Density Based Traffic Lights System
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Introduction

We aimed at designing a density based traffic light system where he signal will change automatically on sensing the traffic of density at any junction. Now days traffic congestion (jams) is a severe problem in most cities across the world and therefore it is time to shift more manual mode or fixed timer mode to an automated system with decision making capabilities. This may render inefficient if one road is operational than the others.

Traffic jam become a serious issue in our day to day activities. It brings down the productivity of individual and thereby the society as lots of work hour is wasted in the signals. High volume of vehicles, in adequate infrastructure and irrational distribution of the signalling system are main reasons for this problem. To optimize this problem we have made a frame work for density based traffic light control system.

Method

In this system we used the Arduino as the heart of the system, IR sensors which will be used to measure the traffic density at a particular road. All these sensors are interfaced to the arduino. We used electronic devices and the knowledge of obstacle detector using infrared rays skills that we have to make something more important rather than only using these sensors for detecting an obstacle. Therefore we used these infrared ray sensors for measuring the density of traffics at a particular road and hence controlling the system.


Procedure

How do this system work?

The IR receivers receives IR rays that are invisible to the human eye, they have to be transmitted by IR transmitters. Normally IR transmitter and receivers has low resistance in our circuit, when receiving IR rays the resistance become high in mega ohms hence providing a logic state low to the arduino. When Arduino receiving the logic state low, it detect that there is a high density at a certain road.

The operating voltage of IR receiver is 2 Volts to 3 volts. The light emitting diodes (LEDs) were used instead of traffic lights. If the traffic density is high on any particular path, then glows green LED of that particular path and glows the red for remaining paths. In normal condition we allow the traffic at time interval o one minute for each path.

We chose this method simply because it is more effective than the others. In our project we used arduino nano as a heart of the system instead of using a microcontroller itself this is because the arduino board is compatible with many things with a microcontroller in it, so it is more efficient.
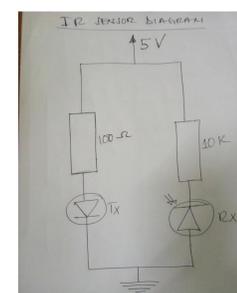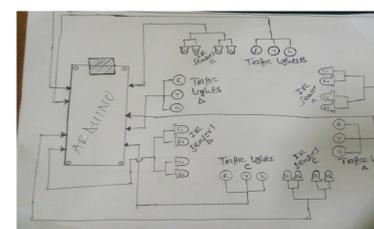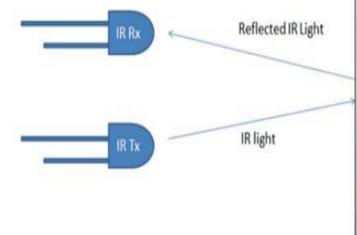
Results

Generally we had a result from the outcome of our project whereas this was after our installation that we did to one among of our laboratories in which the system operated well. We have compared our system from the existing one and we found that other systems fail to solve the problem of interference of sun's radiations to Infrared ray sensors but we in our project we tried to solve it.

Now our system operates well that is at normal situation the lights are interchange in the time delay of 1 minute and when we place a car at any particular road, the green light highs at that particular road while in other roads the red light glows also when the roads are all have cars and one of them has many cars than the other, then the green light glows at that road with many cars. On the other hand when all roads are occupied with cars and all sensors sense the same, the system operate normally in a respective order as we arrange it.
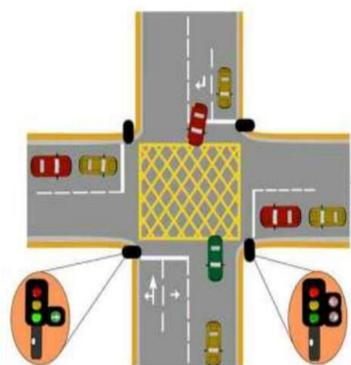
Conclusions

We developed a simple traffic light control by using infrared rays to which the system can detect the presence of car or any vehicles and know in which road there is many vehicles than the other and allow vehicles to pass through at that road with many vehicles.

We have find out other systems that resembles to our system and find others have tried to make the system like ours but one problem to them is that their systems failed to overcome the problem of sun's radiation which interferes with the system. But ours now we resolved that problem to some extent.

We also want to develop our system to be more efficient one, that we want to keep a display which will show the exact number of vehicles that are present at any particular road and regulate it automatically without barriers.