

“Solar & Density Based Traffic System”

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ABSTRACT

Traffic congestion is one of the major issues in the present-day world. The present day traffic signal control only works on a fixed time delay basis irrespective of the vehicle density. With the rapid increase in vehicle usage, such a system can prove to be inefficient causing a lot of losses. In this situation we proposed a System which tries to handle all problems regarding traffic. Due to Solar system usage of electricity will be less also with the help of microcontroller, IR sensors & other electronic devices we will make a reliable and effective traffic system. Area of domain of our Topic is Smart Grid is a concept for transforming the electric power grid by using advanced automatic control and communications techniques and other forms of information technology. It integrates innovative tools and technologies from generation, transmission and distribution all the way to consumer appliances and equipment.

INTRODUCTION

The economic growth in India is increasing due to its massive growth. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints. Also, Indian traffic is non lane based and chaotic. It needs traffic control solutions, which are different from developed Countries. Intelligent management of traffic flows can reduce the negative impact of congestion. In recent years, wireless networks are widely used in the road transport as they provide more cost effective options [1]

In the growing cities like India due to the rapid increase in economic growth automobiles are increasing in a vertical manner. Due to this increase of population density traffic levels arise which produce unbearable crises to daily life. To reduce this congestion of vehicles in the traffic junction various papers and ideas are introduced. But still now the traffic level remains the same. In the existing system these problems can't be solved, that's why for such problems smart technology and innovative techniques should be used using sensors beside the road will help to know the density of traffic and number of vehicles, this information will get forward to microcontroller and it will give instruction to the signals to continue green light or to continue red light.[3]

EXISTING SYSTEM:-

The presence of a fixed time period of signal operation irrespective of the lack of comparison of the vehicle densities in the different parts of the road at a junction. Even if the road is empty and lacks the presence of vehicles, it still receives a fixed time period of green signal which is of no use.[4]

This can lead to a large level of traffic congestion since there is no uniform flow of vehicles from all the roads at the junction. Human irritability increases and this can be one of the main reasons for some of the traffic violations such as jumping signals, over speeding, etc.[2]



With the number of vehicle users constantly increasing, the facility provided by the current system is limited and inefficient with respect to the energy and time consumed. A survey shows that an average person spends about four to six months of his/her entire life just waiting for the green light to be turned ON at a signal



It is also been identified that this inadequate facility and irrational distribution of signal control is leading to such traffic issues[5]. These inefficient traffic control system is also contributing to various traffic violation wherein the people don't possess the patience to wait for that interval of the signal which does not have much vehicle density than the other existing densities.[6]

PROPOSED SYSTEM

Currently the vehicle problem is increasing and Traffic congestion is a severe problem in many modern cities all over the world. To overcome the problem, we have come up with the idea of Density based traffic light control system. Traffic research has the goal to optimize traffic flow, as roads have been overloaded with the increasing number of vehicles. There are several models which give solutions for traffic simulation. In our research we have focused on controlling the traffic lights on the basis of traffic density. Nowadays congestion in traffic is a serious issue. The traffic congestion can also be caused by large Red light delays, etc. The delay of the respective light is hard-coded in the traffic light and it is not dependent on traffic. Thus I propose multiple traffic light control systems. The system tries to reduce possibilities of traffic jams, caused by traffic lights, to an extent.

Junction timings selected are fixed. Sometimes high traffic density at one side of the junction demands longer green time, as evaluated in typical allotted time. The Future scope includes Profiling of the traffic by storing the data and managing the traffic lights according to the collected data. The Profiling can also be used for Traffic study and the variation in traffic density throughout the day, week, month or a year. Further, we can optimize this system for emergency Vehicles such as ambulances. The Traffic data collected can be used to locate different routes for a specific daily vehicle to avoid the congestion problem. The main purpose of introducing this smart traffic system is that for every minute the vehicles at the junction will be dense and the traffic lights shall be changed to each side for some fixed time. Even though there are no vehicles on a particular side, the traffic signals will glow for a given fixed time. Due to that there is time wastage & vehicles on the other side have to wait for the time to complete the process. So to reduce the wastage of time, we can implement the system that controls the traffic based on the heavy flow of

vehicles at any particular side. With this system, we shall count the number of vehicles at each side at the junction and give path to the particular side which has denser traffic and keeping the other sides stopped

