Traffic signal Light Control

Abstract:

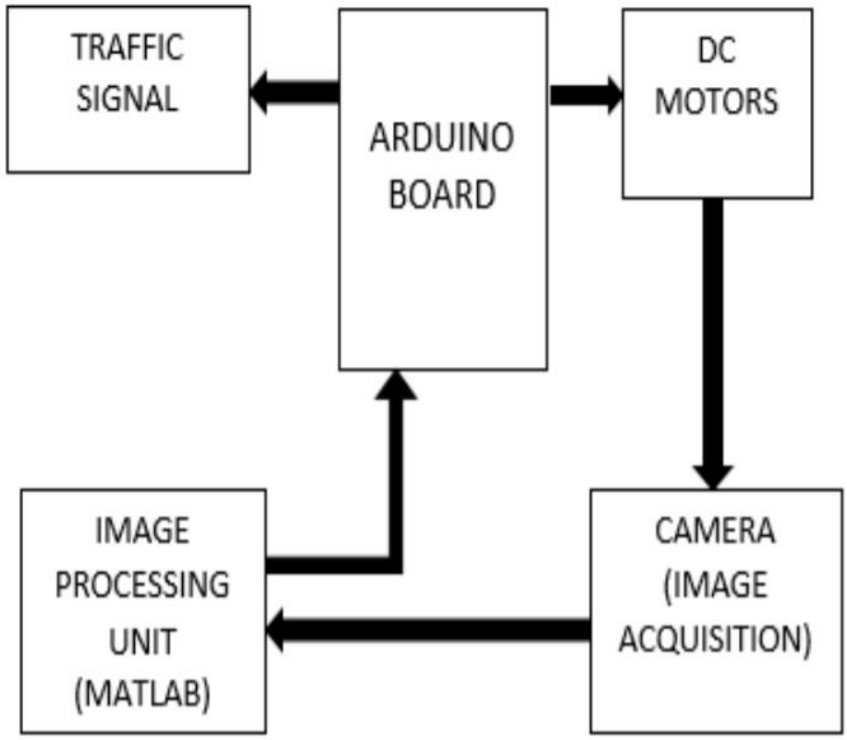
In India, with the growing number of vehicles, traffic congestion at junctions has become a serious issue. The density of vehicles is increasing day by day and there is an urgent need of adaptive traffic signals which can do real time monitoring of traffic density. This paper describes a system which uses image processing for regulating the traffic in an effective manner by taking images of traffic at a junction. A step by step approach of image acquisition, image processing and implementation of algorithm to change the traffic light duration as per the density of vehicles on different roads at a traffic signal is followed. The number of objects in a given image is counted and priority is given to the densest road.

Introduction:

Traffic lights play a very significant role in traffic control and regulation on a daily basis. The traffic lights that are used nowadays comprise of three lights: Red for stop, Yellow for wait and Green for go. Users are made to wait for the signal to change from red to yellow and then from yellow to green. The time that a commuter has to wait for is decided by the traffic signals. The traffic lights used nowadays are hardwired at the time of installation. They are pre-programmed to wait for a fixed duration of time after every change in signal. It is independent of the traffic on the roads and remains constant during its operation. Sometimes there is a situation where one

particular road is very crowded as compared to others. A simple way of decongesting the road is by allocating more time for the vehicles on the densest road to pass as compared to other less dense roads. The system should be intelligent enough to decide the priority on a daily basis. In this system, basically, the waiting time for the motorists on road with higher density is reduced. In doing so, the images for each lane are taken and processed simultaneously and a decision is passed as to which lane should be given how much amount of time and which should be the highest priority. A camera is used to take pictures of the roads that connect in a traffic junction. The pictures taken are then processed to determine the density of vehicles on each road at that instant. A list of priority is assigned to each road in one cycle and the waiting time for that road is made to vary according to its density. A denser road is given more time to pass all its vehicles and reduce the traffic at the junction. This system is subjected to less hardware failure as it consists of a camera mounted on top of the signal which captures images and sends the images for image processing. Using MATLAB the density of the roads is determined and the microcontroller changes the duration of green light given for each road as per the output after image processing.

Block Diagram:



Conclusion:

This technique can be effective to combat the growing pressure of traffic on Indian roads. It uses image processing to estimate the density of vehicles on roads and regulates the traffic at fixed intervals of time. It is cost efficient and does not require the installation of complex machinery to monitor the traffic. Deploying this system will not only save the time consumed in waiting at traffic junctions, but will also conserve a lot of resources that are otherwise wasted.