

IOT BASED SMART VEHICLE SAFETY AND SECURITY SYSTEM

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ABSTRACT

Vehicle Safety Technology (VST) in the vehicle business implied outstanding advancement (moved driver-encourage structures) made to ensure the prosperity and security of cars and explorers. In this propelled time transportation is getting the opportunity to be as one of the basic need of human. Regardless of the way that it has different necessities, we go up against part of issue in it which cost human life. This article oversees issue which cause incident and moreover to ensure prosperity.

It oversees vibration sensor to perceive the setback through this an alert to the IOT which give GPS zone. A segment incorporates attesting the confirmation of shot seat strap. Likewise, it also ensures the driver isn't getting failed through the alcohol sensor. In case the driver was not wear seat strap or he/she is failed engine won't start. Additionally, MEMS sensor is used to screen the circumstance of the vehicle it gives 3 turn regards.

The driver security is ensured through the vehicle framework. The essential point of convergence of the structure is to make a smart accident disclosure and information system using this technique we can advise the occasion of an incident to the movement

control masters or emergency help centers with no others empower which to can help the voyager with rescuing at time in like manner we can keep the loss of human lives.

Keywords: Vehicle Safety Technology, Driver Assistive System, IOT Based Smart Vehicle, Vehicle Security System.

I. INTRODUCTION

Road incidents include the noteworthy bit of the accident passings wherever all through the world. As shown by the Insurance Institute for Highway Safety (IIHS), new automobiles and its inventive prosperity features have lessened auto related passing over the span of ongoing years. Regardless of the way that it credits advancement for reducing vehicle impacts, yet the IIHS can't avoid decrying awful driving practices like put driving, speeding and not using seat straps for so far causing genuine development passing. Modified vehicle accident acknowledgment and information structure is an introduced understanding inserted into the auto-compact.

The inspiration driving the investigation is to find the vehicle where it is and discover the vehicle by

strategies for sending information using a system which is put inside vehicle structure. Most of the events we will doubtlessly be notable find incident territory since we don't know where disaster will happen. In order to give treatment for hurt people, first we need to know where the incident happened through region following and sending information to your related one or to the emergency organizations. So in this work we are using the basic microcontroller ARDUINO for keen and moreover for basic cognizance. Here we used embedded c programming for better precision and GPS and Zigbee modules which pursues the vehicle wherever on the globe. The right territory of the vehicle is sent to our remote contraptions (IOT) using Zigbee modem.

EXISTING SYSTEM:

In the current framework, just restricted sensors were utilized in the framework and no area following was utilized to imply about the mishap and condition and status of the clients.

PROPOSED SYSTEM:

The purpose of the structure is to make a splendid setback acknowledgment system using that distinguishes the occasion of an accident and sends an information to the action control specialists or emergency help concentrates normally if there ought to be an event of a disaster with the objective that expeditious help can be given. It similarly enables nonstop after of vehicle's territory using IOT. This system goes about as a black box to vehicles. The vehicle's territory can be seen using iot development which is significantly less requesting than region to the extent extension and longitude.

II. SYSTEM DESIGN

The structure is given in Fig.: 2.1 The essential fragment of the system is the MEMS and Vibration Sensor. Incident is perceived from the manner in which that it makes a gigantic g forces to be made. The vibration perceives this power conveying a yield identifying with the proportion of intensity made. To gauge this g urge, the yield of the vibration sensor is reinforced to an ADC by methods for a solidarity gain speaker which truly works as an impedance organizing unit with the objective that the sensor isn't stacked by the ADC. The ADC is a 8 bit unit and gives an automated parallel out contrasting with the sensor straightforward scrutinizing.

This is given to the microcontroller which differentiates the proportionate and set away edge for an incident. If the regard read is more unmistakable than the limit set away, the microcontroller in a flash sends the zone of the vehicle obtained from the GPS to the IOT Station as emergency caution. This is done through the Zigbee remote correspondence modem that has been interfaced with the microcontroller. A LCD indicates has moreover been interfaced with the controller that shows the status of the system. The entire structure is energized by vehicle battery and introduced strategy of getting dc 5V has been in like manner made. Thusly the system can be controlled by 12V or 24 V battery course of action of any vehicle.

