# SMART ACCIDENT DETECTION

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ABSTRACT:

As the population grows, so does the rate of regularly occurring accidents each minute. There are frequently not enough emergency services available to deliver first aid and give fast assistance, which can swiftly result in fatalities. GPS-based smart accident detector. When an accident occurs, the GPS and vibrational sensors will detect it, the GSM module will send an alarm message to your mobile phone with the accident's location and employed to locate the quickest route to the hospital. The rescue crew will arrive at As soon as they can after getting the alarm message from the user car system, they read the data from the server and head to the accident scene. This study's goal is to provide an IOT framework that will aid in the swift detection and notification of car accidents.

INTRODUCTION:

The "Internet of Things" refers to the communication between objects and people as well as between objects and other objects. (IoT). Technology is developing at an exponential rate in modern society. Due of the significant benefits of IoT across a wide range of sectors, businesses are heavily investing in this area of research. These components work together to create the ideal IoT ecosystem.

Modern cities are getting more advanced, and As a result, the vehicle industry is growing, which has increased traffic. As a result, there are now more frequent traffic accidents. 50 million traffic-related injuries and 1,35 million fatalities occur each year, according to a new WHO report. ILO estimates that 2.3 million men and women globally pass away in work-related accidents,or more than 6000 people every day.

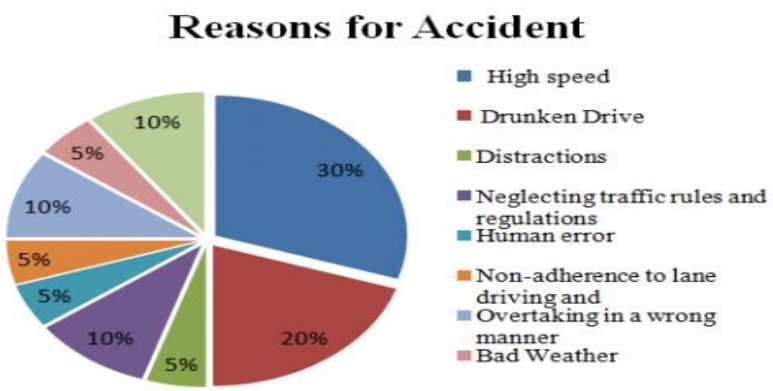



**Figure 1 Overview of accident**

Shortly after a car collision, for instance someone must proactively call 911 to summon assistance in a crisis. Nobody's loved ones, police, or ambulance are ever alerted automatically. The Internet of Things can be deployed to automatically notice and respond to the situation. (IoT). GSM module transmits a signal from a piezoelectric sensor, and the GPS module uses that signal to determine where the accident occurred. Also, a GPS sensor is automatically transmitted to the cloud, where whoever has subscribed to that automobile will receive an emergency alert. The ambulance will use the GPS information to get there quickly. Lidar (Light Detection and Ranging) sensors employ laser beams to detect the shortest distance between the sensor and objects in the environment, which may be used to construct a map of the surroundings. This project is distinctive in that when an accident is detected, information is immediately sent to the ambulance and also indicates the quickest route to the hospital, obviating the need for a middle step. The feasibility of equipping

a car with technology that may instantaneously alert emergency services to an accident and identify it is investigated in this study.

RELATED WORK:

The relevant academic literature review reveals that IoT has a wide range of applications. between automobiles and infrastructure communication (V2V and V2I).Nowadays, V2X, a cutting-edge technology that combines V2V and V2I, is becoming more and more well-liked, especially when combined with Internet access and mobile transportation apps.

All of these vehicle networks provide useful services for controlling traffic, mobility, as well as secure driving, promoting the ITS paradigm for automated transportation systems. [1]. One research created a mobile device app that shows maps together with the locations of pertinent surrounding automobiles.

The programme was able to alert the user when an ambulance was approaching, permitting the driver to adapt his or her path. [1]. Another comparable research effort tracked the emergency responders' GPS coordinates and provided users who needed assistance with the contact details of the closest responder. This situation also made use of a smartphone application [2].

An accident reporting system was developed by Zhao et al. using data from accelerometers and the Global Positioning System.[3]. This system conveys information about the accident to the relevant authorities. A approach that detects car theft using GPS and delivers a message using a GSM module was proposed by Reddy et al. [4]. A technique for accident detection was presented by Ali et al. [5] employing variables including noise, gravitational force, and speed. Patel [6] created an Android application that, just utilising the information obtained from the accelerometer, detects accidents and calls an ambulance. A plan that detects an accident and sends an SMS to the local hospital was proposed by Khot et al. [7]. To detect the accident, our device just needs data from an accelerometer.

A smart phone-based accident identification system was presented by Faiz et al. [8] that detects accidents using pressure sensor and GPS data. A concept that uses the sensors in smart phones to detect accidents was proposed by Thompson et al. [9]. A system that continuously transmits data on the location and speed of one vehicle to another using a mobile phone was introduced by Dogru et al. [10].

PROPOSED SYSTEM:

MEMS Accelerometer

The system seeks the accident by utilizing accelerometer and flex sensors, and it broadcasts the location of the accident to the emergency services through GSM modem. The message is changed. The alert message contains details on the accident's location, vehicle identification number, and time of occurrence. The installed camera's real-time video feed is utilised to monitor the guests' present location. The accelerometer tracks the speed of the vehicle. An accident has happened when the output of a sensor is compared to a value that has already been pre-fetched and exceeds a threshold value. [6].

