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Vehicle Accident Detection And Location Tracking System

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Abstract:

Nowadays, the population increases day by day. Road transport is used mostly. The most preferable road transport are Vehicles, containers, cars, etc., This paper primary goal is to supply safety to the passengers as well as Vehicles. Nowadays, the major reason for road accidents are overspeed, fire accidents, and driver's negligence. This research study intends to overcome these challenges by using fire detection, accident detection, and alcohol sensing for drivers. If in case any accidents occur, it sends instant SMS and live location to the related Road centres like RTC centres, hospitals, fire stations, etc., This makes the accident location to be immediately known and it helps to save valuable lives. This study also provides solar panels for power generation and stores it in the battery. A new approach for calculating the total number of passengers traveling is proposed. The flame sensor is used for fire detection, alcohol (MQ3) sensor is used for the alcohol detection for drivers. The paper is based on the AURDINO, all the sensors are connected to it and send SMS of the live location through the GPS AND GSM module.

INTRODUCTION

WORKING OF PROJECT:

When an individual riding his/her Vehicle, meets with a mishap, quite possibly the individual may experience the ill effects of genuine damage or lapse immediately and there is nobody around to help him. Well, this project is an answer to the issue.The system acts as an accident avoidance and detection system that gathers all the information and sends it to the close person or anyone whose number the driver has assigned. In this task, Arduino is utilized for controlling entire the procedure with a GPS Receiver and GSM module.GPS Receiver is utilized for identifying directions of the vehicle, GSM module is utilized for sending the ready SMS with the directions and the connection to Google Map. An accelerometer can be used in a car alarm application with the goal that risky driving can be distinguished

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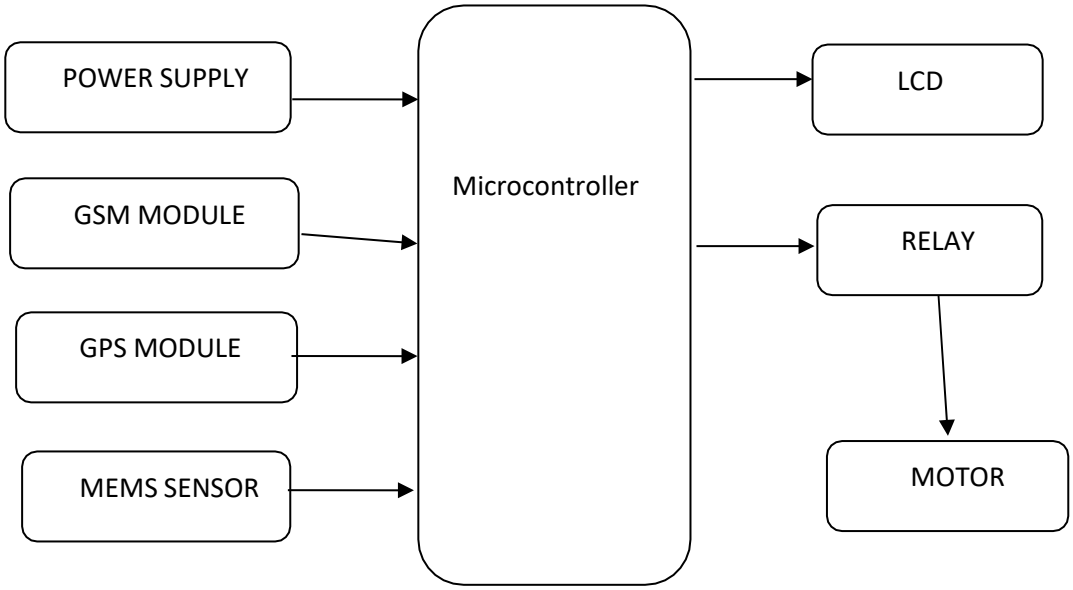
BLOCK DIAGRAM:



Block Diagram of IOT Based Vehicle Accident Detection and Tracking Systemusing GPS Modem

CIRCUIT DIAGRAM POWER SUPPLY:

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supplyunit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to othersThis power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage (no frequency) with the amplitude of +5V and +12Vfor various applications.Each voltage regulator output is again is connected to the capacitors of values (100µF, 10µF, 1 µF, 0.1 µF) are connected parallel through which the corresponding output (+5V or +12V) are taken into consideration.

