

An Intelligent Framework for Highway Monitoring

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Abstract

The task of monitoring of aging highway bridges and overpasses is incredibly important not only from the aim of preventing economic losses but also a matter of avoiding catastrophic failures and loss of human life. In recent years, sensor technologies are used extensively to develop highway monitoring platforms for roads. In this, we propose a system that automatically reduces the sunshine's intensity for the parts of the streets with no vehicles and increases the intensity of sunshine when vehicles are there. Logically, this method may save an outsized amount of wattage. This method automatically controls and monitors the sunshine of the streets within the presence of vehicles only, street light lights with a maximum intensity otherwise light with minimum intensity. We are proposing a street light with an image processing technique to watch the situations near highways and even inroads, also lonely areas. If the road light is turned on for quite the estimated time, then the camera goes to be automatically turned on and captures the photographs which are happened near the road light poles. The image goes to be processed and further verified by the space if any accidents or violated acts are performed, then the digital images are visiting be sent to hospitals and alert the police stations.

Keywords: - Arduino Board, Web Camera, LDR sensor, IR sensor

INTRODUCTION

The Internet of Things (IoT) is that the collection of physical gadgets, sensors, actuators and other thing installed with hardware, programming empower these things to gather and trade information without human-to-human and human-to-PC cooperation. Internet of Things (IoT) is additionally a concept which enables the communication between internetworking devices and applications, whereby physical objects or 'things' communicate through the web. IoT is the transformation of basic technologies like embedded devices, communication protocols, sensor networks, internet protocol and applications from conventional to smart ones. IoT is that the technique or network accustomed send the accurate alert message to the last word public. That depends on how you define a “car.” In 1869, Irish scientist Mary Ward was riding in an exceedingly steam-powered automobile built by her cousins. As they rounded a bend within the road, Ward was thrown from her seat and fell within the vehicle’s path. one all told the wheels rolled over her and broke her neck, killing her instantly.

The first accident happened in Ohio City involving a gasoline-powered auto, In

1891, engineer James Lambert was driving one all told his inventions, an early gasoline-powered buggy when he met slightly trouble. The buggy, also carrying passenger James Swoveland, hit a tree root protruding of the underside. Lambert lost control and so the vehicle swerved and crashed into a post. Both men suffered minor injuries. The main reasons for accidents are drunken driving, Over speed and avoiding safety measures like wearing helmets for bikes and putting seat belts for cars.

An important part of power consumption worldwide is street lighting. India isn't any different. Global trends in street lighting show that 18-38% of the overall energy bill goes towards street lighting and so this can be one domain that needs major attention if we glance at improving the efficiency of power consumption with an objective of saving energy.

RELATED WORK

We can provide a solution to overcome a certain extent the problems caused by street light power consumption and easy highway monitor. Various researchers have given different solutions, some of them are considered here to conclude a new solution.

Ozbayoglu, Murat, Gokhan Kucukayan, and Erdogan Dogdu developed a real-time autonomous highway accident detection model supported big processing and computational intelligence." 2016 IEEE International Conference on Big Data. IEEE, 2016. one in all the most reasons behind traffic jam is accidents which might not only end in casualties and losses for the participants. When we detect incidents that happened on road as soon as possible then it will save the amount of time and actions can be taken according to the incident.

Roy, Bilam, et al. "A smart street-light intensity optimizer." (IEEE, 2018) This research work mainly focuses on saving of energy consumptions for street light additionally and reduces environmental pollution in saving power usage. So, they introduced the LDR sensor which maintains the intensity of sunshine. An automatic system is designed using Arduino board which may be placed on or OFF the road lights at a given time supported the movement of the item and system can change the intensity of sunshine supported the movement of the vehicle.

Abinaya, B., S. Gurupriya, and M. Pooja. (IEEE, 2017) proposed a system supported weather adaptive lighting in street lights. The project is implemented with a smart embedded system that controls the road light supported detection of sunlight. During the night time, the road light gets automatically ON and thru the day time, it gets automatically OFF. The ON/OFF are accessed anywhere anytime through the net. A camera is placed on top of the road light to trace the actions performed on the road where the footages are stored during a server.

