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An optimized solar traffic control and alert system using wireless sensor networks

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Abstract— *The optimized solar traffic light control and alert system provides the better approach for traffic congestion. The system is composed of wireless modem and solar panel designed inside the modem itself. The design makes use of solar energy rather electrical energy which makes it energy efficient. The wireless modem tracks the vehicle in highway and lights the vehicle with the help of solar panel. The solar panel is composed of solar tracker that helps to detect the vehicle in highway. The system also helps to avoid the accidents in highways and also sends the SMS to respective RTO authority .the approached system uses solar energy as a major source which makes it economic The main aim behind this system is to control the accidents in broad section of highway with optimal use of solar energy.*

Keywords— *wireless modem,solar panel,highways.*

I. INTRODUCTION

In country's today environment, road accidents has become very major issue. Therefore people need to be very safe and secure. In order to address this problem, Lighting appears to be major solution in highways. Being able to observe the Road on Daily basis and avoid the traffic is very difficult task. And that to in darker nights, it is harder to control the traffic. In night, By using light in very major Portions of Highways, Accidents can be reduced. The source of light has moved from conventional source of energy to green source of energy where solar panel is used to light the roads and highways. solar panels are considered to be optimal way to provide the light without any transmission lines.it represents a cost saving technology without any wires and by the use of solar energy no need to pay any recurring bills. Solar panels are composed of Photo voltaic cells whose efficiency ranges from 12% to 20%. Whenever the vehicles go through the highway, the solar panel tracks the vehicle and directs the vehicle to go in particular direction of a road.

The proposed system is composed of array of sensors that helps to detect the vehicle in a highway over a long distance and it also sends the SMS to respective RTO authority. This traffic technology system helps to reduce the traffic congestion not only for narrow section of highway but also for the broad section of highway. If this new traffic technology system is added with present system, then it will be more beneficiuos for highways to control the accidents and to improve the traffic management system.

II. METHODOLOGY

In this system, The Wireless modem is composed of Solar Panel and Array of sensors. The Solar panel is Rotating and is also made up of Light dependent Resistor (LDR). The LDR detects the direction and also angle of sunlight and gives the signal for the Rotation of Solar panel. In this Process, the Solar Panel converts Solar energy into Electrical Energy. The LED uses this light coming from Solar Panel to Control the Accidents in Broad Section of Highway. The System also Sends the Traffic Jam Alert to RTO authority via SMS.

The System is also designed with Array of Wireless Sensors which helps to track the Vehicle over the long distance in a Highway. The Wireless Sensor is designed inside the Wireless Modem itself. Since the Wireless Sensor is Operating Continuously to track the Vehicle, the Energy Efficiency of Wireless sensor becomes very low. In order to improve the Energy Efficiency of Wireless sensors, the Protocols like LEACH (Low Energy Adaptive Clustering Hierarchy) and PEGASIS (Power Efficient Gathering Sensor Information Systems) are implemented. By using these Protocols, large amount of Energy Consumption can be achieved.

III. FLOWCHART

Here the Wireless Modem is designed with array of sensors and Solar Panel is designed in the modem itself. The Flow Chart is represented for 3 Sensors Shown below. The Flow Chart can also be represented for a group of 4 or more Sensors.