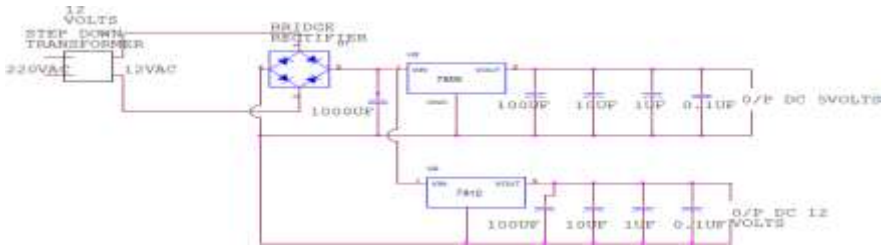


Fig: 2.2 Circuit diagram of power supply

CIRCUIT EXPLANATION:

1) <u>Transformer</u>

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A transformer is a device that transfers electrical energy from one circuit to another throughinductively coupled electrical conductors. A changing current in the first circuit (the primary)

creates a changing magnetic field; in turn, this magnetic field induces a changing voltage in thesecond circuit (the secondary).

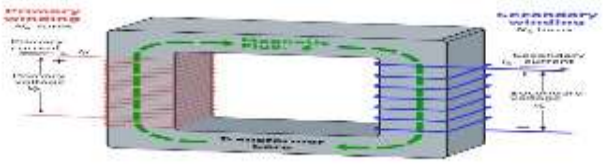
By adding a load to the secondary circuit, one can 2make current flow in the transformer, thus transferring energy from one circuit to the other. The secondary induced voltage V_S, of an ideal transformer, is scaled from the primary V_P by a factor equal to the ratio of the number of turns of wire in their respective windings:

$$\frac{V_S}{V_P} = \frac{N_S}{N_P}$$

Basic principle:

The transformer is based on two principles: firstly, that an electric current can produce a magnetic field (electromagnetism) and secondly that a changing magnetic field within a coil of wire induces a voltage across the ends of the coil (electromagnetic induction).

A simplified transformer design is shown below. A current passing through the primary coil creates a magnetic field. The primary and secondary coils are lines produced by the primary current are within the iron and pass through the secondary coil as well as the primary coil.



An ideal step-down transformer showing magnetic flux in the core

Fig:2.3step-down transformer

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ARDUINO UNO:

ATMEGA 328 Pinout:

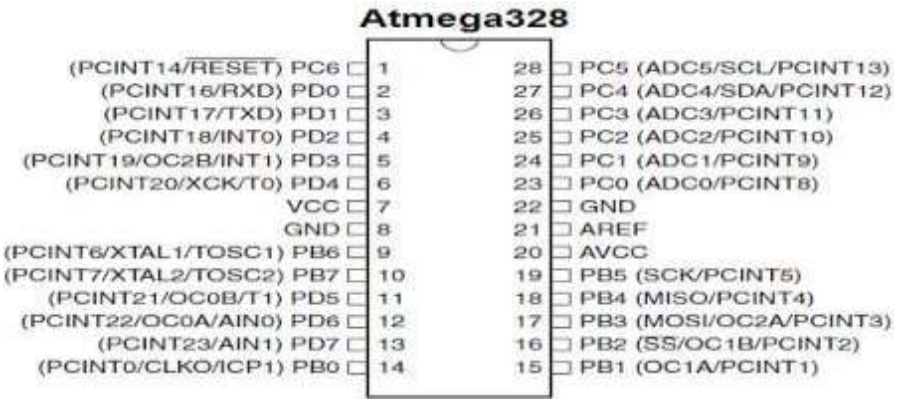

Fig: 2.9 ATMEGA 328 Pin description

Arduino Program:

Programming into the Arduino board is called as sketches. Each sketch contains three parts such as Variables Declaration, Initialization and Control code. Where, Initialization is writtenin the setup function and Control code is written in the loop function.The sketch is saved with in and any operation like opening a sketch, verifying and saving can be done using the tool menu.

- Select the suitable board from the serial port numbers and tools menu.
- Select the tools menu and click on the upload button, then the boot loader uploads thecode on the microcontroller.

