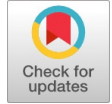# Multitasking Streetlight –A Novel System

Arpita Gupta, Bhawish Goel, Anas Ali khan, Shyam Sharma

Abstract: In today's era vehicle accidents are one of the leading causes of death due to lack of attention and help in time, poor emergency facilities, people lose their life. Highways are very vulnerable to accidents and many times the accident victims are unattended. Several time the accidents do not come under notice due to low traffic or ignorant trespassers. The Street light discussed in the paper is an automated system which witness the street throughout day and night. In case of any accident the streetlight will be able to generate an alarm as well as it will alert the concern authority. It simply observes the stay time of a vehicle in a pre-decided patch of road. In case of any delay, the streetlight will warn the concern team about the same. If there is an issue, the location is sent to the rescue team with the help of GSM module. The authors are also trying to reduce power consumption whenever there is no vehicle movement on the road. The streetlight will glow with high intensity when there is a vehicle on road otherwise it will be dim.

Keywords: IR Sensor, Arduino, LED Bulb, Timer, GSM Module, Accident, Streetlight, Highway, Medicine, Treatment, Smart City, IOT.

I. INTRODUCTION

According to official statistics 2,202 people died in road accidents in Delhi between January and May last year. The demise discerns elevated to two,357 at some point of the primary 5 months of 2022. The rate of deaths per thousand vehicles in 2021 has also increased from 0.45 in 2020 to 0.53 in 2021. Uttar Pradesh recorded the highest number of road crash deaths (14% of total deaths in 2021) followed by Tamil Nadu (9.88%) and Maharashtra (8.94%) [7]. Main reasons are that when driving obstacles suddenly come in out route like people crossing road other than zebra crossing, animals, vehicle in the front stops suddenly. In these situations, the driver cannot response quickly and hence an accident occurs. there's one dying each four mins due to a street twist of fate in India. One critical road coincidence within the united states of America happens every minute and sixteen die on Indian roads each hour. Approximately 1214 road crashes occur every day in India.

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Two wheelers account for 25% of general avenue crash deaths. 20 kids beneath the age of 14 die each day due to road crashes in the us. Most of such deaths happen due to not getting necessary medical treatment in time. Even in the case of accidents the injured people can be rescued, and casualties can be reduced if medical assistance is given on time. But many accidents occur on highways, in low traffic areas where people drive at fast speed. In these areas accidents are not discovered on time and medical assistance cannot be given, resulting in deaths [7].

In 2021 according, GOI ministry of Road transport and highways a complete of four, 12,432 site visitors' injuries were suggested in the USA, claimed 1,53,972 lives and injured 3, eighty-four,448 individuals. alas, the most affected age organization in road injuries is eighteen-forty-five years, which represents about 67 percentage of the entire accidents caused by accidents [7].

The paper proposes a Novel Street Light system which is a new and innovative concept. These light sensing refers to public street lighting that adapts to movement by pedestrians, cyclists and cars. Smart street lighting, also referred to as adaptive street lighting, dims when no activity is detected, but brightens when movement is detected.[3] [9][10].

This system also inculcates the feature of automatic switching the streetlights. In recent times, it's far visible that the technique is extensively used in the usa. The method operates by set up an optical control circuit, changing the resistance by using a light sensitive device to control streetlamps light up automatically at dusk and turn off automatically after dawn in the morning.
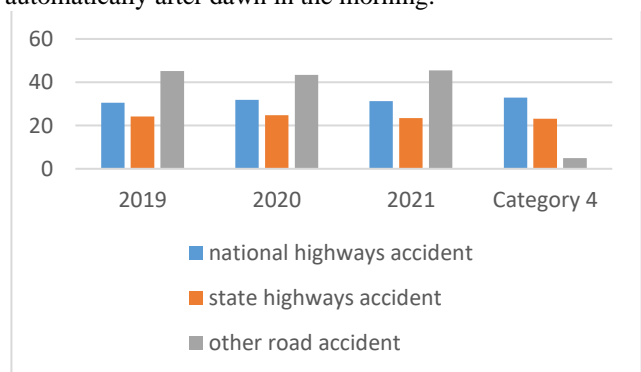

Fig. 1: % Accident on Highway in 2019-2022

II. PROBLEM STATEMENT

Accidents mainly occur due to various reasons like obstacles on the road, sudden intrusion of humans or animals on driving lanes, drunk driving. These lead to accidental casualties. Most of these casualties occur due to not getting medical treatment on time. Most deaths occur on roads, not in hospitals or in front of qualified doctors.

This accident alert system would be a big step towards improving the safety of vehicle drivers and reducing the injuries and casualties occurring due to late medical treatment.

This system will keep sensing the path with help of an IR sensor and when a person vehicle arrives in range it will turn ON the streetlight. The streetlight will be kept ON till the person or vehicle is in between the two nodes and will turn OFF the streetlight when vehicle leaves the range.