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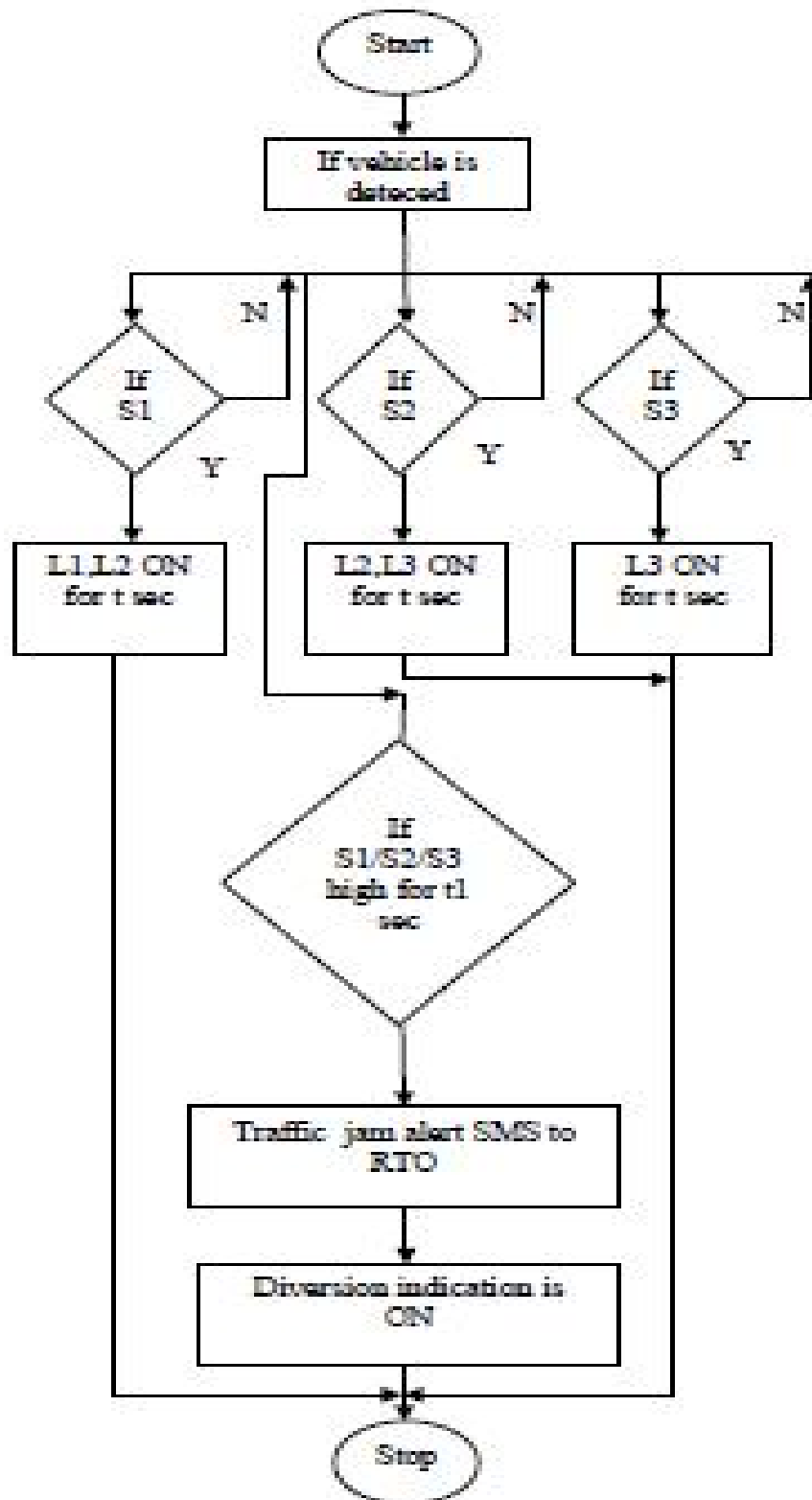