BLOCK DIAGRAM:

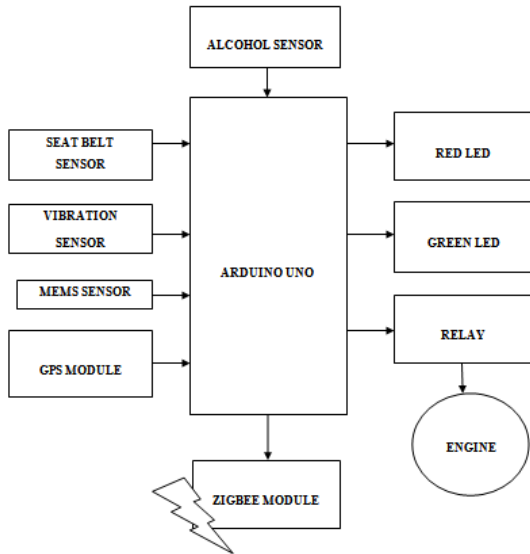


Fig.: 2.1 Transmitter Side

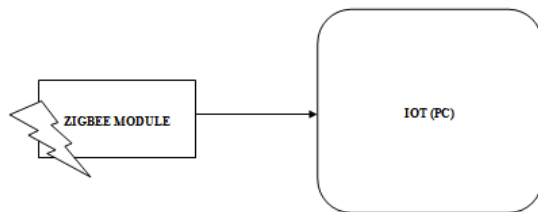


Fig 2.2 Receiver

III METHODOLOGY AND MATERIALS USED

It contains two areas which is hardware enhancement and programming progression. Hardware enhancement incorporated the organizing the circuit of the endeavor and printed circuit board (PCB) works. While the item enhancements are based on emulating the circuit before test to the authentic portion and moreover arranging coding to be embedded in the gear. IOT Part will structure and encouraged using Visual Studio Dotnet.

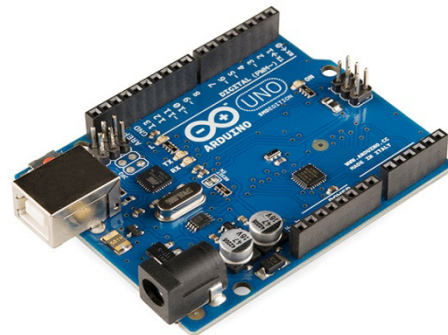
Microcontroller is the center of system. We have used the Arduino microcontroller, in which we set away the program which controls the entire VST structure. Which is executed in Arduino IDE and

performed in Proteus as shown by the program microcontroller provides the guidance to the hand-off.

A. ARDUINO UNO DEVELOPMENT BOARD:

Arduino is an open-source devices arrange reliant on easy to-use gear and programming. Arduino sheets can scrutinize inputs - light on a sensor, a finger on a catch, or a Twitter message - and change it into a yield - impelling a motor, turning on a LED, appropriating something on the web.

The Arduino Uno is a microcontroller board subject to the ATmega328. It has 14 propelled data/yield pins (of which 6 can be used as PWM yields), 6 straightforward data sources, a 16 MHz jewel oscillator, a USB affiliation, a power jack, an ICSP header, and a reset



get.

The endeavor relies upon microcontroller board structures, conveyed by a couple of merchants, using distinctive microcontrollers. These structures give sets of cutting edge and basic data/yield (I/O) adheres that can interface to various improvement sheets (named shields) and diverse circuits. The sheets feature successive correspondence interfaces, including Universal Serial Bus (USB) on a couple of models, for stacking programs from PCs. For

programming the microcontrollers, the Arduino adventure gives a joined enhancement condition (IDE) in light of a programming vernacular named Processing, which in like manner supports the tongues C and C++.

FEATURES

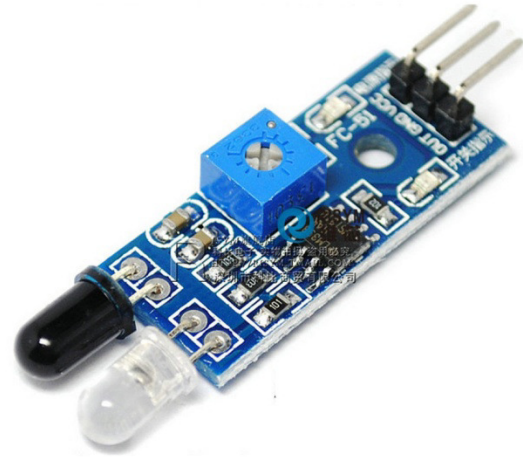
- Microcontroller: ATmega328P
- Operating voltage: 5V
- Input voltage: 7-12V
- Flash memory: 32KB
- SRAM: 2KB
- EEPROM: 1KB

