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DEVELOPMENT OF ACCIDENT TRACKING AND TRAFFIC CLEARANCE ALERT SYSTEM

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Abstract: In highly populated Countries, speed is one of the basic reasons, everyday people lose their lives because of accidents and poor emergency facilities. Many lives could have been saved if emergency services could get accident information and reach in time.. This project implies a system which is a solution to this drawback, when a vehicle meets with an accident and deals with accident detection system when the accident occurs it uses various components and alerts the Rescue team for help. Vibration sensor detects the sudden change in the vibration of vehicle and GSM module sends the alert message on your Mobile Phone with the location of the accident. Location of accident is sent in the form of Google Map link, derived from the latitude and longitude from GPS module . It reads the exact latitude and longitude of the vehicle involved in the accident and sends this information to nearest emergency service provider. The goal of the project is to detect accidents and alert the rescue team in time. Due to real-time tracking facility, vehicle tracking systems are becoming increasingly popular among owners of expensive vehicles

Keywords Vibration sensor, GPS module, GSM module, vehicle tracking systems

I. INTRODUCTION

The development of a transportation system has been the generative power for human beings to have the highest civilization above creatures in the earth. automobile has a great importance in our daily life. We utilize it to go to our work place, keep in touch with our friends and family, and deliver our goods. but it can also bring disaster to us and even can kill us through accidents.speed is one of the most important and basic risk factors in driving. it not only affects the severity of a crash, but also increases risk of being involved in a crash. Despite many efforts taken by different governmental and non-governmental organizations all around the world by various programs to aware against careless driving, yet accidents are taking place every now and then. however, many lives could have been saved if the emergency servicecould get the crash information in time. a study by Virtanen et al. shows that 4.6% of the fatalities in accidents could have been prevented only if the emergency services could be provided at the place of accident at the proper time. as such, efficient automatic accident detection with an automatic notification to the emergency service with the accident location is aprime needto save the precious human life.

II. BLOCK DIAGRAM

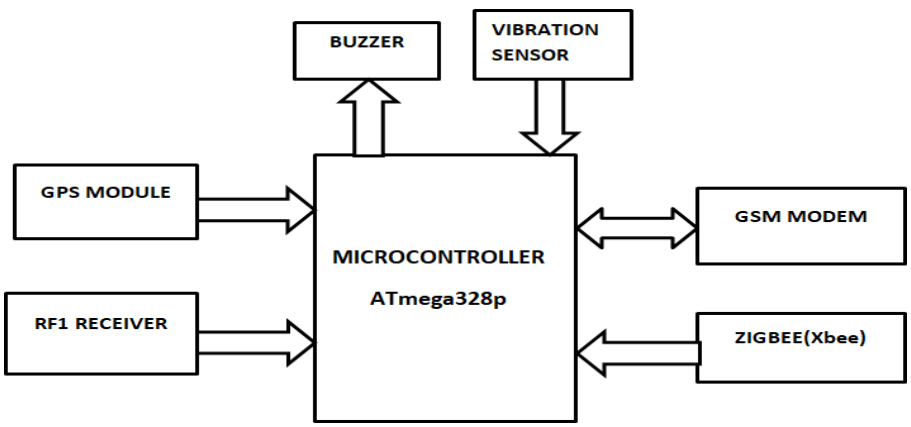

FIG 1 BLOCK DIAGRAM OF VEHICLE MODULE

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First and further most aim of this vehicle module block is to identify the accident and send the message to the respective owners which we are specified in the program. Here when accident happens peizoelectric plate senses the corresponding maximum threshold and this detected thresholds from the sensor are considered as accident signals using a microcontroller Arduino mega 2560.

Arduino is used as main microcontroller, this system is made for accident alert, the whole system is to be implemented in the vehicle itself. So, when the accident happens, the vibration senses the shock and send it to an Arduino microcontroller, at the same time, with GPS the latitude and longitude of that particular location is obtained, and with that the exact location of the accident site is determined. And here, GSM modem SIM900 is interfaced with microcontroller. So that, when accident happens, the SMS will be sending automatically to the particular numbers which would be entered in the code.