Pendor, Rahul B., and P. P. Tasgaonkar (IEEE, 2016) within which they proposed a system of low cost and reliable IoT framework which accommodates RFID sensors for tracking the vehicles on the roads or maybe in highways and developed in step with today's Intelligent Traffic Monitoring Systems (ITS). Using of RFID sensors makes less complexity in comparing with the image processing system.

The above research motivated to develop an efficient way of monitoring incidents that are happened especially in night times and also for saving huge amount of power consumption for street light.

PROPOSED WORK

As coming to our project, in an increasing number of vehicles and humans population, it becomes difficult for authorities like the police department to monitor the situations that happened on roads especially in night times. So, in which they are failing in finding accidents or other incidents that happened near outskirts of the city which leads to one of the failures for them due to lack of advanced techniques which are now possible with Internet of Things (IoT). And also in saving power consumption where unnecessarily street lights with high intensity in the absence of vehicles on roads in which lots of power consumption goes unnecessarily evaporated. So, we proposed a system in which street light glows with minimum intensity in the

absence of vehicles and in the presence of a vehicle street light glows with maximum intensity. Mainly the intensity of the light can be controlled by a sensor namely Light Dependent Resistor sensor (LDR). Whenever a vehicle enters the road then the camera activates and street light glows with maximum intensity and if vehicles stay on the road for some time then street light acts as a sensor and takes snaps around the range of street light poles and sends information to control room. So, It becomes an easy task for the police department to monitor the situations that happened on roads even in the night times with the help of IoT technology. We can provide solutions for power consumption mainly and also for easy highway monitoring at night time also.

METHODOLOGY

Step 1: Initiate system

Step 2: If a vehicle is not present on the road then street light lights with minimum intensity.

Step 3: If a vehicle is present on the road then street light lights with maximum intensity and camera turns on.

Step 4: If street light lights more time with maximum intensity

- Then street light acts as a sensor.
- And snaps the incidents happened around the pole.

Step 5: Snaps taken by street pole sent to control room and also send notifications regarding that.

Step 6: After pictures verified by control room sends to either ambulance or police patrol. So, They can easily analyse the situation that happened on the road.

