



Automatic Accident Detection and Intelligent Information System

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Abstract: Road accident is the major problem in urban areas. Currently there is no technology for accident detection. Also due to the delay in intimation for the ambulance to the accident location, conveying the situation of the passengers to their relatives and reduces the chances of the rescue of victim. There is a need of introducing a system to reduce the loss of life due to accidents and the time taken by the ambulance to reach the hospital. We will implement the system in which there is an automatic detection of accident through sensors provided in the vehicle. A GPS and GSM module in the concerned vehicle will send the location of the accident to the main server which will rush an ambulance from a nearest hospital to the accident spot and convey the occurrence of accident to the relatives. It can automatically find a traffic accident, search for the spot and then send the basic information to first aid center within two seconds covering geographical coordinates, the time and circumstances in which a traffic accident takes place. GPS software is fitted in the vehicle will now start communicate with the satellite and get the latitude and longitude values and send the information to the nearest hospital. The hospital will then be sending the ambulance to the accident zone. Then the injured people will be saved as soon as possible.

Keywords: Accident, GSM, GPS, Vibration sensor, Accelerometer, IR sensor, Arduino Uno.

I. INTRODUCTION

Road accidents are the major problem in this fast growing world. With a large population and large amount of vehicles there is also a big trouble of car accidents or road accidents. Currently there is no technology for accident detection. Also due to the delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of the death of passenger and driver. There is a need of introducing a system to reduce the loss of life due to accidents and the time taken by the ambulance to reach the hospital, which includes the accident detecting, alerting and tracking mechanism with automatic traffic light controlling system such that the ambulance can achieve a free way in order to provide the first aid to patient as fast as possible.

With the increase in the population and due to luxurious living there is an increase in the traffic on roads. Amidst all these frenzied life, one forgets the importance of human life. This is a very serious problem even in case of road accident

one even doesn't care to call the emergency unit. On road due to high traffic people are unable to provide the free way to the emergency unit which also becomes one of the factors of late first aid to the patient due to which one can die on the way to hospital. So to overcome their negative factors and to provide the first aid to the victim this system Intelligent Ambulance with automatic traffic control is proposed in this paper. This paper describes the working of accident detection and immediately accident with the location co-ordinates, receiving such co-ordinates the ambulance unit or so called emergency unit respond immediately alerting the emergency ambulance unit about the accident with the location co-ordinates, receiving such co-ordinates the ambulance unit or so called emergency unit respond immediately and leaves for the accident location. Now while moving toward the location or while taking the patient to the hospital there may or may not occur some traffic so in order to free or release the traffic the intelligent ambulance controls the traffic light itself such that the traffic light



converts in a manner so that it could receive the freeway to the hospital.

II. NEED OF ACCIDENT DETECTION SYSTEM

According to the Global status report on road safety 2015, the total number of deaths caused due to road accidents has leveled out at 1.25 million a year. India faces the highest number of accidents and accidental fatalities in the world. In India, there are many kind of places like hilly area plateaus, and due to improper road facilities accidents are more and death rate due to this accidents are more. The maximum number of accidents are reported in the transport sector, that is, on road as well as railways. Some approximations claim that Indian roads alone accounted for approximately 105,000 accidental fatalities in 2010. This is almost 15 percent of the global road fatalities when India has just 1% of the total global vehicles. The incidents of accidental deaths have shown increasing trend during the year 2000-2015 with an increase of 50 percent in the year 2010 as compared to the year 2000. According to Planning Commission of India, the total annual economic loss is 2.5% of India's GDP due to rising number of road fatalities.

Traffic accidents are a major public issue worldwide. The huge number of injuries and death as a result of road traffic accident uncovers the story of global crisis of road safety. According to statistical projection of traffic fatalities, the two-year comparison of total driver participation in mortal crashes presented a three percent increase from 43,840 in 2011 to 45,337 in 2012. Additionally 184,000 young drivers (15 to 20 years old) were injured in vehicle crashes, in 2012, an increase of two percent from 180,000 in 2011. The most obvious reason for a person's death during accidents is unavailability of the first aid provision, which is due to the delay in the information of the accident being reached to the ambulance or to the hospital. Thus, in the case of incidents involving vehicular accidents, response time is crucial for the timely delivery of emergency medical services to accident victims and is expected to have an impact on fatalities. Moreover, each minute is passed while an injured crash victims do not receive emergency medical care can make a large difference in their survival rate, for example, analysis shows that decreasing accident response time by 1 minute correlates to a six percent difference in the number of lives saved.

