SMART ACCIDENT DETECTION SYSTEM

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1. Abstract.

Vehicle accident is the paramount thread for the people's life which causes a serious injured or even dead. The automotive companies have made lots of progress in alleviating this thread, but still the probability of detrimental effect due to an accident is not reduced. Force sensor, Global System for Mobile (GSM) and Global Positioning System (GPS) are used in this system. After taking places of an accident, the system delivers as short message to a nearby rescue team and police station via GSM module. The message includes the longitude and latitude values of the location. A rescue team can instantly track the location of the vehicle tapping geographical coordinates in Google earth to help injured people. Most of the previous system comprised of multiple sensors for detecting accident which increased the cost of the project. But, the proposed model includes only one force sensor; thus it reduces the cost of multiple sensor and the complexity of interfacing. So, it will be affordable for vehicle owners. This application is integrated with an external pressure sensor to extract the outward force of the vehicle body. It measures speed and change of tilt angle with GPS respectively. By checking conditions, this application also capable of reducing the rate of false alarm.

Keywords. GPS, GSM, Arduino, ADXL Sensor, Road Traffic Accident.

2. Introduction.

The demands for vehicles are increasing exponentially as the population increases. The percentage of road accidents has grown tremendously in the last few years, which is an alarming situation for everyone. According to a detailed analysis undertaken by the WHO, road accidents claim the lives of millions of people each year and are the world's eighth largest cause of death. Road accidents are expected to become the fifth greatest cause of mortality in the future, according to the Association for Safe International Road Travel (ASIRT). There are multiple causes of an accident such as high speed, overtaking, using a mobile phone, weather conditions, etc. This paper proposes a Smart Accident Detection system for the smart cities that includes a force sensor, GPS module, alarm controller, camera, controller, and GSM module to collect and transmit accident-related information to the cloud/server. Deep learning techniques are used on the cloud to measure the severity of the accident and alert the police station and hospitals accordingly. The proposed system consists of two phases: In the first phase, an accident is detected using IoT and deep learning. In the second phase, accident information is sent to the emergency departments for the rescue operation.

3. Project overview

Objective:
This system is designed to monitor vehicles and provide information about their position and movements, particularly in the event of an accident. The system can detect factors that commonly contribute to accidents, such as changes in speed, tilting, and collisions.Using electronics component such as Controller, GPS, GSM, AXDl sensor

4. Literature servey

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 • Gundepu Reddy Anuroopa, Vuyyala Lingaswamy. . vol,.12 No.02(2021),2532-2537. "GSM and GPS module based automatic vehicle accident detection and rescue system.
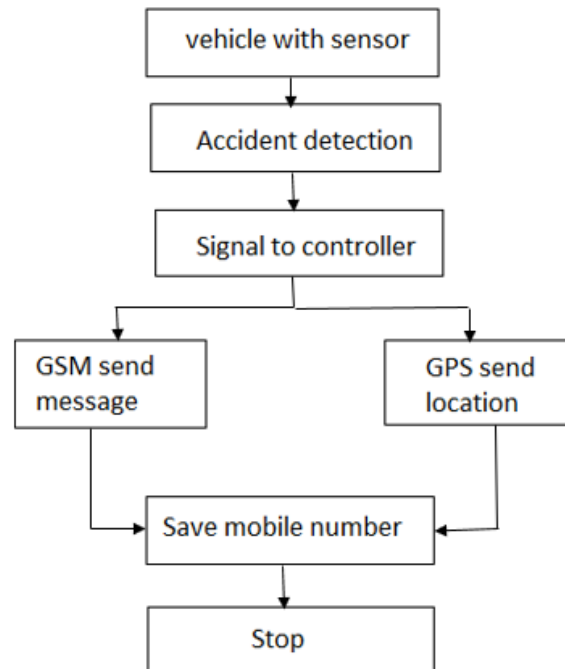
5. Problem Statements
The main objective of this project is to reduce the damage caused by the accident by sending a message to register mobile using wireless communication techniques. It would provide a digital record in case of any judicial dispute current.

