TRAFFIC MANAGEMENT SYSTEM

PROJECT NAME: SMART CONTROL OF TRAFFIC LIGHT

SYSTEM USING ARTIFICIAL INTELLIGENCE

TEAM NAME:

Project-212981-Team-1

SMART CONTROL OF TRAFFIC LIGHT SYSTEM USING ARTIFICIAL INTELLIGENCE

INTRODUCTION:

The proposed work is intended to study and analysis the management of traffic light signal. By the use Artificial Intelligence and Arduino technique. Therefore, this chapter provides the basic overview and the core objectives of the presented work.

OVERVIEW:

Traffic administration has the goal to constantly improve traffic system and regulation. As the number of vehicle users constantly increases and resources provided by current infrastructures are limited, intelligent control of traffic will become a point of focus in the future. Avoiding traffic jams is beneficial to both environment and economy. In our research we focus and optimization of traffic light controller in a city using IR sensor and developed using Arduino. An intelligent transportation system (ITS) estimates the traffic parameters and optimizes traffic signal to reduce vehicle delays and stop. Fixed control on traffic is basically not control according to the density, but in a manner of programming which is already fixed in the system. This thesis proposes an intelligent system using Arduino for implementing it in the city.

OBJECTIVES:

Traffic management has become one of the severe problems today because of the growth of industrialization and population there has been a tremendous growth in the traffic. With the increase in traffic there arise a number of problems such as heavy traffic jams, violation of traffic rules etc. Mismanagement and traffic congestion also results in long waiting times, loss of fuel and money etc. It is therefore necessary to have a fast, economical and efficient traffic control system for national development. One way to improve traffic flow and safety of the current transportation system is to apply automation and intelligent control methods to roadside infrastructure as well as vehicles.

Our objective to reduce the following points.

1. Heavy Traffic Jams.
2. No Traffic, but Still Need to Wait on Signals.
3. Emergency Car /Ambulance Stuck in Traffic Jam.
4. Accident increasing day by day

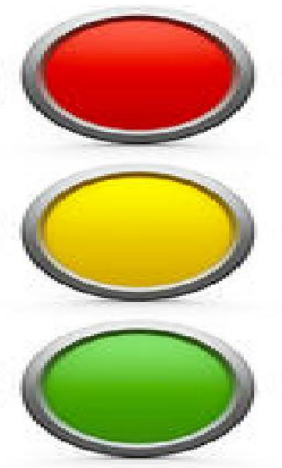
TRAFFIC MANAGEMENT IN ARTIFICIAL INTELLIGENCE:

An intelligent transportation system (ITS) is an advanced application which aims to provide innovative services relating to different modes of transport and traffic management and enable users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks. Some of these technologies include calling for emergency services when an accident occurs, using cameras to enforce traffic laws or signs that mark speed limit changes depending on conditions Intelligent transport systems vary in technologies applied, from basic management systems such as ; control systems; container car navigation traffic signal management systems; variable message signs; automatic number plate recognition speed cameras or to monitor applications, such as security systems; and to more CCTV advanced applications that integrate live data and feedback from a number of other sources, such as parking guidance and information weather information systems; ; bridge systems; and the like. Additionally, predictive techniques are being developed to allow advanced modelling and comparison with historical baseline data.

Traditional Traffic Light System:

We're going to discuss one of the systems that are being used and implemented in our society, the traffic light system. And as we go on, we're also going to discuss in this thesis the different types of traffic lights that are currently being used today.