We are using GPS, GSM and ZigBee like three wireless communication protocol devices hence the use of atmega2560. Where it is capable of handling 4 serial devices with UART protocol.

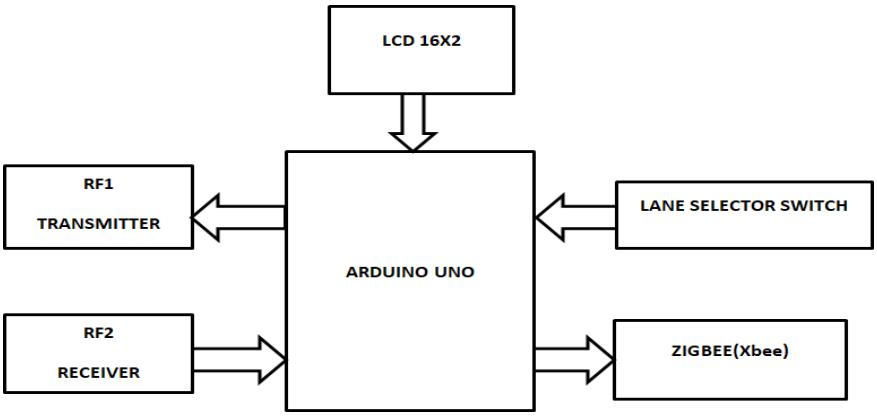

FIG.2 BLOCK DIAGRAM OF AMBULANCE MODULE

In the ambulance block we have selected ZIGBEE(Xbee) (standard bases wireless technology) which has a range of 10-100 meters and if we want to increase the range we have to use smart plugs which will enable more range without a problem .For the displaying of messages we have selected a lcd panel called I2C module which needs only four pins for our microcontroller to run.

Where we have connected every ambulance through near node methods which is IP configured and named A,B.C,D etc in the code .whenever the accident occur , the SMS will be sent automatically to the particular numbers which would be entered in the code and to the nearby ambulance, The request received with latitude /longitude data which is displayed on the LCD and after clicking the link ,we will be redirected to the Google map and then we can see the exact location of the vehicle. For accepting the request which is displayed on the screen of nearby ambulances we have provided a switch to select that particular ambulance ,after that ambulance got selected and furthermore it cannot accept the request on the other ambulances.

A lane selector switch is also provided to guide the ambulance in the traffic and the block is explained in the next page. 2RF modules are used to indicate other vehicles the approach of ambulance and other for lane controlling during busy traffic areas of signals.

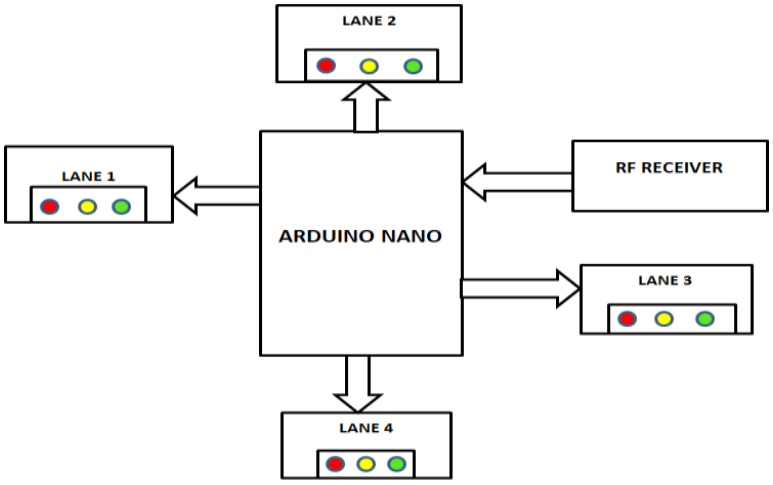

FIG.3 BLOCK DIAGRAM OF AMBULANCE MODULE

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This above module represent the smart traffic module where its performance the normal functional traffic signal but any request from ambulance with lane selection.