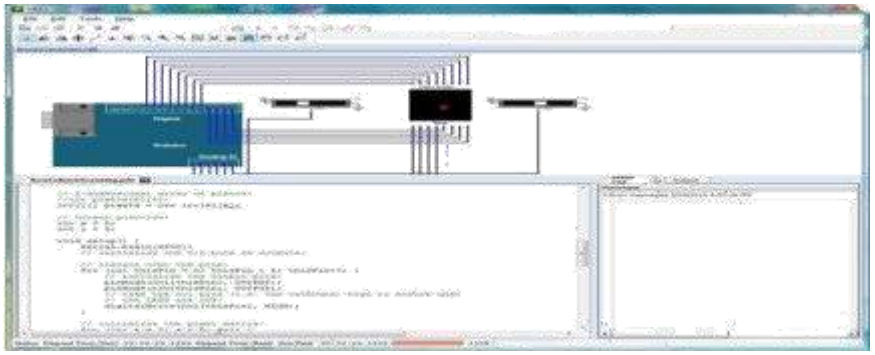

Fig.: 2.11 Programming an Arduino

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MOBILE TELEPHONY STANDARDS:

Standard	Generation	Frequency band	Throughput	
GSM	2G	Allows transfer of voice or low-volume digital data.	9.6 kbps	9.6 kbps
GPRS	2.5G	Allows transfer of voice or moderate-volume digital data.	21.4-171.2 kbps	48 kbps
EDGE	2.75G	Allows simultaneous transfer of voice and digital data.	43.2-345.6 kbps	171 kbps
UMTS	3G	Allows simultaneous transfer of voice and high-speed digital data.	0.144-2 Mbps	384 kbps

Table:2.1 Mobile telephony standards

1G

The first generation of mobile telephony (written **1G**) operated using analogue communications and portable devices that were relatively large. It used primarily the followingstandards:

- **AMPS** (Advanced Mobile Phone System), which appeared in 1976 in the United States, was the first cellular network standard.
- It was used primarily in the Americas, Russia and Asia. This first-generation analogue network had weak security mechanisms which allowed hacking of telephones lines.
- **TACS** (Total Access Communication System) is the European version of the AMPS model. Using the 900 MHz frequency band, this system was largely used in England and then in Asia (Hong-Kong and Japan).
- **ETACS** (Extended Total Access Communication System) is an improved version of the TACS standard developed in the United Kingdom that uses a larger number of communication channels.

The first-generation cellular networks were made obsolete by the appearance of an entirely digital second generation.

Second Generation of Mobile Networks (2G)

The second generation of mobile networks marked a break with the first generation of cellular telephones by switching from analogue to digital. The main 2G mobile telephony standards are:

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- GSM (*Global System for Mobile communications*) is the most commonly used standard in Europe at the end of the 20th century and supported in the United States. This standard uses the 900 MHz and 1800 MHz frequency bands in Europe.
- In the United States, however, the frequency band used is the 1900 MHz band. Portable telephones that are able to operate in Europe and the United States are therefore called **tri-band**.
- **CDMA** (*Code Division Multiple Access*) uses a spread spectrum technique that allows a radio signal to be broadcast over a large frequency range.
- **TDMA** (*Time Division Multiple Access*) uses a technique of time division of communication channels to increase the volume of data transmitted simultaneously. TDMA technology is primarily used on the American continent, in New Zealand and in the Asia-Pacific region.

With the 2G networks, it is possible to transmit voice and low volume digital data, for example text messages (**SMS**, for *Short Message Service*) or multimedia messages (**MMS**, for *Multimedia Message Service*). The GSM standard allows a maximum data rate of 9.6 kbps.

The **EDGE** (*Enhanced Data Rates for Global Evolution*) standard, billed as **2.75G**, quadruples the throughput improvements of GPRS with its theoretical data rate of 384 Kbps, thereby allowing the access for multimedia applications

3G

The IMT-2000 (*International Mobile Telecommunications for the year 2000*) specifications from the International Telecommunications Union (ITU) defined the characteristics of **3G** (third generation of mobile telephony). The most important of these characteristics are:

1. High transmission data rate.
2. 144 Kbps with total coverage for mobile use.
3. 384 Kbps with medium coverage for pedestrian use.

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4. 2 Mbps with reduced coverage area for stationary use.
5. World compatibility.
6. Compatibility of 3rd generation mobile services with second generation networks.

3G offers data rates of more than 144 Kbit/s, thereby allowing the access to multimedia uses such as video transmission, video-conferencing or high-speed internet access. 3G networks use different frequency bands than the previous networks: 1885-2025 MHz and 2110-2200 MHZ.

INTRODUCTION TO THE GSM STANDARDS:

The **GSM** (*Global System for Mobile communications*) network is at the start of the 21st century, the most commonly used mobile telephony standard in Europe. It is called as Second Generation (2G) standard because communications occur in an entirely digital mode,

unlike the first generation of portable telephones. When it was first standardized in 1982, it was called as **Group Special Mobile** and later, it became an international standard called **"Global System for Mobile communications"** in 1991.

GSM Standards:

GSM uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency. There are three basic principles in multiple access, FDMA (Frequency Division Multiple Access), TDMA (Time Division Multiple Access), and CDMA (Code Division Multiple Access).