6. Proposed system model
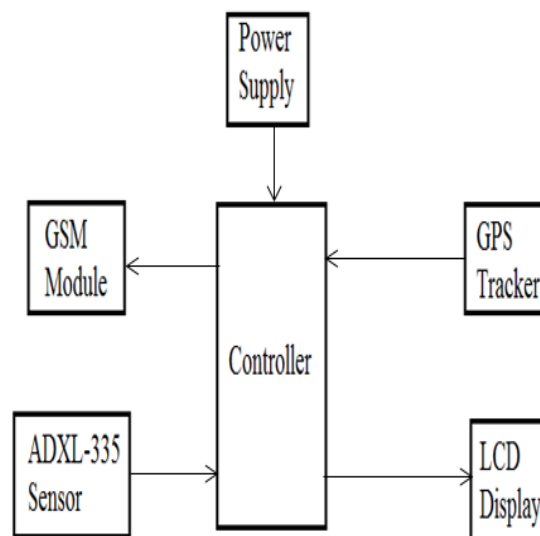
Fig. Smart accident detection system

7. Procedure to Detect the Accident

Components:

1. Controller:

A controller is embedded inside of a system to control a singular function in a device. It does this by interpreting data it receives from its I/O peripherals using its central processor. The temporary information that the controller receives is stored in its data memory, where the processor accesses it and uses instructions stored in its program memory to decipher and apply the incoming data. It then uses its I/O peripherals to communicate and enact the appropriate action. Controller are used in a wide array of systems and devices. Devices often utilize multiple controllers that work together within the device to handle their respective tasks.

2. GSM Module:

A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership. GSM is a digital cellular communication standard that is universally accepted. The European Telecommunications Standards Institute created the GSM standard to define the procedures for second-generation digital mobile networks that are used by devices such as mobile phones.

3. LCD Display:

16×2 LCD is electronic device used to display the message and data. The term LCD full form is Liquid Crystal Display. The display is named 16×2 LCD because it has 16 Columns and 2 Rows. it can be displayed (16×2=32) 32 characters in total. These displays are mainly based on multi-segment light-emitting diodes. but the 16×2 LCD is widely used. These LCD modules are low cost, and programmer-friendly, therefore, is used in various DIY circuits, devices. liquid crystal display or LCD draws its definition from its name itself. It is a combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. Liquid crystal displays are super-thin technology display screens that are generally used in laptop computer screens, TVs, cell phones, and portable video games. LCD's technologies allow displays to be much thinner when compared to a cathode ray tube (CRT) technology.

4. ADXL-335 sensor:
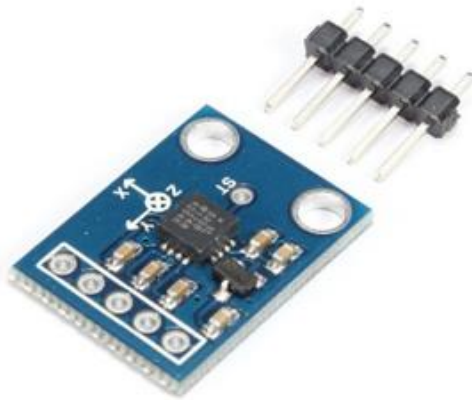
The force including torque, thrust, and drag – thrust increases the object's velocity, while drag reduces velocity, and torque generates changes in the object's rotational speed. When there's a balanced distribution of forces in the object, there is acceleration. If you want to monitor the force on an object, you need a device called a force sensor. Force sensors are responsible for measuring the force acting on an object. As a golden rule, both tensile and pressure forces, as well as elastic deformations are measured.

5. GPS Tracker:

GPS receivers are generally used in smartphones, fleet management system, military etc. for tracking or finding location. Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth. GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from each visible satellites, along with other pieces of data.

8. Advantages

1) The vehicle which has undergone to accident can be identified by using tracking technology without any delay.
2) The immediate medication will be provided to accident victims in remote area.
3) Easy to detect exact location of the vehicle.

9. Conclusion.

Smart accident alert and crime detection system could be safer system and about two third of the lives form dangerous road accident could be saved, especially in remote area where the human activity is less. The GPS tracker attached in the system given the information of the exact geographical location that could specify the latitude and longitude. The SMS contains

the details about the information of occurrence of accident and condition of patient by measuring the vital bio signals and the registration number of the vehicle. SMS alert is send immediately to the nearby hospitals, ambulance, police station, also to the family members of the victim. The ambulance could be arrived at the accident spot immediately by using the location details and quick medical help could be provided to the victim. If the victim is not injured severely then that person can switch off the alert system by pressing a button which is placed in the side of the unit. Thus a simple way is achieved to reduce the frequency of accident and immediate alerting system, a low cost way to safe high cost live as a future works, the method could be devised as a low-cost product and will be installed in all types of vehicles.

10. Refercences.

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