III. HARDWARE TOOLS

1. ARDUINO MEGA 2560

The Arduino Mega is a widely used open-source microcontroller board based on the ATmega328P microcontroller and developed by Arduino.cc. The Arduino is the major control unit to detect or alert when an accident occurs. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, 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. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

2. ARDUINO UNO

Arduino Uno is a popular microcontroller development board based on 8 bit ATmega328P Microcontroller. ATmega328P MCU IC, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller.

3. ARDUINO NANO

The Arduino Nano is another popular Arduino development board very much similar to the Arduino UNO. They use the same Processor (Atmega328p) and hence they both can share the same program.

4. GPS MODULE

The NEO-6MV2 is a GPS (Global Positioning System) module and is used for navigation. The module simply checks its location on earth and provides output data which is longitude and latitude of its position. It is from a family of stand-alone GPS receivers featuring the high performance u-box 6 positioning engine. These flexible andcost effective receivers offer numerous connectivity options in a miniature (16 x 12.2 x 2.4 mm) package. The compact architecture, power and memory options make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints.

5. GSM MODULE

To find the location on the earth the whole is divided into some coordinates where the location can be easily captured by a module called GPS module. The module can also be used for developing IOT (Internet of Things) and Embedded Applications. SIM900A is a dual-band GSM/GPRS engine that works on frequencies EGSM 900MHz and DCS 1800MHz. SIM900A features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

6. RF MODULE

An RF module (short for radio-frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices.RF module operates at Radio Frequency. This frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This types of modulation is an Amplitude Shift Keying.

7. VIBRATION SENSOR

It is a device that measures the amount and frequency of vibration in a given system, machine, or piece of equipment. Those measurements can be used to detect imbalances or other issues in the asset and predict future breakdowns.

8. ZIGBEE

ZigBee is an IEEE based specification for a suite of high-level communication protocols used to create personal area networks with small, low-power digital radios, such as for home automation, medical device data collection, and other low-power low-bandwidth needs, designed for small scale projects which need wireless connection.

9. LCD DISPLAY

To display the numbers, alphabets and special characters an LCD module with 16x2 alpha numeric types is used.

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IV. WORKING PRINCIPAL

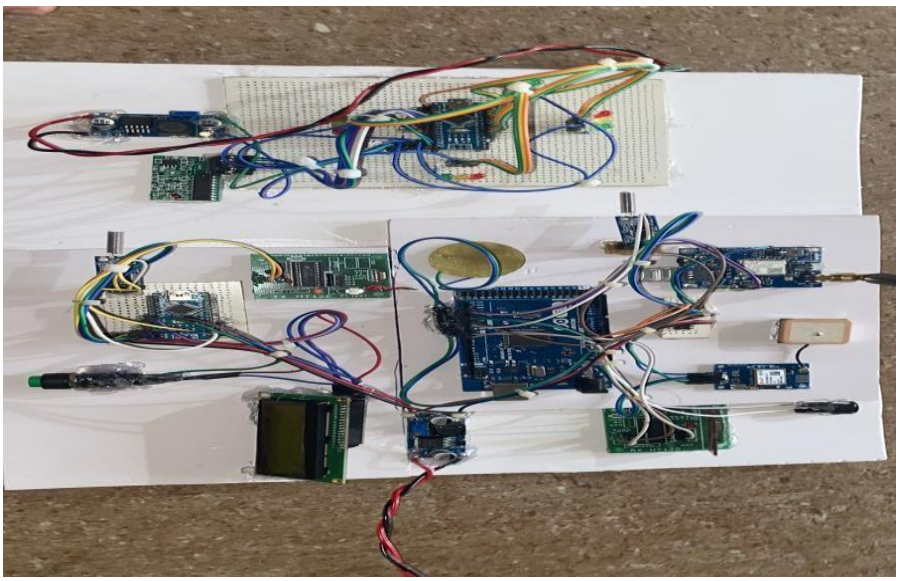

FIG 4 IMAGES OF THE DESIGNED CIRCUIT

Diagram shown in figure, Arduino is used as main microcontroller, this system is made for accident alert, the whole system is to be implemented in the vehicle itself. So, when the accident happens, the vibration senses the shock and send it to an Arduino microcontroller, at the same time, with GPS the latitude and longitude of that particular location is obtained, and with that the exact location of the accident site is determined. And here, GSM modem SIM900 is interfaced with microcontroller. So that, when accident happens, the SMS will be sending automatically to the particular numbers which would be entered in the code.