III. PROPOSED METHODOLOGY

Road accidents are the major problem in this fast growing world. To detect the accidents immediately, when it was

happened and intimate to the Rescue team (Ambulance, Police station, Fire station) ,Automobile servicing agency, Blood relatives about the status of vehicle (severity of accident) and passengers .We will implement the system in which there is an automatic detection of accident through sensors provided in the vehicle. A GPS and GSM module in the concerned vehicle will send the location of the accident to the main server which will rush an ambulance from a nearest hospital to the accident spot and convey the occurrence of accident to the relatives. It can automatically find a traffic accident, search for the spot and then send the basic information to first aid center within two seconds covering geographical coordinates, the time and circumstances in which a traffic accident takes place. GPS software is fitted in the vehicle will now start communicate with the satellite and get the latitude and longitude values and send the information to the nearest hospital. The hospital will then be sending the ambulance to the accident zone. Then the injured people will be saved as soon as possible.

IV. AUTOMATIC ACCIDENT DETECTION AND INTELLIGENT INFORMATION SYSTEM



Fig.1 Block diagram.

A. Arduino UNO (Microcontroller)

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your



UNO without working too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.



Fig.2 Arduino UNO.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

B. GSM:

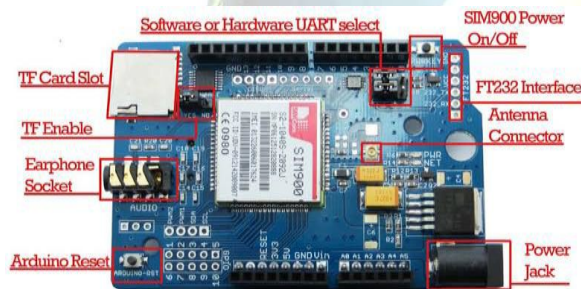


Fig.3 GSM Module

GSM is an international standard for mobile telephones. It is an acronym that stands for Global System for Mobile Communications. A GSM Module is basically a GSM Modem (like SIM 900) connected to a PCB with different types of output taken from the board – say TTL Output (for Arduino, 8051 and other microcontrollers) and RS232 Output to interface directly with a PC (personal computer). The board will also have pins or provisions to attach mic and speaker, to take out +5V or other values of power and ground connections. These type of provisions vary with different modules. It is also sometimes referred to as 2G, as it is a second-generation cellular network. Among other things, GSM supports outgoing and incoming voice calls, Simple Message System (SMS or text messaging), and data communication (via GPRS).

C. GPS

The Global Positioning System (GPS), is a satellite-based radio navigation system owned by the United States government and operated by the United States Air Force . It is a global navigation satellite system that provides geo location and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Obstacles such as mountains and buildings block the relatively weak GPS signals.



Fig.4 GPS Module

D. Accelerometer

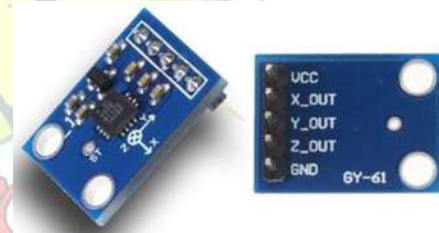


Fig.5 Accelerometer

An accelerometer is an electromechanical device that measures both static (gravity) and dynamic (motion or vibration) accelerations. An accelerometer measures proper acceleration, which is the acceleration it experiences relative to freefall and is the acceleration felt by people and objects. For example, an accelerometer at rest on the surface of the Earth will measure an acceleration due to Earth's gravity, straight upwards (by definition) of $g \approx 9.81 \text{ m/s}^2$. By contrast, accelerometers in free fall (falling toward the center of the Earth at a rate of about 9.81 m/s^2) will measure zero.

E. Vibration Sensor



Fig.6 Vibration Sensor



The vibration sensor SW-420 Comes with breakout board that includes comparator LM 393 and Adjustable on board potentiometer for sensitivity threshold selection, and signal indication LED. This sensor module produce logic states depends on vibration and external force applied on it. When there is no vibration this module gives logic LOW output. When it feels vibration then output of this module goes to logic HIGH. The working bias of this circuit is between 3.3V to 5V DC. The Vibration Sensor Module Vibration Switch SW-420 is based on the vibration sensor SW-420 and Comparator LM393 to detect if there is any vibration that beyond the threshold. The threshold can be adjusted by the on-board potentiometer. When this no vibration, this module output logic LOW the signal indicate LED light, and vice versa.

F. IR Sensor

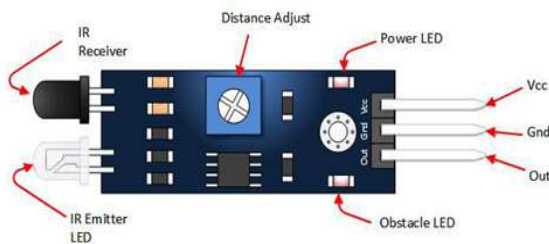


Fig.7 IR Sensor

Infrared Obstacle Avoidance Proximity Sensors Module has built-in IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect presence of any obstacle in front of the sensor module. The module has on board potentiometer that lets user adjust detection range. The sensor has very good and stable response even in ambient light or in complete darkness. The sensor module can be interfaced with Arduino, Raspberry Pi or any microcontroller having IO voltage level of 3.3V to 5V.