APPLICATIONS

- Real time biometrics
- Robotic applications
- Academic applications

B. SEATBELT SENSOR (IR SENSOR):

An infrared sensor is an electronic contraption that transmits to distinguish a couple of parts of nature. An IR sensor can measure the glow of an inquiry and likewise recognizes the development. These sorts of sensors appraises simply infrared radiation, rather than exuding it that is called as a dormant IR sensor.



IR SENSOR

An infrared sensor is an electronic contraption, that releases to recognize a couple of parts of the earth. An IR sensor can measure the glow of an inquiry and also recognizes the development. These sorts of sensors appraises simply infrared radiation, rather than releasing it that is called as a withdrew IR sensor. Generally speaking in the infrared range, all of the things exude some kind of warm radiations. These sorts of radiations are impalpable to our eyes that can be perceived by an infrared sensor. The maker is only an IR LED (Light Emitting Diode) and the discoverer is basically an IR photodiode which is fragile to IR light of vague wavelength from that released by the IR LED. Exactly when IR light falls on the photodiode, the insurances and these yield voltages, change in degree to the enormity of the IR light got.

FEATURES

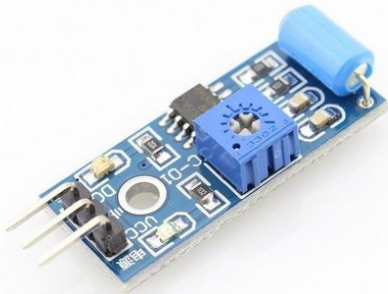
- Input voltage : 3.3v
- Output : analog

APPLICATION

- Radiation
- Thermometers
- Flame Monitor
- Moisture
- Analyzers
- Gas Analyzers

C. VIBRATION SENSOR:

Vibration sensors are sensors for measuring, displaying, and analyzing linear velocity, displacement and proximity, or acceleration. Vibration however subtle and unnoticed by human senses is a telltale sign of machine condition.



VIBRATION SENSOR

Vibration sensor conventionally at any edge switch is ON state, by the vibration or improvement, the rollers of the conduction current in the switch will convey an advancement or vibration, causing the current through the refinement or the rising of the check and trigger circuit. The characteristics of this switch is ordinarily expansive in the conduction state immediately isolated impenetrable to vibration, so it's high affectability settings by IC, customers according to their affectability necessities for adjustments. Since it rapidly the buzz film used in the standard ready contraption, the amazing structure of the magnet notwithstanding the spring, and thusly on the

electric vehicle alert starting late expansive application.

The gadgets and parts inside machines start to move forward and backward, the vibration is keeping a smooth stream of vitality. The stream is interfered, thus the clamor and the shake. Normally its overburden because or some likeness thereof of stress, or the parts themselves may have achieved their helpful life—gears, teeth, course, or belts might be presently disappointment. Vibration investigation is utilized as an instrument to decide a machine's condition and the explicit reason and area of issues, speeding up fixes and limiting expenses. The item is reasonable for the little flow circuit determinations tilt, vibration sensors vibration sensor is Triggered, the caution on the electric vehicle, bike, additionally can be utilized for the improvement of SCM application.

FEATURES

- Input voltage: 5v
- Output voltage: 3.3-5v
- Output: digital
- Dimensi on of the board: 3.2cm x 1.4cm

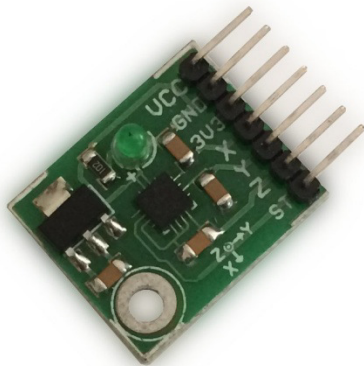
APPLICATIONS

- Vibratio n detecting
- Burglary protection system
- Object Movement detecting

- Triggering effect reported theft alarm

D. MEMS SENSOR:

Micro-electromechanical framework (MEMS, additionally composed a smaller scale electro-mechanical, Micro-electromechanical or micro-electronic and micro-electromechanical frameworks and the related micro-mechatronics) is the innovation of infinitesimal gadgets, especially those with moving parts. The accelerometer is a low power, low profile capacitive miniaturized scale machined Accelerometer highlighting signal molding, a 1-shaft low pass channel, temperature Compensation, individual test, 0g-Detect which recognizes direct freefall, and g-Select which Allows for the choice between 2 sensitivities Zero-g balance and affectability is Factory set and requires no outside gadgets. This incorporates a Sleep Mode that makes it perfect for handheld battery fueled.