TDMA allows the users to share the same frequency channel by dividing the signal into different time slots. Each user takes turn in a round robin fashion for transmitting and receivingover the channel. Here, users can only transmit in their respective time slot.

CDMA uses a spread spectrum technology that is it spreads the information contained in a particular signal of interest over a much greater bandwidth than the original signal. Unlike TDMA, in CDMA several users can transmit over the channel at the same time.

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TDMA IN BRIEF:

In late1980's, as a search to convert the existing analog network to digital as a means to improve capacity, the cellular telecommunications industry association chose TDMA over FDMA. To reduce the effect of co-channel interference, fading and multipath, the GSM technology can use frequency hopping, where a call jumps from one channel to another channel in a short interval.

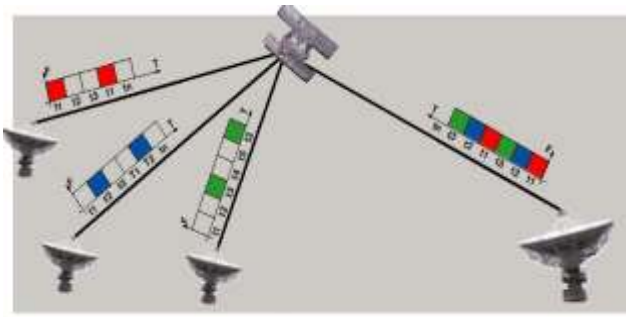

Fig:2.12 Time Division Multiple Access

Block Diagram

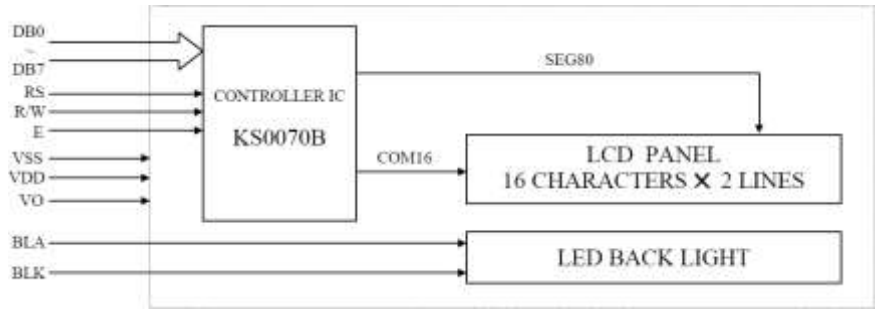

Fig:2.23 Block Diagram Of LCD

Display Data RAM

Display data RAM (DDRAM) stores display data represented in 8-bit character codes. Its extended capacity is 80 X 8 bits, or 80 characters. The area in display data RAM (DDRAM) that is not used for display can be used as general data RAM.

So whatever you send on the DDRAM is actually displayed on the LCD. For

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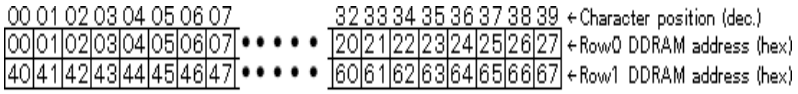
LCDs like 1x16,only 16 characters are visible, so whatever you write after 16 chars is written in DDRAM but is not visible to the user. Figure below will show you the DDRAM addresses of 2 Line LCD.



DDRAM Address for 2 Line LCD

Instruction Register (IR) and Data Register (DR)

There are two 8-bit registers in HD44780 controller Instruction and Data register. Instruction register corresponds to the register where you send commands to LCD e.g LCD shift command, LCD clear, LCD address etc. and Data register is used for storing data which is tobe displayed on LCD.

16 x 2 Alphanumeric LCD Module Features

- Intelligent, with built-in Hitachi HD44780 compatible LCD controller and RAMproviding simple interfacing
- 61 x 15.8 mm viewing area
- 5 x 7 dot matrix format for 2.96 x 5.56 mm characters, plus cursor line
- Can display 224 different symbols
- Low power consumption (1 mA typical)
- Powerful command set and user-produced characters
- TTL and CMOS compatible