When we are ready with our hardware after programming, we can install it in our vehicle and power it up. Now whenever there is an accident, the car gets tilt and Vibration sensor changes his axis values. These values read by Arduino and checks if any change occurs in any axis. If any change occurs then Arduino reads coordinates by extracting $GPGGA String from GPS module data and send SMS to the predefined number to the police or ambulance or family member with the location coordinates of accident place. The message also contains a Google Map link to the accident location, so that location can be easily tracked. When we receive the message then we only need to click the link and we will redirect to the Google map and then we can see the exact location of the vehicle.
Many ambulance driver receive the accident message . The message received by the ambulance driver can attend the accident with the location coordinates of accident place. The driver has a zigbee module which button containsa button in which its acts as a master. The nearest driver can click the button saying that he is attending the accident place. That message is received by other ambulance driver so that they can attend other accident so it cansaves the time also.

The driver also can control the traffic signals by using control switches which he can control the traffic signal by jamming the signal during the emergency cases. He can select which lane he want to go by making it green and remaining red.

V. FLOW CHART

At first the vehicle module with the help of the timer keep on checking the threshold of the piezoelectric plates if any changes occurs more than the limited threshold then it is determined as accident occurred and buzzer gets ON and then the message got sent to the perspective owner, friends and family and to the nearby ambulance after determining the location and then it stops.

Step 1. Start
Step 2. System Initialization occurs
Step 3. System normal go back to step 2
Step 4.Accident is occurred then buzzer should be on.
Step 5.Vibration detection is done.

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Step 6. Switch is on then Terminate the message else GPS Search
Step 7.Find the location of the accident
Step 8. GPS module data and send SMS to the predefined number to the police or ambulance or family member withthe location coordinates of accident place. **.**The message also contains a Google Map link to the accident location, so that location can be easily tracked.
Step 9. Stop

