AUTO ACCIDENT DETECTION AND ALERT SYSTEM WITH GREEN CORRIDOR

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Abstract - A disproportionately common cause of death is auto accidents. Even though they occur frequently, road accidents are the worst thing that may strike a road user. The most regrettable aspect is that we do not learn from our on-the-road errors. The majority of people who use the roads are generally well aware of the safety precautions and general guidelines that should be followed. Still, accidents and wrecks only occur due to road users' negligence. Generally speaking, a s a result of human error. Human mistake is the primary factor in accidents and crashes. We are describing a few of the typical human actions that lead to accidents.

1. **Over Speeding**
2. **Drunken Driving**
3. **Distractions to the Driver**
4. **Red Light Jumping**
5. **Eschewing safety equipment such as seat belts and helmets.**
6. **Driving when drifting out of lanes and improper overtaking.**

We are attempting to construct an Arduino-based automobile accident alarm system combining GPS, GSM, and an accelerometer to save people's lives in a traffic collision. The GSM module sends an alarm message with the location of either the accident to your mobile phone if the accelerometer notices a dramatic change in the vehicle's axis. The longitude and latitude coordinates from the Global positioning system are used to determine the accident's location, which is given in the form of a Google Map link. The vehicle's speed in knots is also included in the message.

Keywords - Accident Detection, Global Positioning System, Global System for Mobile Communication, Green Corridor, Internet of Things, Vehicle Accident.

I. INTRODUCTION

Whenever a traffic collision occurs, neighboring residents must manually dial the ambulance, which wastes time. As a result, it takes longer for emergency personnel to get to the scene of the accident. We are going to create a system that will give the victims access to emergency facilities as soon as feasible in order to solve this issue. It features an embedded system connected to an Arduino UNO by GPS and GSM modules. The front of the car has the whole setup mounted. The vehicle's location can be determined using the Global Positioning System (GPS). The precise location of a vehicle is communicated via GSM via an SMS to precoded numbers in the form of longitude and latitude coordinates. With a SIM card, the GSM module offers two-way communication. Such a module functions in a similar way to a standard phone. This program offers the best solution to inadequate emergency services for traffic accidents.

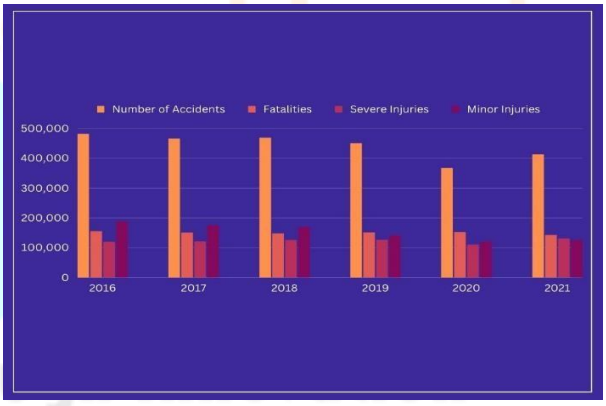

Fig.1 Road Accidents from year 2016 - 2021 in India

From this, it may be concluded that following an accident, an injured individual rarely receives competent medical care in remote locations. This is a result of the accident's location being unknown, which lowers the likelihood of that person surviving. To save the life of the injured victim, it is therefore imperative to learn the exact location about the accident so that the appropriate action can be taken immediately and without delay. However, without using an electronic system, it is challenging to determine where the accident occurred. In this study, a system called AADASGC is created that, in the event of any accident, even one that occurs in a remote area, will spontaneously detect and report the accident's location.

The remaining sections of the study are as follows: Section II, Literature Review; Section III, System Architecture and Implementation; Section IV, Results and Discussion; and Section V, Conclusion.

II. LITERATURE REVIEW

S. Roy et al[1], automobile accidents are becoming one of the main problems that kill a lot of people all around the world. India now holds the top spot for fatalities from traffic accidents. This is a major issue that needs to be resolved in order to preserve the lives of several accident victims who have been injured. Many automakers have developed many methods to address this issue, like safety airbags, seat belts, video sensors, etc. Yet, neither the source nor the effect of the collision can be eliminated. Giving the victim promptly, appropriate medical care is one of the key measures. Statistics show that every time an accident occurs, the witness hesitates to assist the victim because of the drawn-out process. A system that automatically detects accidents and, using that data, immediately notifies the hospital and any affected family members of the accident and its location is urgently needed to remedy this problem. In this work, an Automatic Disaster Detection and Location Communication System based on Arduino is built. When any type of accident happens, the system continually records the location of the vehicle. Automatically detecting the accident, it promptly sends the location of the incident to the hospital, the victims' loved ones, and the police. Its main advantages are this system's minimal cost, simplicity of implementation, ease of use, processing speed, high accuracy, and independence.