General Overview:



Traffic lights are also named as stoplights, road traffic lamps, traffic signals, stop-and-go lights which are signalling devices placed at road crossings, everyday pedestrian crossings and other locations to control competing flows of traffic. Traffic lights have been fixed all over the world in many cities. Traffic light control assigns a right way to the road users by using lights in normal colours (red – amber/yellow – green). Traffic light control system uses a worldwide colour code (a specific

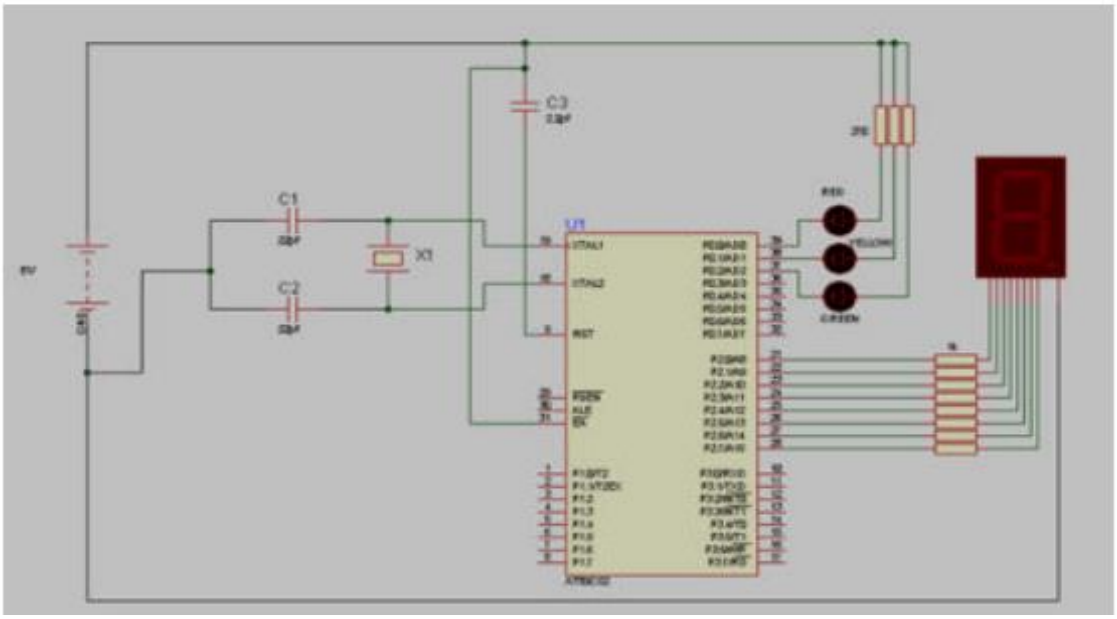
colour order to enable colour recognition for those who are colour blind).

In China, there were unsuccessful efforts to change the importance of “red” to “go” during the Cultural Revolution. Typical traffic lights consist of three types of coloured lights such as red, orange and green. In a typical cycle, turning on of a green light allows traffic to continue in the way indicated. Similarly, lighting of the amber/orange light for a short time of transition represents a signal to prepare to stop, and the Illumination of the red signal disallows any traffic from going on.

Traffic Light Controller using Microcontroller:

The main objective of this traffic light controller is to provide sophisticated control and coordination to confirm that traffic moves as smoothly and safely as possible. This project makes use of for indication purpose and a microcontroller LED light is used for auto changing of signal at specified range of time interval. LED lights gets automatically turns on and off by making corresponding port pin of the microcontroller “HIGH”.

LED Traffic Lights – This type of traffic light lamps are using light-emitting diodes as an alternative to the traditional incandescent or halogen light bulbs. LED traffic lights are composed of an array of LED bulbs arranged in diverse patterns, unlike the incandescent-based traffic lights which use a single large bulb. These multiple LED bulbs when viewed from a distance, appears as a continuous light source. Most consumers prefer this type of traffic light because of its numerous advantages such as greater energy efficiency, capability to be solar-powered, much longer lifetime between replacements, bulbs will still operate even if some of the LED bulbs in the array fail, brighter illumination with better contrast against direct sunlight, capability to display multiple colours and patterns from the same lamp, and much faster switching. Instead of sudden burn-out like incandescent-based lights, LEDs start to gradually dim when they wear out which indicates the need for replacement.