Advantages:-

- Fully automatic, power consumption.
- It provides easy access to the traffic light.
- Low cost to design the circuit, maintenance of the circuit is good.
- By using this microcontroller IC we can create many more controls for the appliances.
- Easy convenience to handle

Aim & Objectives:-

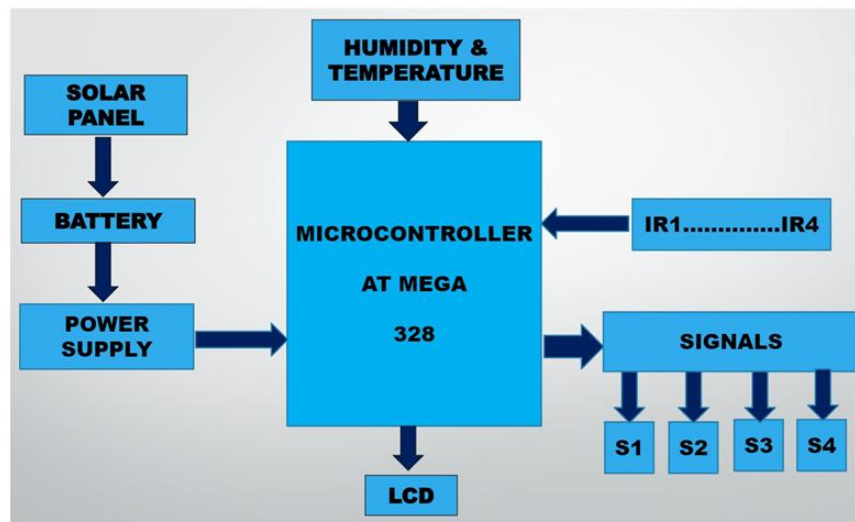
AIM :-

Optimize Energy Systems focusing on minimizing the consumption of non-renewable resources, high efficiency, optimal use of new and existing energy and ICT infrastructure. Reducing traffic congestion also to reduce unwanted long time delays. Replacing Costly Actuated Traffic System with our Solar and Smart Traffic System by using sensor and controller's technologies

OBJECTIVES:-

- 1) Reducing traffic congestion.
- 2) Reducing unwanted long time delays.
- 3) It is designed to be implemented in places nearing the junctions .
- 4) It keeps a track of the vehicles .
- 5) Need to develop the system without developing the infrastructure.

