

Synchronized Traffic Controller: The Smart Solution for Smart Cities

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Abstract

Traffic signal controlling systems are widely conventional monitor and control the flow of automobiles through the junction of the many roads. We aim to work out the graceful motion of vehicles on roads. Our idea proposes a system which is able to help us to manage the traffic more effectively. we would like to form a system that produces it easier to manage traffic. If there's more traffic at one signal of a square and fewer traffic at another signal for this our system wants to create changes within the timings for the green signals instep with the traffic at each road.

Keywords: *Traffic Signals, TSOP Sensors, Arduino Microcontroller.*

1. Introduction

As the growing population, the number of travelers constantly increases while resources provided by current Infrastructures aren't sufficient for this, therefore intelligent control of traffic became a very serious issue [1]. Traffic Signals within the urban areas are supported by fixed predefined cycles of traffic lights, which ultimately not configuring in many cases and causes unnecessary extra waiting times for the vehicles [2]. The normal traffic light monitoring techniques include interval monitoring. However, there's no system which we will call a capable and effective system or are often adopted in real-world effectively [3]. This is often because the control system is non-linear and thus established methods of modelling and control cannot work alright. In order to solve the above-mentioned issue, comes our project. If there's more traffic at one signal of a square and fewer traffic at another signal for this our system wants to form changes within the timings for the green signals consistent with the traffic at each road [4]. We even have the ever-increasing problem of the traffic violation. Our project also helps in reducing traffic light violation. for instance, if anyone crosses the red signal our system will generate a challan for breaking the signal and it'll directly send the challan to the registered number of the vehicle with a selected deadline [5]. In order to curb the number of violations and reducing the number of accidents happening. Currently, the monitoring approaches of traffic violation aren't effective and ok within the majority of the cases [6]. Project Architecture: Hardware for the traffic signals using sensors to see the traffic on the roads. Software will be made using C, C++, Python, MI.

2. PROJECT DESCRIPTION:

- MICROCONTROLLER

The micro-controller is usually available within the market without much complications and uncertainty. The micro controller is at the heart of all the electronics projects. Hence it is same for ours also the micro-controller acts as a bridge between the hardware and the software. The defined process is executed by fetching the inputs from the sensors and then providing the accepted output as per the conditions observed. So, the Arduino board plays a major role in our project.

- POWER SUPPLY

All Arduino boards need electric power to function. A power supply is what's won't to provide electrical power to the boards and typically are often A battery, USB cable, AC adapter or a regulated power source device.

- TIME-SETTING

If there's more traffic at one signal of a square and fewer traffic at another signal for this our system wants to form changes within the timings for the green signals consistent with the traffic at each road.

- CAMERA

The cameras which are located on the traffic signals will help us to collect the data of the density of the vehicles on the roads.

• SENSORS

TSOP sensor will detect the density of vehicles, their number and can provide this information to microcontroller. So, the sensor plays the primary and foremost role in our project in sensing the vehicles. the info which it'll provide are going to be then processed for adjusting the time consistent with the conditions. this is often sensing technology is best fitted to our project as compared to other sensors because it will provide the precise data to the microcontroller which isn't possible altogether the available sensors in markets.