Working of the Traffic Light Controller:

In the above circuit diagram of traffic light controller, a sevensegment display is used as a counter display, and three LEDs are used for the purpose of traffic light control. An 8051 Microcontroller is the brain of this whole project and is used to initiate the traffic signal at the intersections on road. This circuit diagram makes use of a crystal oscillator for generating frequency clock pulses. The LEDs are interfaced to the Port zero of the microcontroller and are powered with 5v power supply. Seven-segment display is connected to the port2 pins of the 8051 microcontroller with an common anode configuration. The LEDs get automatically switched on and off by making the corresponding port pins of the microcontroller high, based on the 8051 microcontroller and its programming done by using KEIL software. At a particular period of time, only the green light holds ON and the other lights remains OFF, and after sometime, the changeover traffic light control from green to red takes place by making the succeeding change for glowing of yellow LED. This process continues as a cycle and the timing for changing the LEDs can be displayed with the use of a seven-segment LED display in this project.

Issues in Traditional Traffic Control System.

The microcontroller-based traffic light system for road intersection control was developed to direct the movement of vehicles meeting at a road junction without any collision. To achieve this, the microcontroller allocates time for each path when the vehicles along that path will move and the other vehicles from the other path will stop. When the time allocated for a specific path has been exhausted, the red light will be ON meaning stop and the next line will be ON (green light) which means the vehicle in that path should start moving. When the time is about to be exhausted, the yellow light will be ON in the third path informing the vehicles in that path to be ready to move, and after some seconds the green light will be ON. Traffic signals are vital to helping vehicles and pedestrians safely travel. They increase the efficiency and order of traffic to reduce the number of accidents. They provide clear guidelines regarding when cars or pedestrians can enter an intersection or when they should stop and wait. While they are necessary to control traffic and keep commutes as smooth as possible, there are both advantages and disadvantages of traffic signals.

Disadvantage of traffic light are as follows

1. Timing is fixed.
2. Excessive Traffic Delays
3. Impatient Driving.
4. Cost of Traffic Signals.
5. Emergency Car /Ambulance Stuck in Traffic Jam.

In order to reduce signalling time according to density of traffic and give

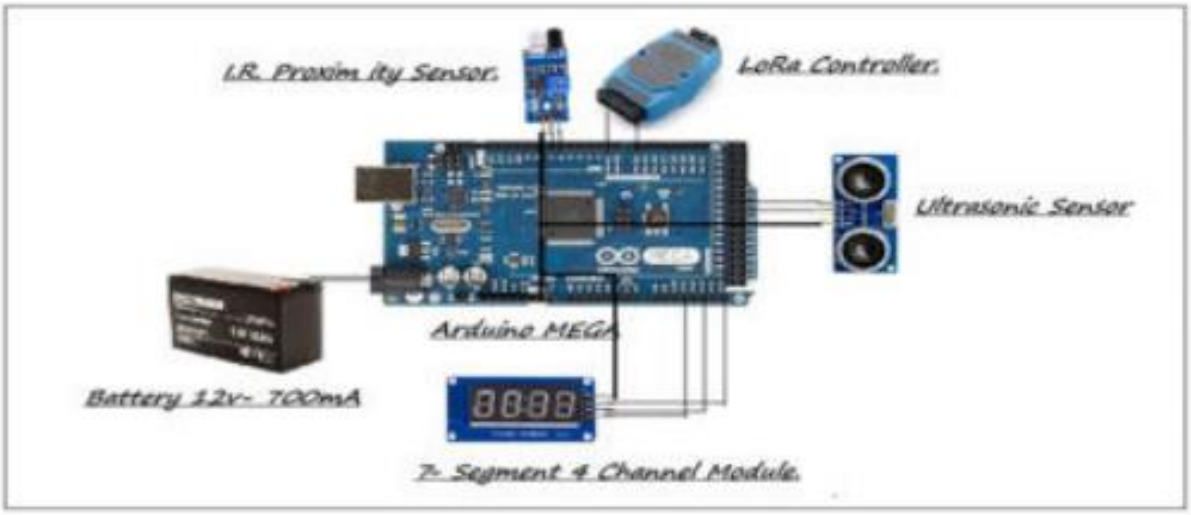
clearance to emergency vehicles the new system which is able to do all these things simultaneously should be established.