The system calculates the time needed by vehicle or person for reaching the next streetlight and if it does not reach the light, it means that it has an accident. After sensing that an accident has occurred, the system will send the rescue message using GSM module

The system shows automatic control of streetlights because of which power is saved to an extent. Smart street lighting offers an answer to saving energy, [1]. which is done by sensing an approaching car with IR sensors, after which the block turns on streetlights ahead of the vehicle with high intensity. Nowadays vehicles have accident alert systems on them that send a rescue message at time of accident. But not all vehicles have these systems [4]. These systems require a separate GPS to locate the position of moving vehicles at time of accident and GSM to send rescue messages. In this project we work with smart streetlights to send the accident position so the GPS system can be eliminated and only GSM system is required to send rescue message. This will also reduce the cost of GPS.

III. WORKING MODEL DAIGRAM

In the project have two IR sensor and connected with these sensor entry and exit counter are installed between the streetlight when vehicle enter in range of IR1 then counter increment by 1 and vehicle should cross the IR2 sensor then counter should decrement by 1 [2]. If vehicle can have stuck between the streetlight more than actual time (mishappening occur that location), then microcontroller send the signal to GSM and Alarm. Where GSM Drop the message Tool station and Alarm get beep until Message received. Region are allocate the Area point (A1, A2,A3,…..An) make help to reduce the cost of the project and enhance the efficiency.
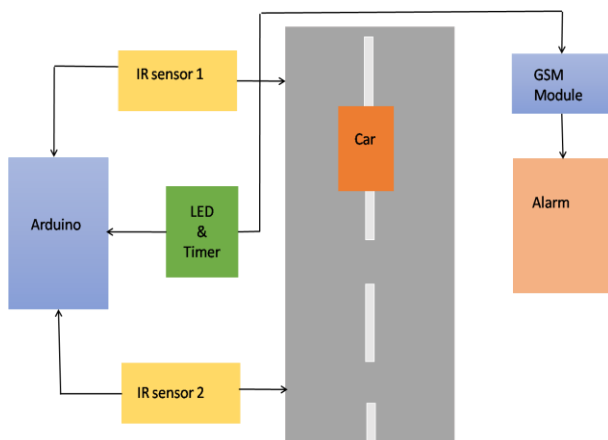

Fig. 2: Working Model Diagram

IV. METHODOLOGY

- In this we use AN IR sensor which sends a signal to Arduino connected to it when a vehicle or a person arrives.
- It will turn ON the streetlight. The streetlight will be kept ON till the vehicle or person is in between the 2 nodes and will turn OFF the streetlight when it leaves the range.
- The system calculates the time needed by vehicle or person for reaching the next streetlight and if it does not reach the light, it means that it has an accident.
- After sensing that an accident has occurred the system will send the rescue message using GSM module.
- The rescue message is sent to the emergency rescuers so that they can arrest the criminal or get victim necessary treatment quickly.
- There is also an automatic regular checkup to see malfunctioning of light and alarm maintenance team.
- In case of subway cases this system can sense if there are unwanted presence in subway for some time in case if street light is ON for some duration.
- The system will alert the guards so that crimes like robberies and kidnapping can be avoided.
- This system will also check if street lights are working properly and send alarm to maintenance team in case if malfunction.
- Energy is utilized more efficiently as the streetlight is ON only in presence of a person or vehicle.
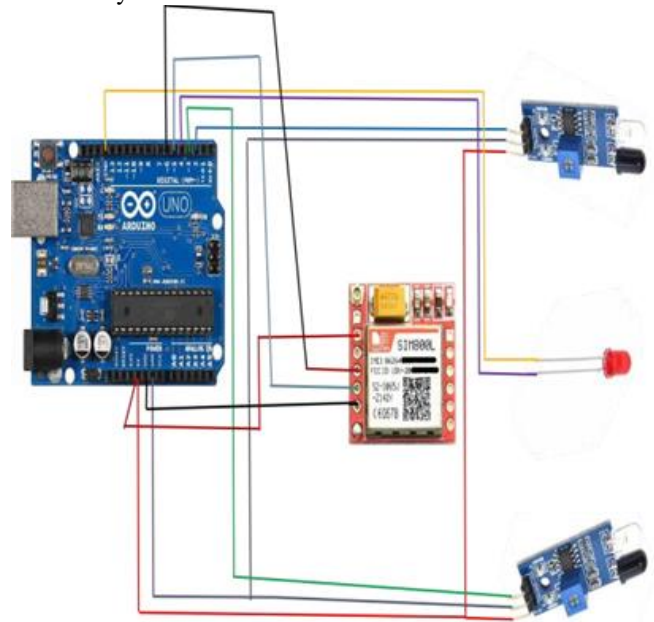- This system is applicable for low traffic areas, underpass, subways etc.