3. FLOW CHART:

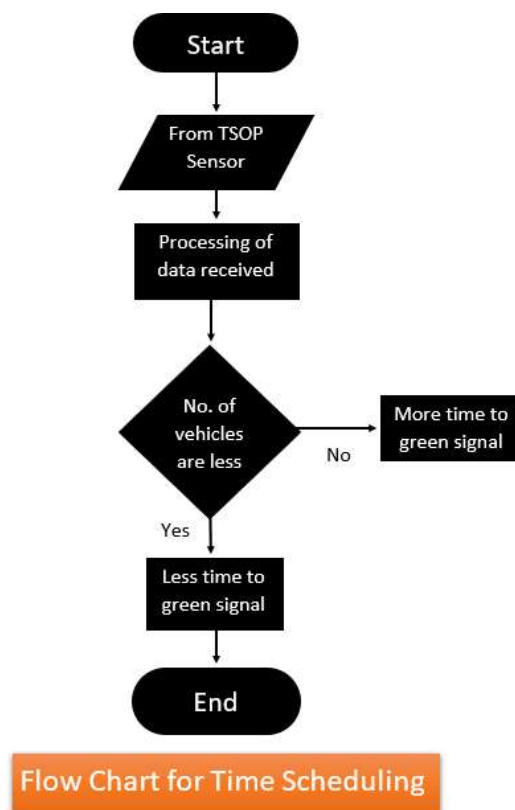


Fig 1: Flow Chart for Time Scheduling

4. BLOCK DIAGRAM:

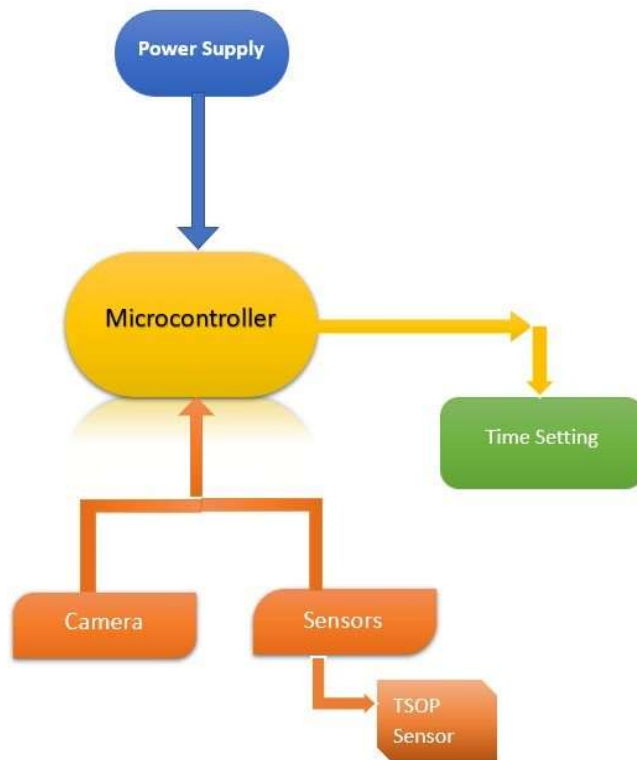


Fig 2 : Block Diagram

5. WORKING MODULES:

5.1 MODULE 1

SENSORS AND CAMERA INPUTS

TSOP sensor will be used for determining the density of vehicles in terms of their number on every lane and will provide this information to the microcontroller. Hence, the sensor plays the first and foremost role in the out shaping of our project in sensing the vehicle data. The data detected will be going to be then processed for adjusting the green signal go time with some predefined conditions. This sensing technology is best fitted to our project as compared to other sensors because the accuracy provided is utmost. Thus, the precise data to the microcontroller which isn't possible in for other sensors will be our plus point.

The cameras which are already preinstalled over the top fitting of the traffic signal lanes will also be used in our project for the detection of the density of the vehicles.

5.2 MODULE 2

PROCESSING, DECISION MAKING, OUTPUT

Arduino is the dynamic microcontroller which is easy to code in C & C++ and the microcontroller is equipped with the ports and pins which are more the sufficient for the project which we are aiming for. The micro-controller is definitely available within the market without much complications in its name. The micro controller plays major role for all the electronics projects so for ours. The micro-controller is a platform between the hardware and therefore the software. It will keenly process the inputs taken from the sensors then provide the specified output consistent with the conditions observed. So, the Arduino board is heart of our project also.

All the data will be handled in the microcontroller and then the decision will be made about the timing of the green signal if there is more traffic at one signal of a square and fewer traffic at another signal for this our system wants to form changes within the timings for the green signals consistent with the traffic at each road and then the output is given to the signal.

5.3 MODULE 3

CENTRAL HUB

The primary collection point for all information. It will be at the centre of your data system and connects to all the channels. It collects data from each of these channels, then arrange and act on that data, often in real time.

The information used across the organization is usually outdated, incomplete, or maybe incorrect. Departments collect an equivalent information in several formats. Crucial data is siloed because it's accessible to only one team or can only be used. There will be a hub within the centre of the town for the info collection and monitoring of the vehicles and signals of the entire city. It will also monitor the violation that happens from signal breaking.

6. PROJECT IMPLEMENTATION:

6.1 GRADUAL INCREASE IN NUMBER OF VEHICLES USING THE ROAD A DAY.

Major issue which is increasing in cities nowadays is that the problem of increased use of vehicles. The vehicles became the need for people without the utilization of auto coping up with the fast-growing world would be nearly impossible. This increase in number of vehicles on huge level has successively cause challenging situation of traffic management.

Traffic congestion may be a challenging task for traffic management system in urban areas. the present system is small backward in effective management of the traffic there are huge traffic jams within the cities resulting in wastage of valuable time also as resulting in extra fuel consumption which successively is harming the environment by polluting the air.

There is no alternative to prevent the utilization of vehicles. So, what we will do is we will attempt to develop an efficient way where within the traffic congestions are often avoided or reduced to a particular minimal level.