Fig. 1. Proposed System's Methodology

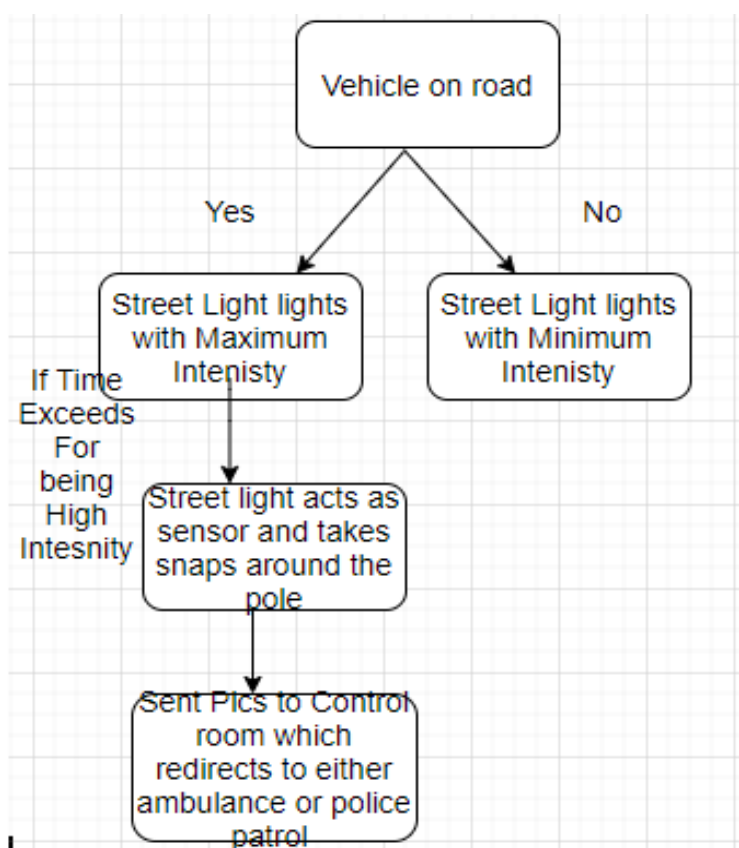


Fig. 2. Flow Diagram of Proposed System

BLOCK DIAGRAM

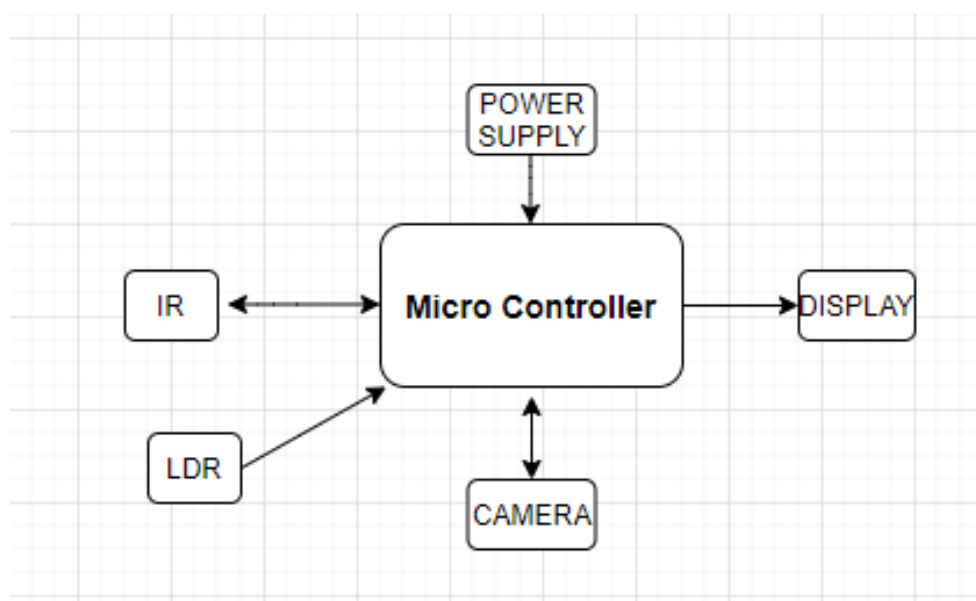


Fig. 3. Proposed System's Block Diagram

COMPONENTS USED

The components that are used in this project are listed below.

The “Arduino Uno” is a micro controller board based on the ATmega328. It's 14 digital input/output pins, 6 analogue inputs, a USB connection, an influence jack, an ICSP header, and a button. It contains everything needed for supporting the microcontroller and easily connects to a computer with a USB cable or power it with electric battery to urge started.

LDR is a type of sensor which maintains the intensity of light. In our project, with the usage of this sensor, we can save power consumption.

IR sensor is a type of sensor which senses the movement of an object which is useful for knowing object detection and more helpful for LDR sensor.