MEMS SENSOR

You can utilize an accelerometer's capacity to detect speeding up to quantify an assortment of things that are extremely helpful to electronic and mechanical activities and plans:

FEATURES

- Low Current Consumption: 400 Ma
- Sleep Mode: 3µA
- Low Voltage Operation: 2.2 V – 3.6 V
- High Sensitivity (800 mV/g @ 1.5g)
- Selectable Sensitivity (±1.5g, ±6g)
- Fast Turn on Time (0.5 ms Enable Response Time)
- Self Test for Freefall Detect Diagnosis

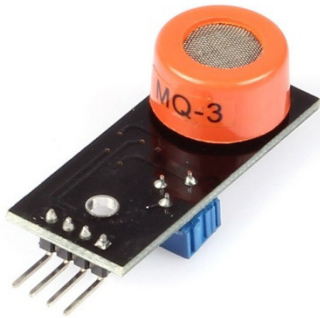
APPLICATIONS:

- Self balancing robots
- Tilt-mode game controllers
- Model airplane auto pilot
- Car alarm systems
- Crash detection/airbag deployment

E. ALCOHOL SENSOR:

This liquor sensor is reasonable for distinguishing liquor focus on your breath, much the same as your regular breathalyzer. It has a high affectability and quick reaction time. Sensor gives a simple resistive yield dependent on liquor fixation. In current innovation situation, observing of gases created is essential. From home machines, for example, forced

air to electric fireplaces and security frameworks at enterprises checking of gases is extremely urgent. Gas sensors unexpectedly respond to the gas present, in this manner keeping the framework refreshed about any adjustments that happen in the convergence of atoms at vaporous state. The gas sensor module comprises of a steel exoskeleton under which a detecting component is housed.



ALCOHOL SENSOR (MQ3)

This detecting component is exposed to current through associating leads. This current is known as warming current through it, the gases approaching the detecting component get ionized and are consumed by the detecting component. The interfacing leads of the sensor are thick with the goal that sensor can be associated solidly to the circuit and adequate measure of warmth gets led to within part. They are thrown from copper and have tin plating over them.

FEATURES

- Analog and Digital output
- Good sensitivity to Alcohol in wide range
- Operation voltage: 5VDC
- Simple drive circuit
- Long life and low cost

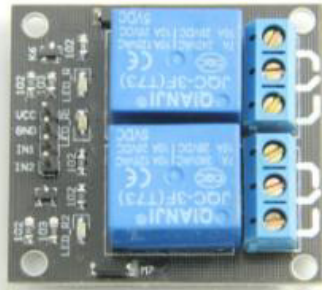
APPLICATIONS

- Domestic gas leakage detector
- Industrial Combustible gas detector
- Portable gas detector

F. RELAY:

A hand-off is an electrically worked switch. Many transfers utilize an electromagnet to mechanically work a switch, yet other working standards are likewise utilized, for example, strong state transfers. Transfers are utilized where it is important to control a circuit by a different low-control flag, or where a few circuits must be controlled by one flag. The first transfers were utilized in long separation broadcast circuits as intensifiers: they rehashed the flag rolling in from one circuit and re-transmitted it on another circuit. Transfers were utilized broadly in phone trades and early PCs to perform sensible activities. Transfers are straightforward switches which are worked both electrically and mechanically. Transfers comprise of a n electromagnet and furthermore an arrangement of contacts. The exchanging component is completed with the assistance of the electromagnet. The principle activity of a transfer comes in spots where just a low-control flag can be utilized to control a circuit. It is additionally utilized in spots where just a single flag can be utilized to control a great deal of

circuits.