M. S. Mahamud et al[2], a system that automatically detects accidents and, using that data, immediately notifies the hospital and any affected family members of the accident and its location is urgently needed to remedy this problem. In this work, an Automatic Disaster Detection and Location Communication System based on Arduino is built. When any type of accident happens, the system continually records the location of the vehicle. Automatically detecting the accident, it promptly sends the location of the incident to the hospital, the victims' loved ones, and the police. Its main advantages are this system's minimal cost, simplicity of implementation, ease of use, processing speed, high accuracy, and independence.

P. Yellamma et al[3], the suggested model incorporates a GPS receiver (GY6MV2), a GSM module (SIM 800L), and an Arduino UNO R3 microcontroller. Moreover, GPS GY6MV2 is used to determine the longitude and area of the accident. The GSM module SIM 800L is used to send SMS messages informing the recipient of the accident's kind and providing the accident's location through Google Maps. The ADXL335 MEMS Accelerometer sensor records the vehicle's X and Y coordinates. Moreover, messages, the scope, and the longitude of the accident site are displayed on a 16x2 LCD screen.

M. L. S. Kumar et al[4], the research suggests a simulation approach that uses sensors to find accidents. The Proteus Simulation Tool was used to create and simulate the sensor-integrated Arduino circuit. Via the detecting app, a notification message is delivered to friends and relatives when the accident is discovered. The Proteus Simulation Model and IoT platform are connected using a program called Virtual Serial Port Emulator. The mobile application to monitor accidents is prototyped using the Blynk IoT Platform.

P. Upender et al[5], in order to keep the car safe and screen it from the intruder's work, the foundation for doing so will be developed in this paper. We cannot look after our own when operating with less awareness. A high level of protection for the driver will be provided by an automated safety system that will be installed in all of the vehicles, along with an alarm. This device has an eye blinking sensor and an alcohol sensor built into the cars. The sensors detect the driver's eye blink and check the amount of alcohol in his breath as soon as he starts the engine. Sensor outputs are provided in this device so that they can be compared to an Arduino.

V. Kinage et al[6], the suggested technique offers a quick, affordable, and practical way to stop auto accidents. Suppose a driver doesn't take action within

a certain amount of time after receiving an alert when the reading exceeds predetermined threshold values. In that case, our suggested solution will take care of the issue by cutting off the gasoline supply. Our suggested system makes use of the Arduino microcontroller, as well as the MQ-3 sensor, an infrared sensor, an accelerometer, and a webcam. All of these sensors are regulated by Arduino.

N. T. S. A. Wadhahi, et al[6], hence, greater transportation infrastructure is required in order to lower the number of traffic accidents and save lives. The use of IR sensors with Arduino Uno technology is one of the solutions suggested in this research. Accident Prevention and Accident Detection are the system's two phases. Infrared sensors are used in the detection phase to identify people and alert them by SMS using a GSM module that has specified numbers and a GPS module to the accident location. In the second phase, IR sensors are used to prevent accidents by alerting the driver to nearby vehicles when their separation exceeds a certain level. This study presents simulation findings and a prototype.

III. METHODOLOGY

If a vehicle has an accident under the proposed system, an alert notification with the position coordinates is immediately sent to the Control center. The adjacent ambulance receives the interaction from the control center. Additionally, a signal is sent to every light between an ambulance and a vehicle to enable RF communication between the ambulance and the traffic lane. The microcontroller that's located in the controller section receives the information about the automobile accident from the vibration sensor and delivers it to the nearest ambulance after receiving it from the PC. Through RF transmission, the signal is sent to the traffic signal section.

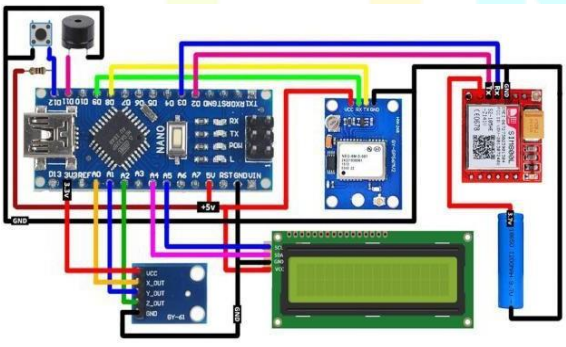

Fig.2 Circuit Diagram for accident detection system

The system consists of three main units:

1. The Vehicle:

A vibration sensor, the controller siren, the user interface, GPS system, and the GSM module make up the vehicle unit. The vehicle's built-in vibration sensor will continually check for any significant vibrations. The GPS system controller within the car receives the sensed data. The GPS locates the vehicle's present location, which is the site of the accident, and provides that information to the GSM. The control unit, whose GSM number is already listed in the module as an emergency number, receives this data from the GSM.

