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Engineering, Design & Innovation - EE 391

"Traffic Signal Light Controller"

Design Alternatives

Solution # 01

The traffic lights will be controlled by an authorized person (traffic police sergeant) who will change the traffic signal light of the route with highest traffic density being displayed on the controller. In this case, once the signal is switched from green to red, it cannot be turned green again unless all the remaining signal lights are switched, i.e. the cycle has to be completed. In order to measure the traffic density, inductive loop sensors must be incorporated in all the routes at the intersection that generates a pulse every time a vehicle crosses synchronized with the clock cycle resulting in displaying the traffic density on the controller's screen that helps the police sergeant handling the controller to make a verdict about signal light switching.

Solution # 02

In this case, the traffic light can be switched without completing a complete cycle. For instance if at any one road end there is not enough traffic, the signal for that road will remain red until sufficient traffic is build up. Infrared sensors are used to execute this proposed solution but due to constraints in detecting the right objects, this solution is not very practical. In order to track the location of the controller, there is no real time tracking option available and the 'last login' will have to be relied on.

Solution # 03

In this case, the traffic light switching can be repeated at most once before completion of one cycle. LIDAR sensor is being used to measure the traffic density which gives precise results. However, LIDAR is no very cost effective as from the market survey it is realized that a LIDAR of 60 meters range cost 80k PKR. In order to track the location of the controller, geofencing mechanism is being used which used RFID technology to create virtual boundaries which helps in tracking the controller if it enters or leave certain jurisdiction.

The Chosen Solution

We will be carrying forward our project according to solution # 1 as the inductive loop method to calculate the traffic density is most effective, minimal cost compared to the other two methods and due to the availability of the sensors in the market. It also enables to have a real time tracking of the controller. Also, for noise filtering purpose, only passive components are being used thus having minimal power consumption.