V. WORKING

A. Work flow of the system

- Step 1: Start.
- Step 2: The system can be initialize on Arduino .
- Step 3: The vibration sensor constantly checks for the vibrations of vehicle.
- Step 4: The accelerometer sensor checks the axis of vehicle constantly.
- Step 5: The IR sensor checks the presence of human inside the vehicle.
- Step 6: If the permissible level of vibration or tilting of vehicle is exceed than the threshold level , it is

observed that accident was occurred and location is captured by GSM and transmitted to the relatives of passenger through GSM.

Step 7: If IR sensor is enable for above step, then the information is also passed to the Hospital near to the accident location.

Step 8 : Stop.

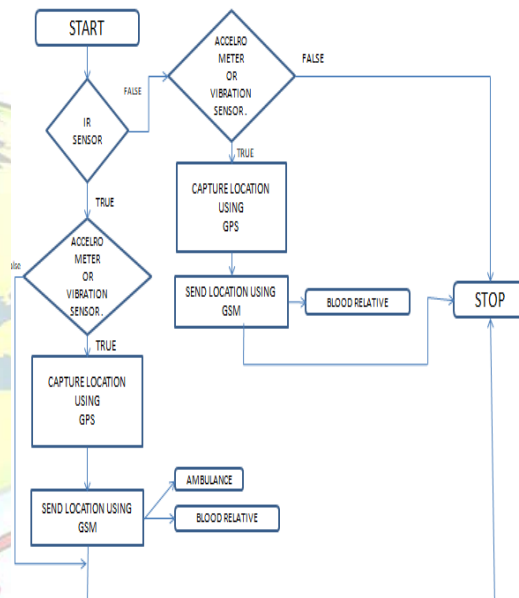


Fig.8 Flow Chart

B. Hardware Photography

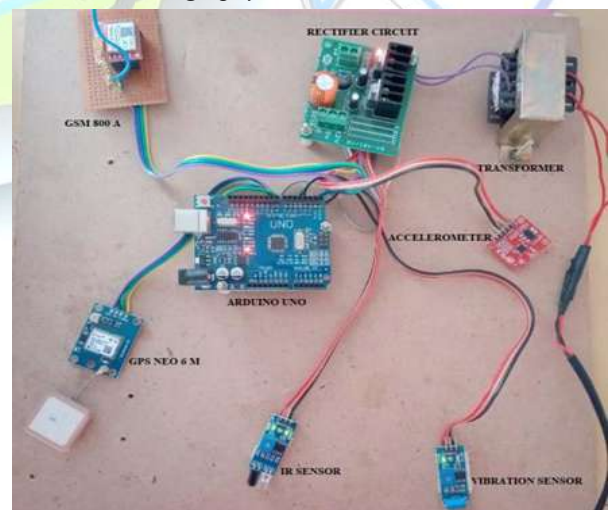


Fig.9 Hardware photography



C. Output Verification

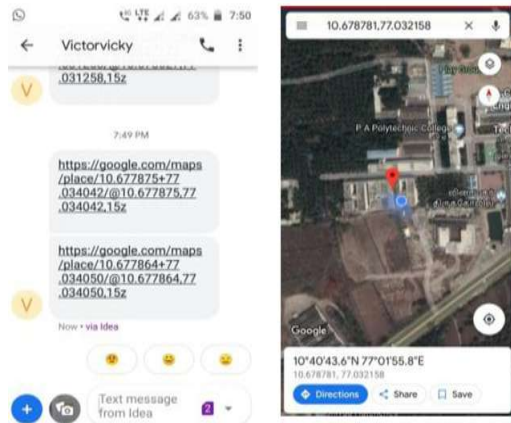


Fig.10 Output photograph

VI. CONCLUSION & FUTURE SCOPE

The paper provide various methods to detect accidents using both hardware and software methods which provide good results. Most of the discussed methods also provide the driver with the option of turning of the alarm in cases where the accident is not serious or false detections of an accident. These methods are either mostly dependent on some hardware like sensors that have to be present in the car or require a smart phone to be present within the car. While the use of such hardware can prove to be a more cost-efficient approach it has the drawback of being destroyed in the accident and hence giving spurious or no readings at all. Hence, an approach that does not depend on any hardware device or sensor that is associated with the car is required for the detection of traffic accidents.

Rescue team (Ambulance, Police station, automobile servicing agency) nearby from the accident location will be sent by linking the accident location to the Google maps. By implementing this product in heavy vehicles, theft of highway dacoity gangs can be avoided.

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BIOGRAPHY

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