Block Diagram:-

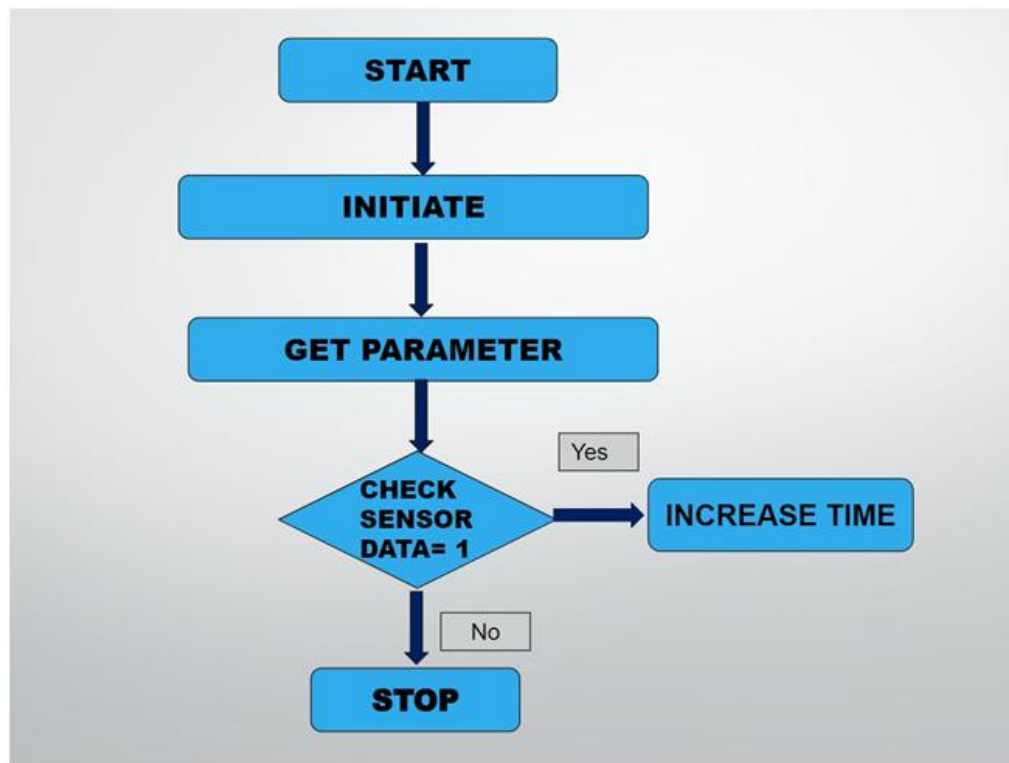


THE WORKING FLOW:-

- The system is based on a microcontroller. The microcontroller used in the system is ATMEGA 328. The system contains an IR transmitter and IR receiver which are mounted on either side of roads respectively.
- The IR system gets activated whenever any vehicle passes on the road between the IR transmitter and IR receiver. Microcontroller controls the IR system and counts the number of vehicles passing on the road. Microcontroller also stores the vehicle count in its memory.
- Based on different vehicle counts, the microcontroller takes decisions and updates the traffic light delays as a result. The traffic light is situated at a certain distance from the IR system.

- Thus based on vehicle count, the microcontroller defines different ranges for traffic light delays and updates those accordingly. In this system IR sensors are used to measure the density of the vehicles which are fixed within a fixed distance.
- All the sensors are interfaced with the microcontroller which in turn controls the traffic signals system according to density detected by the sensors. If the traffic density is high on a particular side more priority is given to that side .
- The sensors continuously keep sensing density on all sides and the green signal is given on a priority basis, where the sensors detect high density. The side with the next priority level follows the first priority level.
- By using this system traffic can be cleared without irregularities and time delay when there is no traffic on the other side can be avoided.

ALGORITHM :-



Software Tools

Programming Tools:- The software for the robot is written in the Arduino programming language. Arduino UNO is programmed using Arduino IDE software. ATmega328 on Arduino UNO comes with a boot loader that allows you to upload new code to it without using any external hardware programmer. It uses the STK500 protocol to communicate. You can bypass the boot loader and program the MCU through an in-circuit serial programming (ICSP) header, but using bootloader programming is quick and easy. Select the correct board from the Tools Board menu in Arduino IDE and burn the program (sketch) through a standard USB port in the computer.

RESULT

Results include the successful operation of the traffic control and monitoring system. The system contains multiple IR transmitter and IR receiver for traffic density measurement which are mounted on the either sides of roads respectively. The IR system gets activated whenever any vehicle passes on the road between IR sensors. When one sensor will be ON at that time density will be less when two sensors will be ON at that traffic density is medium when all 3 sensors

will be ON at that time density will be high. Microcontroller controls the IR system and counts the number of vehicles passing on the road. Based on different vehicle counts, the microcontroller takes decisions and updates the traffic light delays as a result.

a) Case 1

In this case the density is highest on road 1 due to the presence of objects on road 1. The higher density will cause the green light on road 1 to go green while red light will occur for road 2, road 3 & road 4. Road 1

b) Case 2

In this case density occurs at road 2 resulting in the green light to go green on road 2 and remaining road 1, road 3 & road 4 has red lights. Road 2 Analyses

c) Case 3

In this case, density occurs at road 3 resulting in the green light to go green on road 3 and red light occurs for road 1, road 2 & road 4 respectively.

d) Case 4

In this case density occurs at road 4 resulting in the green light to go green on road 4 and red light occurs for road 1, road 2 & road 3 respectively

FUTURE SCOPE

- The Future scope includes Profiling of the traffic by storing the data and managing the traffic lights according to the collected data. The Profiling can also be used for Traffic study and the variation in traffic density throughout the day, week, month or a year. Further, we can optimize this system for emergency Vehicles such as ambulances.
- The Traffic data collected can be used to locate different routes for a specific daily vehicle to avoid the congestion problem.
- IR receiver module extended with automatic turn off when no vehicles are running on any side of the road which helps in power consumption saving.
- The system can be replaced by an image processing system which will give efficient results .

CONCLUSION

In this research we have worked on the Congestion problem for such special areas which have dense traffic density. The system works on traffic related problems such as traffic jam; un reasonable latency time of stoppage of vehicle, emergency vehicles or forcibly passing, etc can be solved. By using this system configuration we try to reduce the possibilities of traffic jams, caused by traffic lights. Number of passing vehicles in the fixed time slot on the road decides the density of traffic and on the basis of vehicle density calculation, the microcontroller decides the traffic light delays.

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