CHANEL RELAY BOARD

FEATURES

- Input voltage: 12VDC
- Driver unit: ULN2003A
- Isolation unit: In4007
- Fast switching
- Motor forward and reverse operation

APPLICATIONS

- Ac load Switching applications
- Dc load Switching applications
- Motor switching applications

G. ZIGBEE MODULE:

ZigBee is a remote advancement made as an open overall standard to address the novel needs of negligible exertion, low-control remote M2M frameworks. The ZigBee standard takes a shot at the IEEE 802.15.4 physical radio assurance and works in unlicensed gatherings including 2.4 GHz, 900 MHz and 868 MHz.



ZIGBEE MODULE

ZigBee is an IEEE 802.15.4-based determination for a suite of abnormal state correspondence conventions utilized for remote systems administration. It is a remote innovation created as an open worldwide standard to address the special needs of ease, low-control remote M2M systems. ZigBee (CC2500) is a minimal effort genuine single chip 2.4 GHz handset intended for low power remote applications. The RF handset is coordinated with a profoundly configurable baseband modem.

FEATURES

- Supply voltage: 5v DC
- Detection range: (10-30) m
- RS232 Output
- TTL uart also provided
- Frequency: 2.4GHz
- Tx and Rx Status LEDs
- Low power

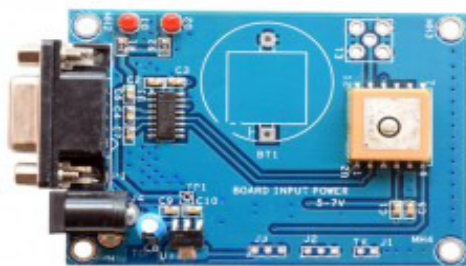
APPLICATIONS

- Lighting controls

- Switching
- Wireless keyboard and mouse
- Consumer electronics

H. GPS MODEM:

The Worldwide Situating Framework (GPS), initially Navstar GPS, could be a space-based radio route framework possessed by the Joined together States government and worked by the United States Discuss Drive. It may be a worldwide route partisan framework that gives geo area and time data to a GPS recipient anyplace on or close the Soil where there's an unhampered line of locate to four or more GPS satellites. The GPS framework does not require the client to transmit any information, and it works freely of any telephonic or web gathering, in spite of the fact that these innovations can improve the value of the GPS situating data. The GPS framework gives basic situating capabilities to military, respectful, and commercial clients around the world. The Joined together States government made the framework, keeps up it, and makes it openly open to anybody with a GPS receiver.



GPS MODULE

The Worldwide Situating Framework (GPS) could be a worldwide route fawning framework that gives area

and time data in all climate conditions. The GPS works freely of any telephonic or web gathering, in spite of the fact that these innovations can improve the value of the GPS situating data. GPS satellites transmit flag data to soil. This flag data is gotten by the GPS collector in arrange to degree the users adjust position. The GPS concept is based on time and the known position of specialized satellites. GPS satellites ceaselessly transmit their current time and position. A GPS collector screens different satellites and fathoms conditions to decide the exact position of the collector and its deviation from genuine time. At a least, four satellites must be in see of the collector for it to compute four obscure quantities. Each GPS disciple ceaselessly broadcasts a flag (carrier wave with tweak) that incorporates a pseudorandom code.

FEATURES

- Supply voltage: 12v DC
- Interface: UART RS232
- Optional T-TL uart also available
- Precision: 5 meters
- Automatic antenna switching function

APPLICATIONS

- GPS trackers
- Automated vehicle

- Robotics
- Fleet tracking

IV. EXPERIMENT RESULTS

There comes about of the framework were up to stamp. The snap shots of the equipment and different messages appeared on the equipment LCD has been appeared. As shown in fig 4.1 This framework gives quick reaction to those who have been harmed amid a mishap and hence can be utilized to diminish the fatalities happening due to delay in restorative consideration. The framework was able to distinguish collision successfully when tried on a scaled down level. As single hub of accelerometer had been utilized, it fizzled to identify a side on collision. The freeze switch concept worked culminates.