Fig. 5.Arduino Uno



Fig. 6.LDR sensor



Fig. 7.IR sensor

IMPLEMENTATION AND RESULTS

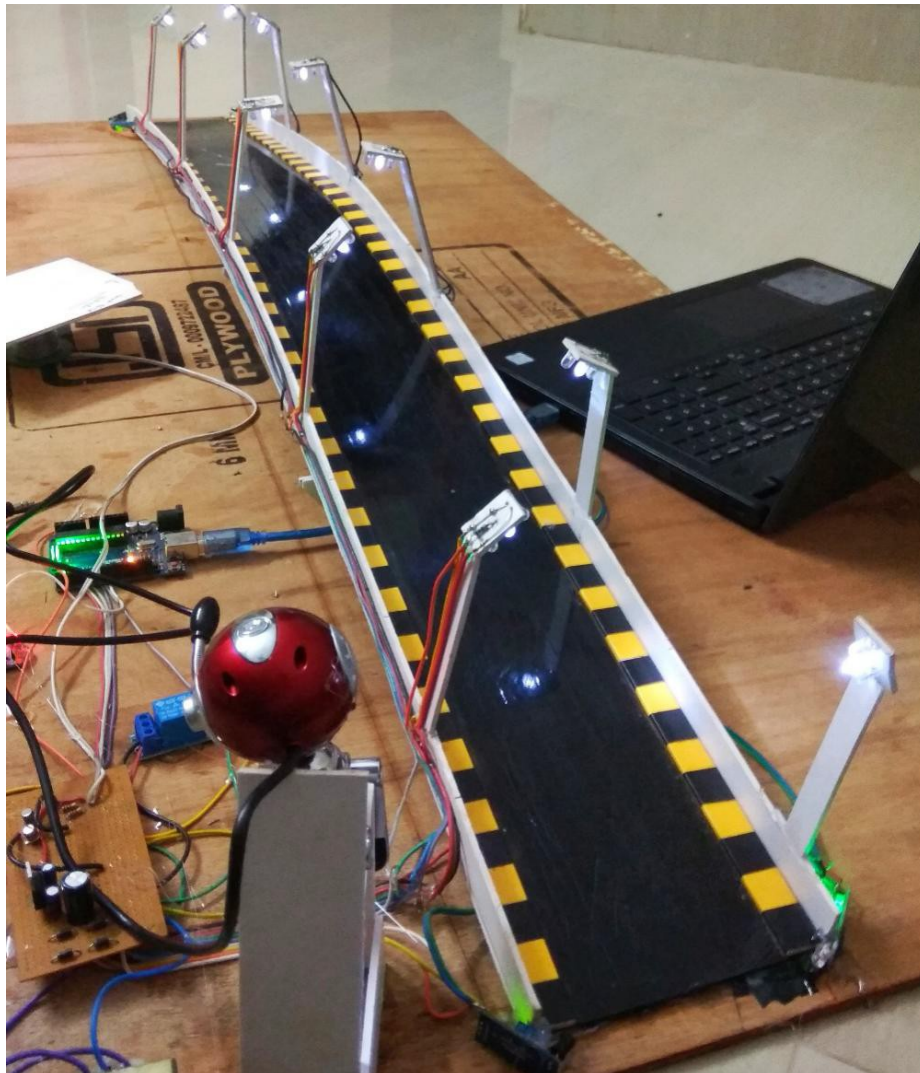


Fig .8.Complete system developed

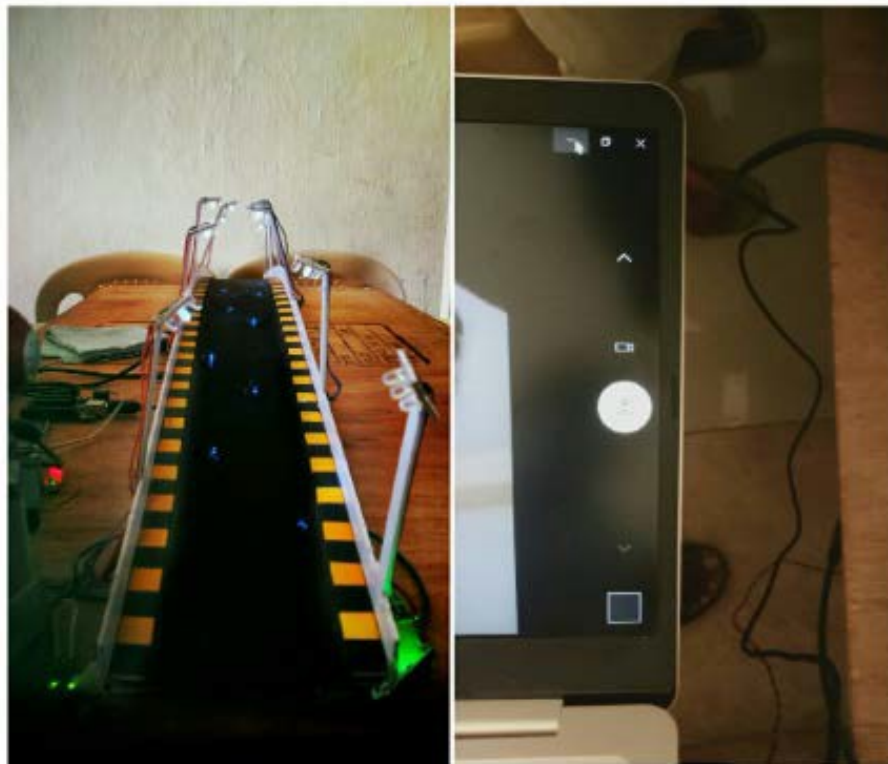


Fig.9. Absence of vehicle and camera disable

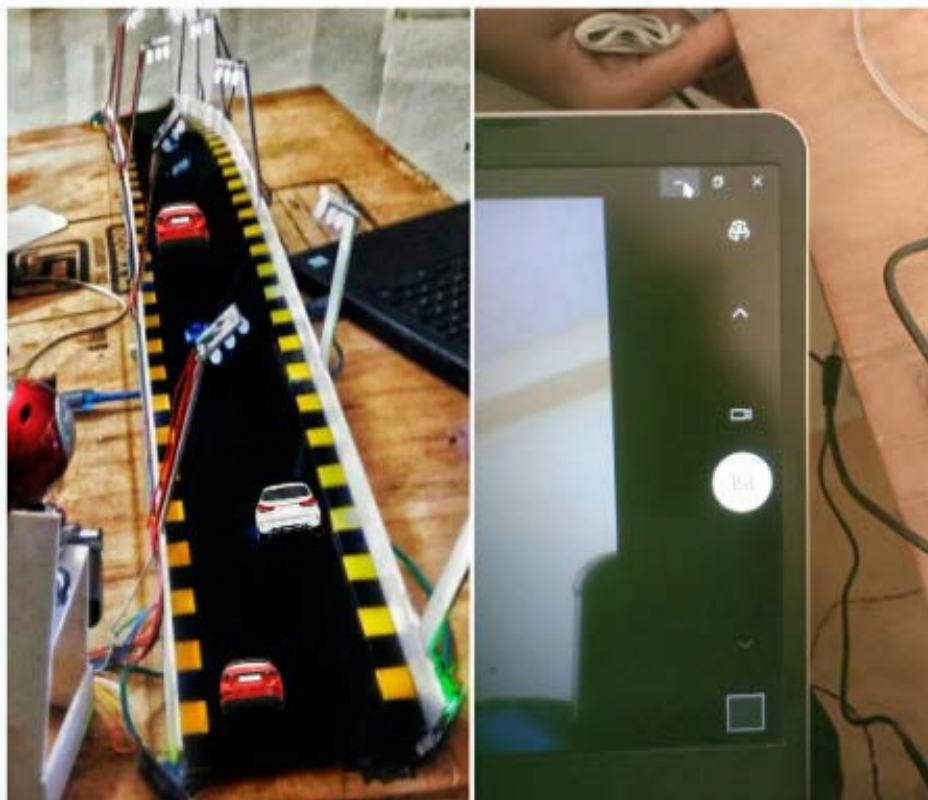


Fig .10 . Presence of vehicle and camera enable

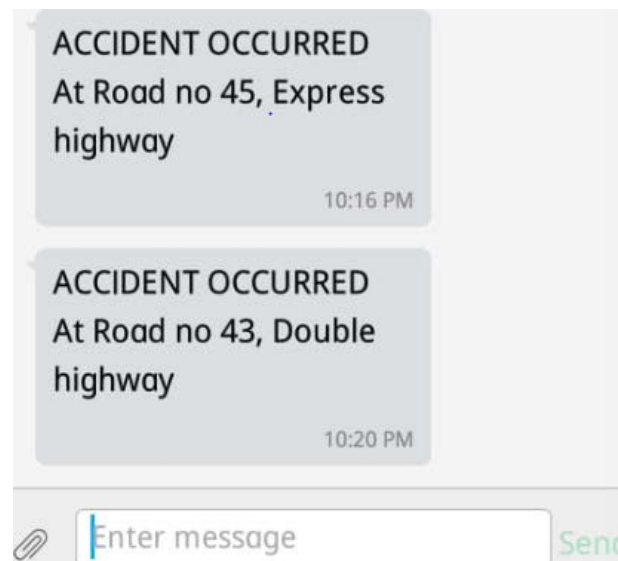


Fig.11.Receiving alert message along with the place.

CONCLUSION

We have developed and verified AN FRAMEWORK FOR HIGHWAY MONITORING USING IoT. First, the street light glows with minimum intensity and camera disables and then whenever a vehicle enters and street light glows with maximum intensity then camera enables if time exceeds being the high intensity of street light then we can conclude an incident may happen and notifications will be sent to control room .we can conclude that this system is very useful for highway monitoring and also for power consumption.

FUTURE WORK

The future work may concentrate on the features like sending coordinates as a

message to the control room. Accidents can happen any time but a major problem is to locate the place and also for energy saving. In future, We may get more sensors which will help in finding a location and for also energy savings. And then, the Police control room can take further actions to assist ambulance or highway patrol. Further based on the innovations in the components and technologies the system can be improved.

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