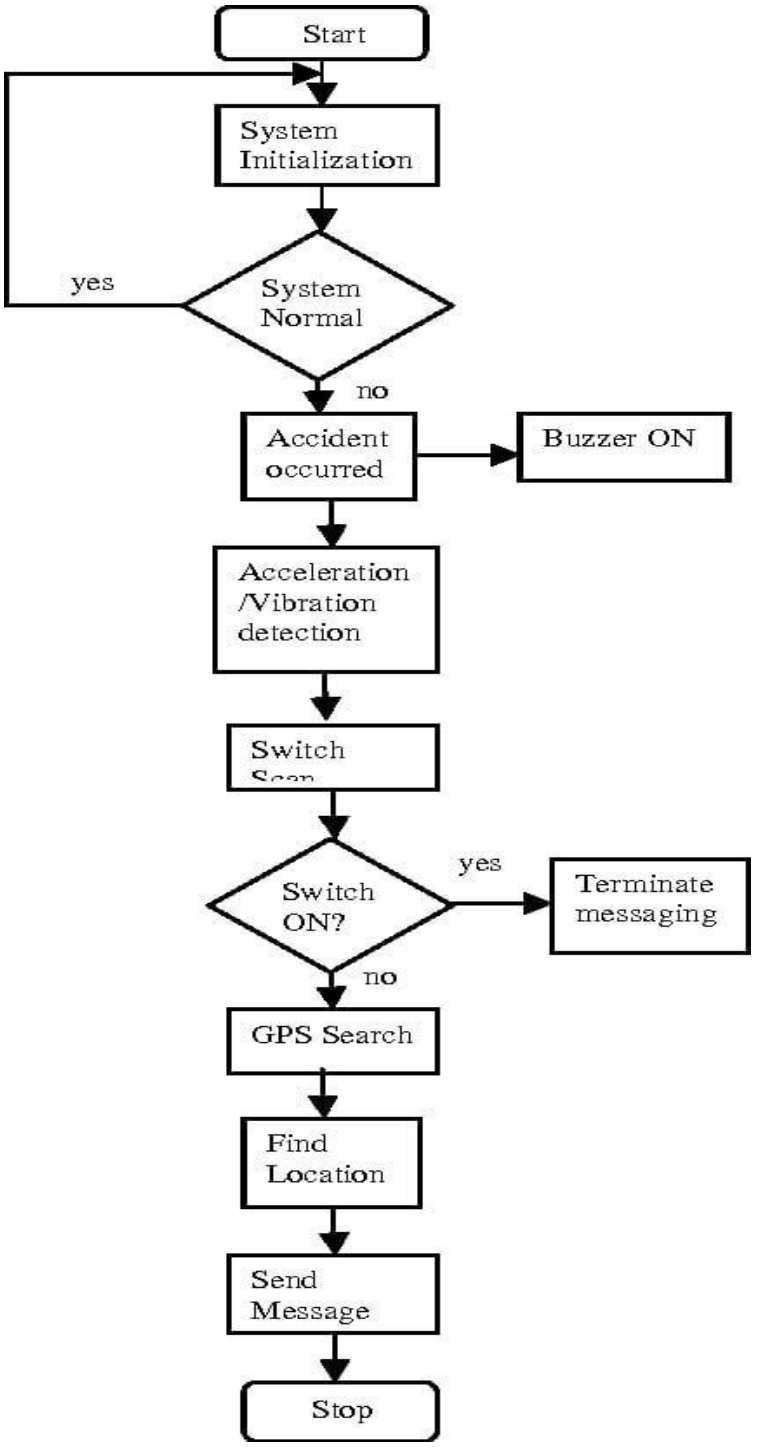

FIG 5. FLOW CHART

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VI. EXPECTED RESULT

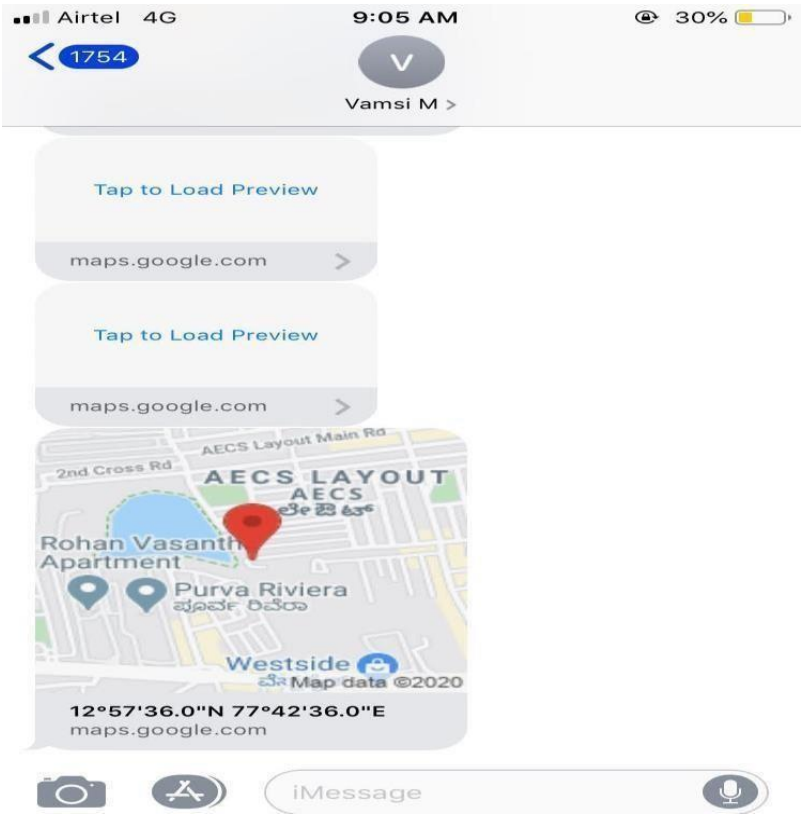


FIG 6. Message Received

Location with Google map link received, we can browse it and look for directions

FIG 7 Location with Google map link received

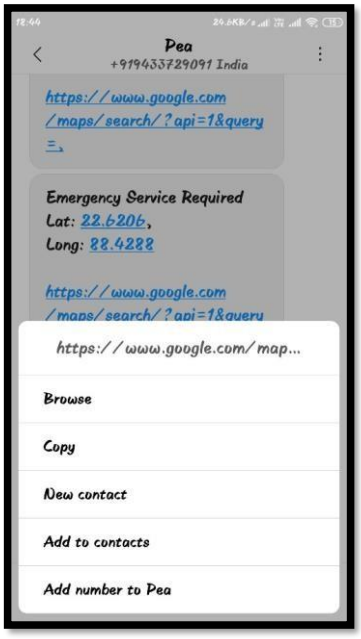
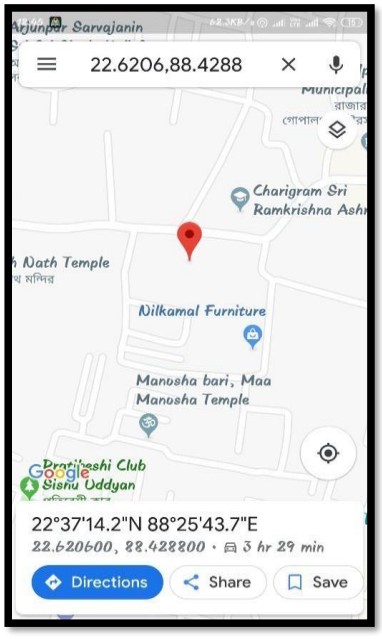


FIG 8 we can browse it and look for directions



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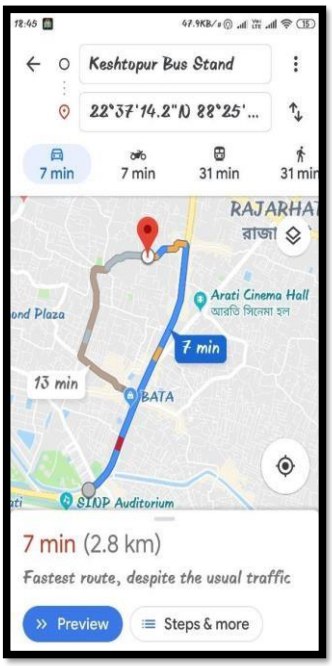

FIG 8 Location in google map with distance

VII. ADVANTAGES AND DISADVANTAGES , APPLICATIONS

ADVANTAGES

1. Easy to operate.
2. Sophisticated security.
3. Simple and Reliable Design.
4. Isolates both GSM and GPS signal.
5. Easy to detect the exact location of the vehicle.
6. It provides security to the vehicle in very reasonable cost.
7. Intelligent high-tech safety system.
8. It saves the precious time required to save the accident victims.
9. For SOS purposes.

DISADVANTAGES

1. It does not work without network.
2. GPS module sometimes takes 2-3 hours to connect to the signal.

APPLICATIONS

1. Used in automotive and transport vehicles from lighter vehicles like cars, to heavier automotive likeships and aero planes.
2. Security and remote monitoring of vehicles especially during military operations.
3. This system is also can be interfaced with Vehicle airbag system such that when the sensors detect the accident, the air bags get opened.
4. School transport vehicle accident detection.
5. This project can be used for cab or car of companies.

VIII. CONCLUSION WITH FUTURE ENHANCEMENT

A novel idea is proposed for controlling the traffic signals in favor of ambulances during the accidents. With thissystem the ambulance can be maneuvered from the ITLS (Intelligent traffic lane system) can be proved to be effectual to control not only ambulance but also authoritative vehicles. Thus ITLS if implemented in countries withlarge population like INDIA can produce better results. The ITLS is more accurate with no loss of time. But theremay be a delay caused because of GSM messages since it is a queue based technique, which can be reduced by giving more priority to the

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messages communicated through thecontroller.

Future scope 1:- This system can be interfaced with vehicle airbag system that prevent vehicle occupant from striking interior objects such as the steering wheel or window.

Future scope 2:- This can also be developed by interconnecting camera to controller module that takes the photographs of the accident spot that makes the tracking easier.

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