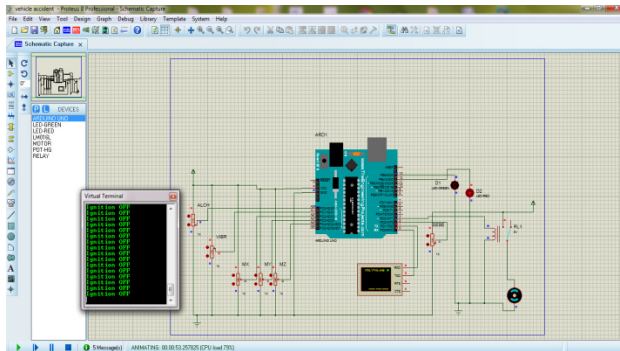


Fig 4.1 Result in Proteus

In this yield page, the start is OFF since the client of the vehicle isn't wearing the seatbelt and the liquor level is tall ,the security framework will not permit to touch off the motor physically until the liquor level is moo and situate belt is weared. The Ruddy Driven shows that the start is OFF and the terminal is utilized to see the status of the client.

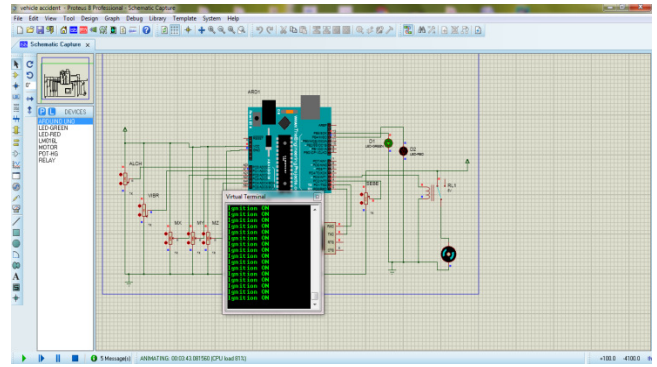


Fig 4.2 Result in Proteus

As shown in fig 4.2 In this yield page, the start is ON since the framework recognized that the liquor level is nonappearance and the situate belt is weared. So the framework permits the client of the vehicle to begin the start of the motor physically. And the status of the motor is see utilizing the terminal that the start is in ON condition. The GREEN LED Driven shows that the start is ON.

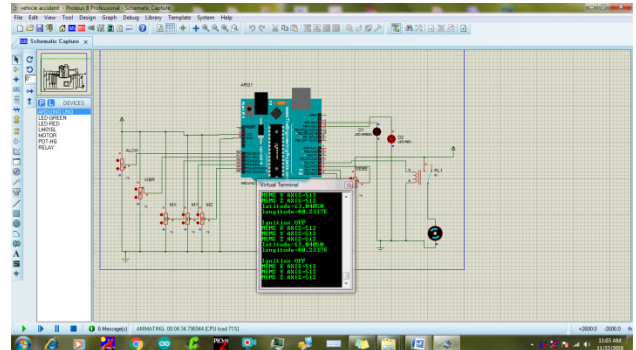


Fig 4.3 Result in Proteus

The final yield pages appear the result of vehicle which experienced a mishap.As shown in fig 4.2 When mischance happens the vibration sensor get actuated and 3 hub mems sensor begin perusing the position and introduction of the client and the vehicle and the vehicle GPS area points of interest sensor esteem were send through IOT. The start is halting naturally Ceased. The Ruddy Driven Appear that the

start is OFF. And the terminal was utilized to appear the start status and other sensors subtle elements.

V. CONCLUSION AND FUTURE EXPANSION

A working show of Programmed vehicle mishap location and data framework employing a GPS and ZIGBEE modems has been actualized effectively. Consequently the programmed hint framework for vehicle mishaps has been executed utilizing Arduino & ATMEGA162 microcontroller. This plan could be a system which can identify mishaps in altogether less time and sends the essential data to to begin with help middle inside a couple of seconds covering geological facilitates, the time in which a vehicle mishap has happened. The extra IOT interface moreover makes the seeing of the area simpler. The issue of recognizing collision in one pivot as it were is exclusively due to utilization of a single pivot of the accelerometer. Observing all three axes would lend a positive edge to the framework permitting it to identify collision from any direction. Moreover the estimate of the system has got to be diminished as vehicles do have a genuine issue of put where they can be safely mounted to the most chassis. Thus, it'll spare the valuable time required to spare the mishap casualties. Assist this framework can be actualized utilizing the vibration sensors as well as the sound sensors, in arrange to form it more exact and proficient to distinguish an mischance. Extra applications of this concept are Stolen Vehicle Recuperation, Armada Administration, and Resource Following, School transport following for security of children and to keep tab on drivers.

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