PROPOSED WORK:

This chapter contains the methodology and proposed algorithm for explaining the required system.

Proposed Model:

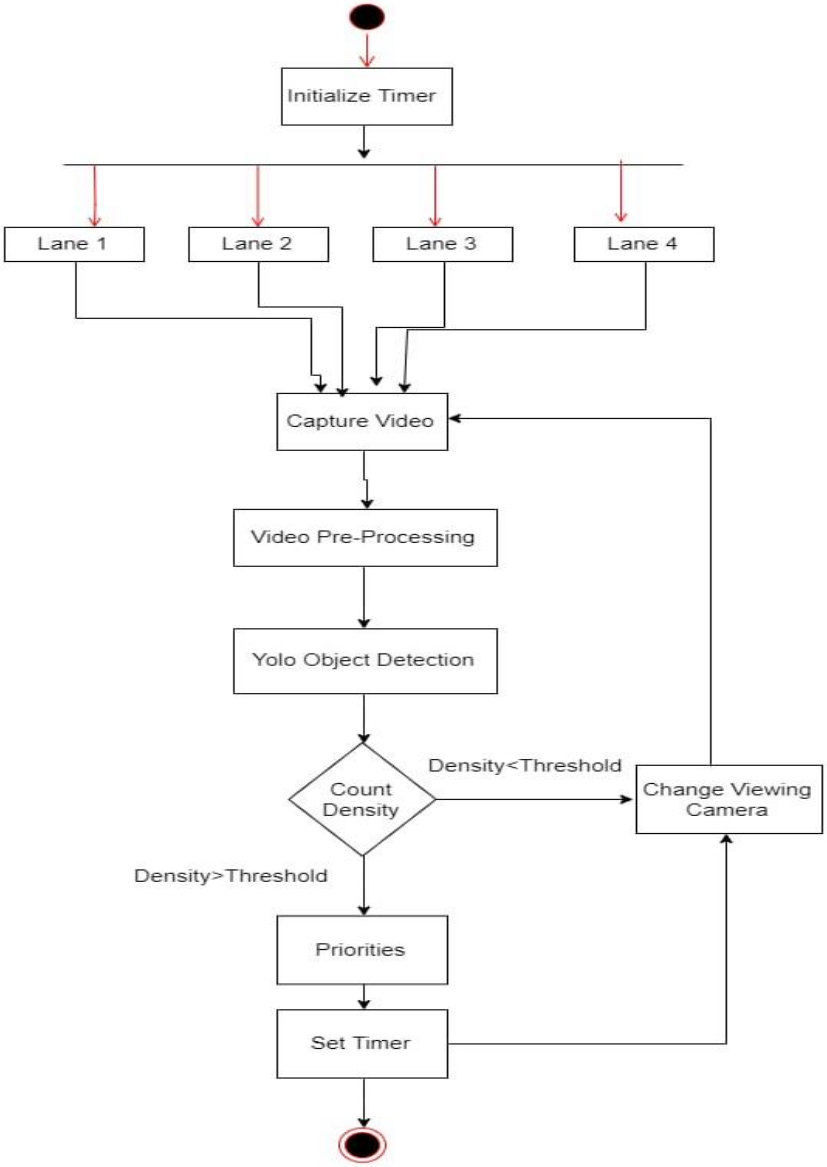
The proposed model which is used to implement the traffic vehicle is reported in this section. The model demonstrated and the components of model are explained in this model.