Fig-1 Traffic Control for Broad portion of Highway

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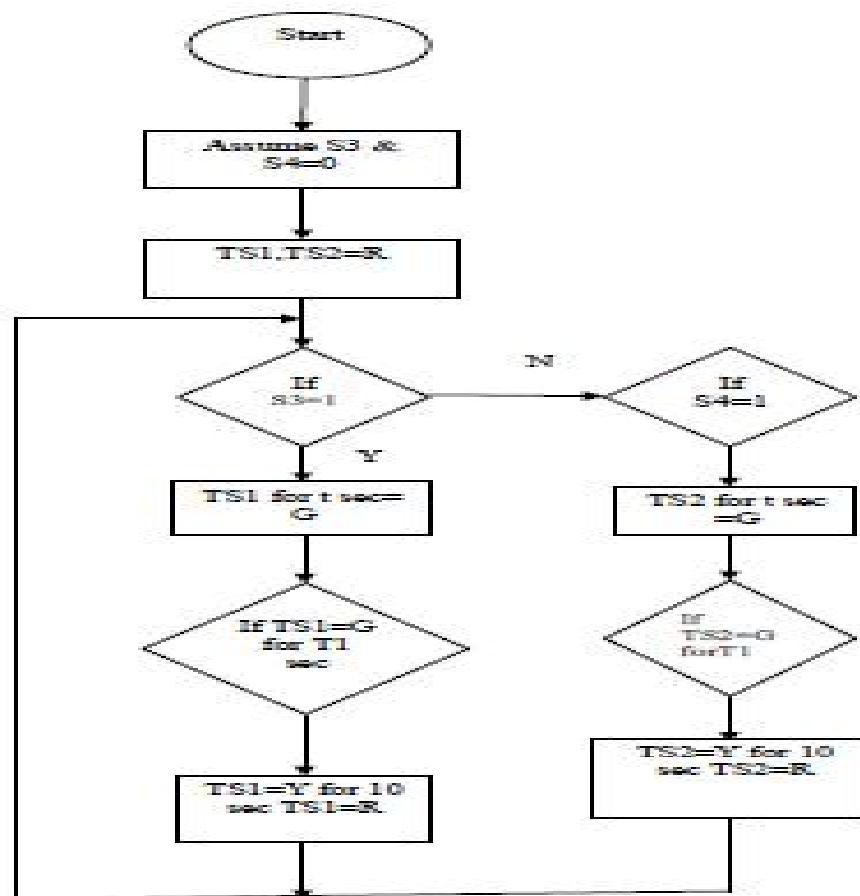


Fig-2 Traffic flow management System

The Traffic Control for the broad portion of Highways with the Symbolic representation of 3 Sensors that is represented as S1, S2, S3 is shown in the Fig-1.

- A. The Vehicle that is going through the Highway is detected with the help of Sensor.
- B. The Array of Sensors are designed in the Wireless Modem for the detection of the Vehicle in highway roads.
- C. The Wireless Sensor detects the Vehicle when it Passes through the Highway and indicates with the help of indicator.
- D. When the Wireless Sensor detects the Vehicle, it sends the data to GSM Modem and in turn it sends the SMS to Traffic Controller and RTO Authority.
- E. Simultaneously, the data sent to the Traffic Controller also sends the data to Diversion indicator.
- F. If Diversion Indicator is off, then it represents that the Highway road is free of vehicles and there is no traffic jam.

The Flow chart of the traffic management system is as shown in Fig-2. In this system the working condition is represented for Sensor 3 and Sensor 4 respectively. It can also be represented for other Sensors also.

- A. Initially both the Sensors S3 and S4 will be in ideal condition. i.e The Status of lights will be in red condition.
- B. The Vehicle going in the highway is detected through the Wireless Sensor.
- C. When the Vehicle is detected by the Sensor, then it gives the green signal status for some period of time.
- D. When another Vehicle is detected in another wireless sensor in another path, then the vehicle that is going in first path will

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go and the status of light switches from green light to yellow light.

- E. After some time when signal switches from yellow light to red light, then the another path Switches to green light which indicates the vehicle to pass through the highway.
- F. The Similar Process repeats for all the vehicles when the Multiple Sensors detects the vehicles in highway.

IV. FUTURE SCOPE

- A. A Software Application containing array of sensors in Wireless modem can be designed in mobile using different Wireless technologies.
- B. Similarly another Software application containing the Solar Panel present in Wireless modem can also be designed in mobile.
- C. By using these techniques, the vehicle can be tracked in highway using mobile itself.

V. CONCLUSION

The paper shows the efficient use of solar energy to control the traffic in highways. the main goal of this project is to control the accidents and avoid traffic jam in broad section of highways using wireless sensors and divergence indicator. The Another advantage of this system is it is energy efficient because of use solar energy rather than electricity. The project implemented is cost effective which makes it very easy to use everywhere in India.

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