led4_yellow, LOW);
digitalWrite(led4_red,LOW);
);
digitalWrite(led2_green, HIGH);
digitalWrite(led2_yellow, HIGH);
digitalWrite(led2_red,HIGH);
digitalWrite(led3_green, HIGH);
digitalWrite(led3_yellow, HIGH);
digitalWrite(led3_red,HIGH);
digitalWrite(led4_green, HIGH);
digitalWrite(led4_yellow, HIGH);
digitalWrite(led4_red,HIGH);
void loop()
{
t_delay(10);
digitalWrite(led1_green, HIGH);
digitalWrite(led1_yellow, LOW);
digitalWrite(led1_red,HIGH);
t_delay(10);
digitalWrite(led1_green, LOW);
digitalWrite(led1_yellow, HIGH);
digitalWrite(led1_red,HIGH);
digitalWrite(led2_green, HIGH);
digitalWrite(led2_yellow, HIGH);
digitalWrite(led2_red,LOW);
digitalWrite(led3_green, HIGH);
digitalWrite(led3_yellow, HIGH);
digitalWrite(led3_red,LOW);
digitalWrite(led4_green, HIGH);
digitalWrite(led4_yellow, HIGH);
digitalWrite(led4_red,LOW);
t_delay(10);
digitalWrite(led4_green, HIGH);
digitalWrite(led4_yellow, LOW);
digitalWrite(led4_red,HIGH);
t_delay(10);
digitalWrite(led1_green, HIGH);
digitalWrite(led1_yellow, HIGH);
digitalWrite(led1_red,LOW);
digitalWrite(led2_green, HIGH);
digitalWrite(led2_yellow, HIGH);
digitalWrite(led2_red,LOW);
digitalWrite(led3_green, HIGH);
digitalWrite(led3_yellow, HIGH);
```

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, May 2023

```
digitalWrite(led3_red,LOW);
digitalWrite(led4_green, LOW);
digitalWrite(led4_yellow, HIGH);
digitalWrite(led4_red,HIGH);
}
```

- The prototype is prepared and tested with several scenarios.
- It is observed that it works well with the vehicles.
- Traffic congestion is limited as compared to different traffic techniques such as time-basedtraffic control.

V. CONCLUSION

Now-a-days, traffic congestion is the main problem in major cities since the traffic signal lights are programmed for particular time intervals. However, sometimes the demand for longer green light comes in at the one side of the junction due to huge traffic density. Thus, the traffic signal lights system is enhanced to generate traffic-light signals based on the traffic on roads at that particular instant. Technologies and sensors have made it possible to create smart and intelligent systems that can address human issues and make life easier. Using infrared sensors on both sides of the highways, our system can estimate traffic density. The time delay for the green light is based on it. can be increased and we can reduce unnecessary waiting time. The whole system is controlled by an ARDUINO microcontroller. The designed system is prepared as a prototype and checked in several perspectives.

REFERENCES

[1]. G. Thanusree, M. Vijay kiran, A. Manideep Reddy, Dr. R. Premsudha4 Keesagani Aakanksha5, G. karthik reddy6 Assessment Of Air Quality Around Heavy Traffic Zone In Hyderabad, International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Impact Factor: 7.301, Volume 3, Issue 7, April 2023, ISSN (Online) 2581-9429 PG NO 258-269

[2]. G. Thanusree, M. Vijay Kiran, A. Manideep Reddy, Dr. R. Premsudha4 Arati Parida5, Keesagani Aakanksha6, G. Karthik Reddy7Air Quality Monitoring at Heavy Traffic Zone in Hyderabad Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Impact Factor: 7.301, Volume 3, Issue 7, April 2023, ISSN (Online) 2581-9429 PG NO 401-409.

[3]. M. D. Irfan1, Myadaram Gayathri2, Shadipuram Akash3, Dr. R. Premsudha4Analysis of Water and Air Quality in and Around HIMSWM Treatment Plant- Hyderabad Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Impact Factor: 7.301, Volume 3, Issue 7, April 2023, ISSN (Online) 2581-9429 PG NO 63-72

[4]. Evaluating reinforcement learning state representations for adaptive traffic signal control - Wade Thorpe.

[5]. Roozemond - an intelligent agent architecture for traffic light control Intelligent traffic signaling agents – researchgate.com.

[6]. Review on Density based Automatic Traffic Light Control System By Prof. Ms. N.C.Band, M.V. Virulkar, R.S.Chopade, R.A.Chikte.

[7]. Rongrong Tian, Xu Zhang - traffic modeling software – sciencedirect.com.

[8]. Jianhua Guo - traffic signal timing optimization- International Research Journal of Engineering and Technology.

[9]. Different Techniques Used in Traffic Control System:An Introduction Siddamma. G. Pashupatimath Prof. Shilpa. Madhavanavar Basaveshwar College of Engineering, Bagalkot, India.

[10]. IMAGES – pinterest.com.