So here comes our project in picture we are getting to design a system which can effectively manage the traffic by using latest technology and thru use of smart way. The traffic management are going to be way easier than it's today. The automated scheduling are scheduling of timer consistent with the requirements and demand of that specific signal. So, the traffic jam is often avoided or reduced by implementing our developed project.

6.2 BY THE UTILIZATION OF SENSORS, ELECTRONICS AND SOFTWARE AUTOMATION TECHNIQUES THE SIGNALS WILL BECOME SMART TO ACQUIRE THE DECISION TO ALLOT TIME ACCORDING TO TRAFFIC DENSITY CONDITIONS.

Let's go deeper on what we trying to try to in our project, we are using technology based on TSOP sensors which is latest technology till date in markets which senses the physical data efficiently. Using the time difference between the sent and received signal, the space to the thing is often determined. This principle is useful in our project to sense the number of vehicles on particular side of signal.

Then the Microcontroller are going to be coded with the programs which will collect the info and process it within the manner that it'll analyze the number of vehicles and that they will generate the timing accordingly i.e., if the vehicles are less, it'll allot small tons of green signals and if the vehicles are more it'll tons big slot of green signal there to.

7. ADVANTAGES:

7.1 TIME SAVING

Our project will mainly help in time saving of the people in travelling they're going to not have wait for much longer to cross the signal as our project is getting to solve this problem of individuals waiting longer and longer on the signals expecting the green light to cross the road.

7.2 ROAD ACCIDENTS ARE OFTEN AVOIDED

As the traffic is continuously increasing therefore the chances of accident on roads also are on rise. Therefore, there's a requirement of handling the traffic in such a way that it'll make the flow of traffic fluent. Our system will convince be the one which can reduce the accidents on road the efficient flow will convince be an element in reducing the road accidents.

7.3 BUSINESS CONGESTIONS ARE FREQUENTLY AVOIDED

As the timing change of the green signal is rested on the business of the roads. So, our design is going to be salutary within the case of holdback. Lower the number of vehicles less situation is going to be created of the business jams. Therefore, business signals are frequently avoided fluently.

7.4 QUICK CONDUCT ARE FREQUENTLY TAKEN AGAINST THE SIGNAL VIOLATORS.

Signal violation has turned to be a well-liked trend within the prevailing society, the violators think that they are doing nothing wrong by violating the traffic rules. It's because no timely conduct been taken against them. There is no problem of authority however, the authority tries its stylish to discipline the violators, maybe trying their stylish it veritably delicate task to discipline each and each one who's violators. So, our system will of great help to penalize the signal violators with the application of technology. This discipline will consecutively reduce the signal violations to lesser extent. So, the society are going to be indeed more disciplined in following the business rules.

7.5 HELPS IN REDUCING ENERGY CONSUMPTION.

As the vehicles will not stay longer on the traffic light it will take lower time reach their destination and smaller energy is going to be employed in this illustration. So, our design helps in reducing energy consumption.

8. CONCLUSION AND FUTURE SCOPE

8.1 CONCLUSION

The end behind this offer or system is to devaluate the traffic viscosity by making use of detectors which are available on the four roads, the beats entered by the detectors are going to be transferred to micro-controller.

If there is further business at one signal of a square and smaller business at another signal for this our system wants to form changes within the timings for the green signals harmonious with the traffic at each road.

The proposed model here is predicted to perform better with time, because the volume of knowledge collected increases, it will be possible to form better prognostications. Therefore, a dependable and enormous data set will help in effective estimations.

Moment traffic jam is that the biggest problem which is seen everywhere and really hard to face. So, this fashion will help us to change moment's problems with the simplest results and benefits this fashion will really help us to form the longer-term roads veritably light and free with downfall within the accident graph.

8.2 FUTURE SCOPE

Though the prototype model which we're getting to make, the real-life situation goes to be far more gruelling and demanding. Many of the challenges that ought to be taken under consideration are listed as follows:

Low range detectors might not be a result for long range signalling system. we should always resort to Ray or radar or Computer Vision/Videotape Processing Based ways for giant scale set-ups.

iNext is that the influence of slapdash signals which will alter the reading of detector receptors and cause conveying false information to the microcontroller.

Periodic checking of the delicacy and perfection may be a must-have for efficient operation of this model prototype.

Safety first it's to be absolutely made sure that no concession is being made on questions of safety, i.e., a secondary stage-by set-up which will switch from automated to homemade mode, should be handed just in case of detector OR circuit malfunctions in order that vehicular crowd does not transcend control. As a part of unborn advancements, the traffic check post could also be attached by wireless transmitters by which the crossings ahead could also be an expectation of the traffic that is approaching.

Still, we'll take it further to NMC if our design works efficiently.

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