Component Description:

- **IR proximity sensor.**
- **Ultrasonic Sensor.**
- **Wireless Transmitter and Receiver.**
- **Arduino Mega.**
- **Long Range Controller (LORA).**
- **LED's.**

Flow Chart:



Proposed Algorithm:

Step 1: Start

Step 2: Connect A to B cable to ARDUINO and our PC.

Step 3: Open the Arduino.cc and select the board and port.

Step 4: Load the program to ATMEGA2560 micro controller.

Step 5: Connect all VCC ports to 5V and all GND ports to GND.

Step 6: Connect all 12 led' s wire according to coding on port 2- 13.

Step 7: Connect all 4th timer wire according to coding on port 22 – 28 (on all even ports).

Step 8: Place the vehicle on the road according to condition.

Step 9: I.R. sensor and U.S. sensor will sense the traffic and green light time will be changed accordingly.

Step 10: Finish.

Implementation:

The proposed model is used for time management for traffic signal. In this chapter the implementation of the proposed system is described. Therefore the required tools and techniques and implemented scripts are reported in detail.

Tools and Techniques:

Implementation of the required system utilizes software and hardware for successfully implementation is listed in this section.

(A) Technology/Framework:

C++

(B) Hardware Specifications:

- 16MHz (clock speed)
- 256KB (8KB by boot loader)
- 8KB (SRAM)
- 4KB (EEPROM)
- 54 Pins (14 provide PWM)
- 16 Pins (Analog input Pins)

(C)Software Specifications:

Arduino.cc

Coding:

```
f = open("out.txt", "r")
no_of_vehicles=[]
no_of_vehicles.append(int(f.readline()))
no_of_vehicles.append(int(f.readline()))
no_of_vehicles.append(int(f.readline()))
no_of_vehicles.append(int(f.readline()))
baseTimer = 120 # baseTimer = int(input("Enter the base timer value"))
timeLimits = [5, 30] # timeLimits = list(map(int,input("Enter the time limits ").split()))
print("Input no of vehicles : ", *no_of_vehicles)

t = [(i / sum(no_of_vehicles)) * baseTimer if timeLimits[0] < (i / sum(no_of_vehicles)) * baseTimer < timeLimits[1] else min(timeLimits,
key=lambda x: abs(x - (i / sum(no_of_vehicles)) * baseTimer)) for i in no_of_vehicles]
print(t, sum(t))
```

RESULT:

Conclusion:

The Design and Implementation of the DENSITY BASED SMART TRAFFIC LIGHT BASED ON ARTIFICIAL INTELLIGENCE is to Save time (because “TIME IS MONEY”) to decrease Man Power, and Increased in Development of Artificial Intelligence and Making our city Smart and Decrease Rush on Roads. The main feature of our model is automation on roads and also wireless technology for any emergency vehicles to reach the destination as soon as possible.

In this design work, a density based on traffic light control system was developed for traffic control at '+' road intersection to reduce unnecessary time wastage and minimize road traffic casualties which the existing conventional traffic light control system has failed to achieve. As demonstrated by the test results in the simulation and the prototype implementation, the design has shown that the system developed is a viable tool for traffic control and the incorporation of a surveillance system would help reduce road casualties caused by road users who ignore traffic signals. Lastly, the objectives of the design were achieved.

This thesis has presented a means of controlling traffic at '+' road intersection using infrared sensors with an embedded microcontroller chip. Specifically, it demonstrates a working software solution for controlling traffic based on the density of traffic on each lane at the intersection. It provides a means of succour away from the conventional traffic light associated with even timing of lanes of traffic irrespective of the number of vehicles on the lanes per kilometre which is the density associated with that lane. This project as resourceful as it has proven to be can be improved upon by; the incorporation of renewable energy

sources for 24 hours performance of the system. The system could also be designed to transmit captured vehicle plate numbers of defaulters in real time to relevant traffic agencies. Lastly, the design can be modified to control more than four lanes of traffic.