Schematic

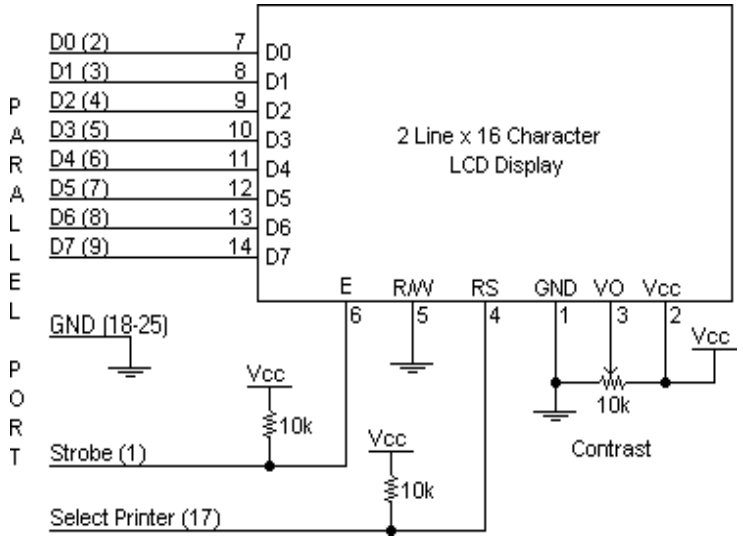


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Fig:2.24 Pin Diagram Of LCD Specification

ARDUI

NO

UNO

Microcontroller:

Introduction:

Microcontroller as the name suggest, a small controller. They are like single chip computers that are often embedded into other systems to function as processing/controlling unit. For example, the control you are using probably has microcontrollers inside that do decoding and other controlling functions. They are also used in automobiles, washing machines, microwaves ovens, toys…. etc., where automation is needed.

Arduino Uno Microcontroller:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 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 power pins are as follows:

- **VIN.** The input voltage to the Arduino board when it's using an external power source (as opposed to5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.·
- **5V.** The regulated power supply used to power the microcontroller and other components on the board. This can

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come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.

- **3.3V.**A 3.3 volt supply generated by the on-board regulator. Maximum currentdraw is 50 mA.
- **GND.** Ground pins.

Technical Specifications:

FEATURE	SPECIFICATION
Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

Table : Arduino uno specifications

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

1. **USB Interface:** Arduino board can be powered by using the USB cable from your computer. All you need to do is connect the USB cable to the USB connection
2. **External power supply:** Arduino boards can be powered directly from the AC mains power supply by connecting it to the power supply (Barrel Jack)
3. **Voltage Regulator:** The function of the voltage regulator is to control the voltage given to the Arduino board and stabilize the DC voltages used by the processor and other elements.

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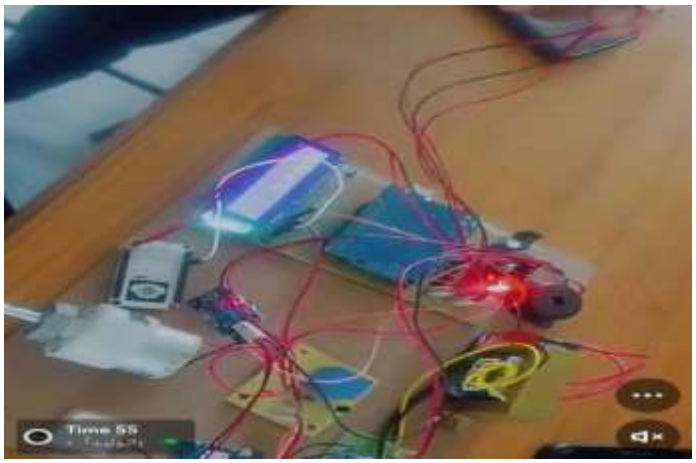
4. **Crystal Oscillator:** The crystal oscillator helps Arduino in dealing with time issues. How does Arduino calculate time? The answer is, by using the crystal oscillator. The number printed on top of the Arduino crystal is 16.000H9H. It tells us that the frequencyis 16,000,000 Hertz or 16 MHZ.

RESULT

Automatic vehicle accident detection and messaging system uses accelerometer in Cr alarm application. So that dangerous driving can be detected. The accident can be sensed by using the vibration sensor. Using ARM controller, the mobile number can be saved in EEPROM and sends the message when accident occurs. Accident prevention is an umbrella term that encompasses all steps taken by an entity to reduce the risk of accidents, to save lives, and tomitigate the risks of injury or to lessen its severity.



CONCLUSION

To minimize the deaths and the server conditions due to accidents with GPS and GSM technologies are used where immediate action would be take placethe ambulance/police service which might reduce the severity.

FUTURE SCOPE

This system can be interfaced with vehicle airbag system that prevents vehicle occupants fromstriking interior objects such as the steering wheel or window. This can be developed by interconnecting a camera to the Controller Module

that takes the photograph of the accident spot that makes the tracking easier.

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