Fig. 3: Circuit Diagram

In this multitasking streetlight-A Novel system have used two IR sensor where IR1 and IR2 pin vcc connected to Arduino vcc (5V) and GSM pin RX connected with Arduino TX and TX pin of GSM connected RX to Arduino where LED performed when vehicle in the range of IR1 then turn ON the LED Light which indicate the presence of a vehicle.
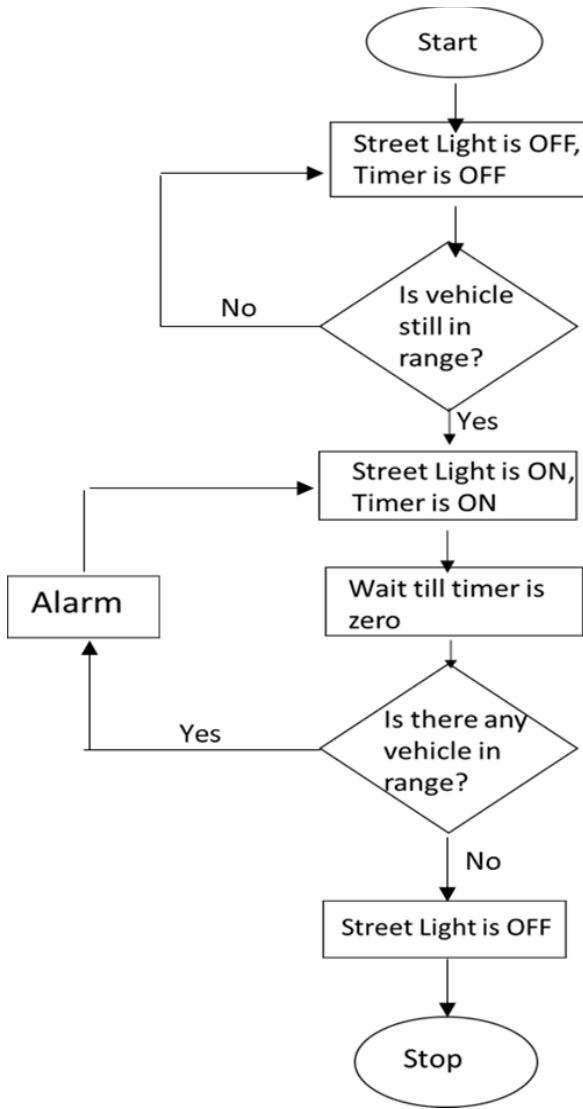
Fig. 4: Methodology

V. COMPONENTS

1. Arduino: Arduino represents an open-source electronics platform characterized by user-friendly hardware and software Arduino boards can read inputs and turn it into an output. Fig 5[8].

Fig: 5 Arduino

2. IR SENSORS: An (IR) sensor is a hi-tech gadget designed to gauge and identify infrared radiation in its nearby surroundings. These sensors come in two main varieties: active and passive. The active type emits infrared radiation and then detects any reflected signals, while the passive variant senses existing infrared radiation without emitting any of its own. In essence, these electronic devices play a crucial role in recognizing heat and motion, finding applications in various fields due to their ability to perceive infrared signals.
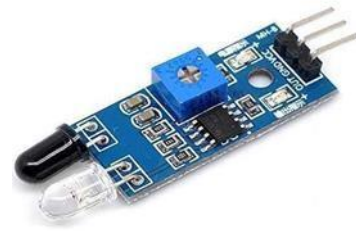

Fig. 6: IR Sensor [8]

3. Led Bulb: A Light Emitting Diode (LED) stands out among traditional light sources as a semiconductor marvel. Unlike its counterparts, it doesn't rely on a filament or gas and lacks the conventional glass bulb. Instead, it illuminates by emitting visible light in a specific color, showcasing its distinctive and innovative design.

Fig. 7: Led Bulb [8]

4. GSM Module: GSM/GPRS is used to establish communication between a computer [5] and a GSM-GPRS system. Global system for mobile communication is an architecture used for mobile communication in most countries.in GSM have 6 pins (rx, tx, power supply, ground, RESET and CTS/RTS). Fig:8 [8].

Fig. 8: GSM

VI. FUTURE SCOPE

In future we will inculcate the following-
1. Fog detector and blower with smart streetlight to blow away fog.
2. IR sensor and alarms to notify drivers of upcoming vehicles on narrow mountain roads [6][11][12] [13].

VII. CONCLUSIONS

1. A system is successfully developed so that accident victims can get timely medical assistance even if they are in low public areas.

This system will work with the help of smart streetlights which are used for power saving. When a vehicle arrives in sensing range the streetlight turns ON and turns OFF when it leaves sensing range. This system checks if vehicles reach the next streetlight and sends rescue message if vehicle does not reach the light.

2. This system will improve the survival rate of victims of accidents and reduce casualties caused by the absence of timely medical treatment. After sensing an accident, the system will send rescue message to the rescue team so they can rescue the victim in time for appropriate treatment.

3. It will also help in reducing crimes like armed robbery and kidnapping that happen in subways.

4. This product will also help in improving energy efficiency by switching ON the light only when object pass by.

5. There will also be an automatic regular checkup to see malfunctioning of light and alarm maintenance team.

DECALARION STATEMENT

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Availability of Data and Material/ Data Access Statement	Not relevant.
Authors Contributions	All authors have equal participation in this article.

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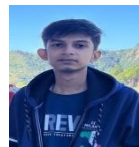
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