2. Traffic Light Controlling:

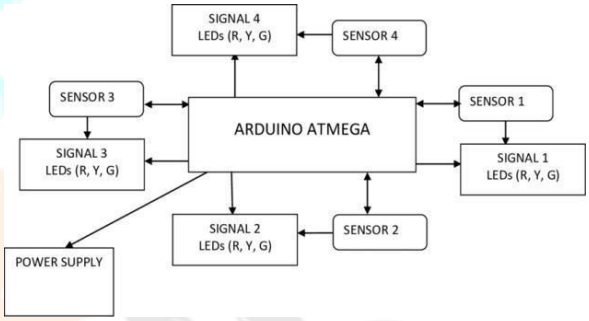

Fig.3 Block diagram for traffic light control and green corridor

In this project, an Arduino UNO development board is used to build a straightforward traffic light system for a four-way intersection. Although it is not a realistic implementation for real-world situations, it provides a general understanding of the traffic light control system's workings. Using an Arduino UNO, a simple traffic light controller is created, controlling traffic according to preprogrammed schedules.

- Green – 20 Sec.
- Yellow – 5 Sec.
- Red – 75 Sec.

A total of 25 seconds are allotted to each lane, including the time to move during the yellow light. After the green light, the yellow light briefly illuminates, advising drivers to slow down before the red signal arrives to prevent an abrupt halt. During a red light, all lanes of traffic must wait for 75 seconds.

	Lane 1	Lane 2	Lane 3	Lane 4
Lane 1 Green	20G	25R	50R	75R
	5Y	5R	30R	55R
Lane 2 Green	75R	20G	25R	50R
	55R	5Y	5R	30R
Lane 3 Green	50R	75R	20G	25R
	30R	55R	5Y	5R
Lane 4 Green	25R	50R	75R	20G
	5R	30R	55R	5Y

Table 1 Traffic light controlling time table

3. Ambulance allocation

The controller determines the ambulance that is closest to the accident scene and the quickest route between the ambulance, accident site, and closest hospital. This path is then sent to the ambulance by the controller. Additionally, the controller uses this information to manage all traffic signals along the ambulance's path and prepares them to open up for it, ensuring that the ambulance gets to the hospital promptly. The RFID transmitter is turned ON at the same moment by the ambulance unit. In order for communication with the traffic department, this will result.

GSM modem receives accident notification from control section and sends it to microcontroller. The closest ambulance is located by microcontroller, and ambulance is told to pick up the patient. The control section uses RFID transmission to send the control signal to every signal between the ambulance and the vehicle. Through RFID connectivity, the traffic signal will turn green whenever the ambulance is in close proximity to it. As a result, using the ambulance to get to the hospital on time is advised.

IV. RESULT

In the first module, accident is detected with the help of ADXL345 sensor. It is a 3-axis accelerometer which can identify the accident at a particular location. The Global Positioning System (GPS) is used to determine the vehicle's location. The actual location of a vehicle is communicated via GSM via an SMS to precoded numbers in the form of longitude and latitude coordinates.

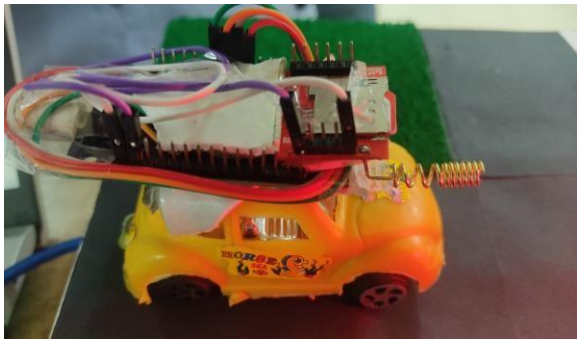

Fig.4 A vehicle with ADLX345 sensor

The next module will deal with a traffic management system utilizing sensor data, communication and automated algorithms is to be developed to keep traffic owing more smoothly. It optimally controls the duration of green or red light for a specific traffic light at an intersection.

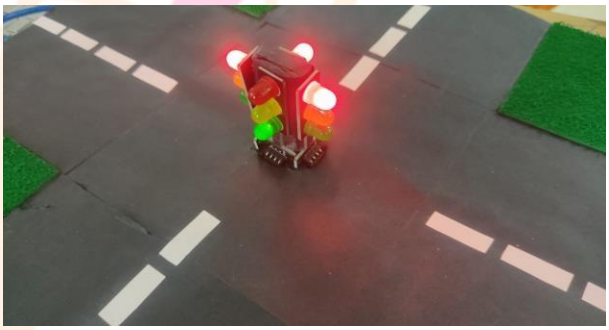

Fig.5 Traffic signals

When an ambulance is near the traffic signal, the installed RFID reader in ambulance will collect the data that an ambulance is crossing. So it will change the traffic signal providing green signal for more time interval to the lane where the ambulance is crossing.

Fig.6 Ambulance crossing signal

V. CONCLUSION

The major reason for doing this is to reduce the amount of time that must pass between an accident occurring and an ambulance arriving at the scene to treat the sufferer. When an accident occurs, a lot of time is lost trying to find the scene. At that moment, our system works more quickly to prevent any deaths caused by a delay. This study puts out a revolutionary concept for managing traffic signals in favour of ambulances during accidents. With the help of this technology, it has been demonstrated that it is effective in controlling not only ambulances but also official cars.
Therefore, ITLS can deliver better outcomes if it is adopted in nations with big populations, like INDIA.

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