To detect unexpected movements in a moving vehicle and notify such incidents with the appropriate position using a GSM network, this system uses a MEMS ADXL335 (Micro-Electro-Mechanical-Systems) device named Accelerometer. An electromechanical instrument known as an accelerometer detects acceleration caused by both gravity and motion or vibration. MEMS are utilised in this instance as micro-sensors.

- F = Mass * Acceleration + Spring Tension Force
- Spring tension force is equal to t * X .

where t = spring constant along with x = displacement

The automobile uses the three-axis accelerometer ADXL335 to determine the x, y, and z coordinate axes.

It has a full 3-axis accelerometer and signal-conditioned voltage outputs. the accelerometer's x, y, and z axes analogue output, which needs to be calibrated to produce consistent data.

It detects the dynamic acceleration that occurs during motion, shock, and vibration in addition to Adaptive acceleration caused by gravity in the tilted position. The system detects the abrupt change anytime the accelerometer is discovered to be crossing these upper and lower limitations and proceeds with the remaining functions. As compared to ADXL3XX , MEMS ADXL335 gives the better temperature co-efficient and linearity.

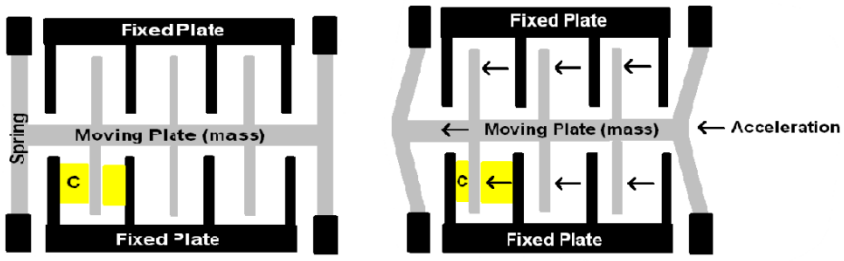



**Figure 2 MEMS accelerometer sensor**

GPS module

When an accident occurs anywhere, the GPS system keeps track of the location of the vehicle and contacts or sends an SMS to the appropriate person with the information through GSM.. [11]. It is embedded with the GPS signal tracking antenna that is simple to connect to. Tx, Rx, VCC, and GND are the basic four linked pins. The GPS receiver is utilised to receive signals, ascertain the car's present location, and pinpoint the precise latitude, longitude, and altitude of the vehicle.

1. latitude - memberName.location.lat()

2. memberName.locaton.lng() returns the latitude.

To reveal a location's latitude and longitude It uses the ardunio serial monitor screen.


**Figure 3 Output of GPS**

The speed is tracked by a GPS receiver, which uses the tracked speed to identify accidents. It tracks the speed through the microcontroller unit and compares it to previously recorded speed. [12].

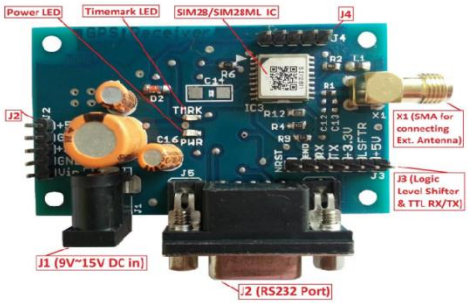



**Figure 4 Model of SIM28ML GPS**

VIBRATION SENSOR

To identify the accident and manage actions like detecting and reporting, a microcontroller is employed with a vibration sensor. The primary goal of this technology is to shorten the response time when an accident has happened. The system pre-fetches a number to which an alarm is delivered in the event of an accident. The Microcontroller unit acts as the heart of the system. It processes the data it receives. It will decide whether the accident had occurred or not based on the threshold values that were previously given to it. The GPS module will provide the position coordinates [12].

**Figure 5 Vibration sensor**

GSM

Global System for Mobile Communications, or GSM. GSM is a cellular technology used for mobile communication that is open and digital. It works on the frequency bands 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz, correspondingly. It combines the use of FDMA and TDMA. With TDMA, different users can utilize the same frequency throughout a number of time intervals. Here, information about motor accidents is delivered through SMS over GSM with AT instructions.

**Figure 6 GSM module**

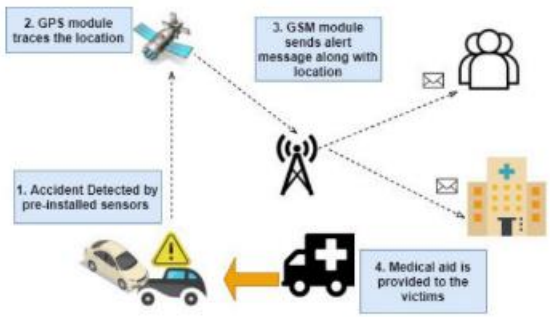
The SIM900A implements a number of AT instructions to operate. All hardware interfaces between the module and the customer's PCBs are included in this GSM. Using the serial port, audio channel with microphone, receiver output, programmable general purpose input and output pins, debug port with keypad, and SPI display interfaces also makes it easier to create user programmes.

OUTCOME :

Despite the proposed design goals of being straightforward, durable, user-friendly, and adaptable, there are still some acknowledged difficulties. A-GPS technology adaptation is one of the challenges that could be overcome. Today's majority of vehicles come equipped with an in-built GPS system to help drivers. GPS are connected in this configuration.

A vibration sensor is used to recognise the accident and notify the appropriate sensor whenever the vibration value exceeds the threshold limit. The processor immediately retrieves the GPS location and speed data after getting an alarm from the vibration sensor. The processor then uses the Wi-Fi module to send the data to the cloud server. The processor simultaneously sends SMS to any family member of the car owner using the GSM module.

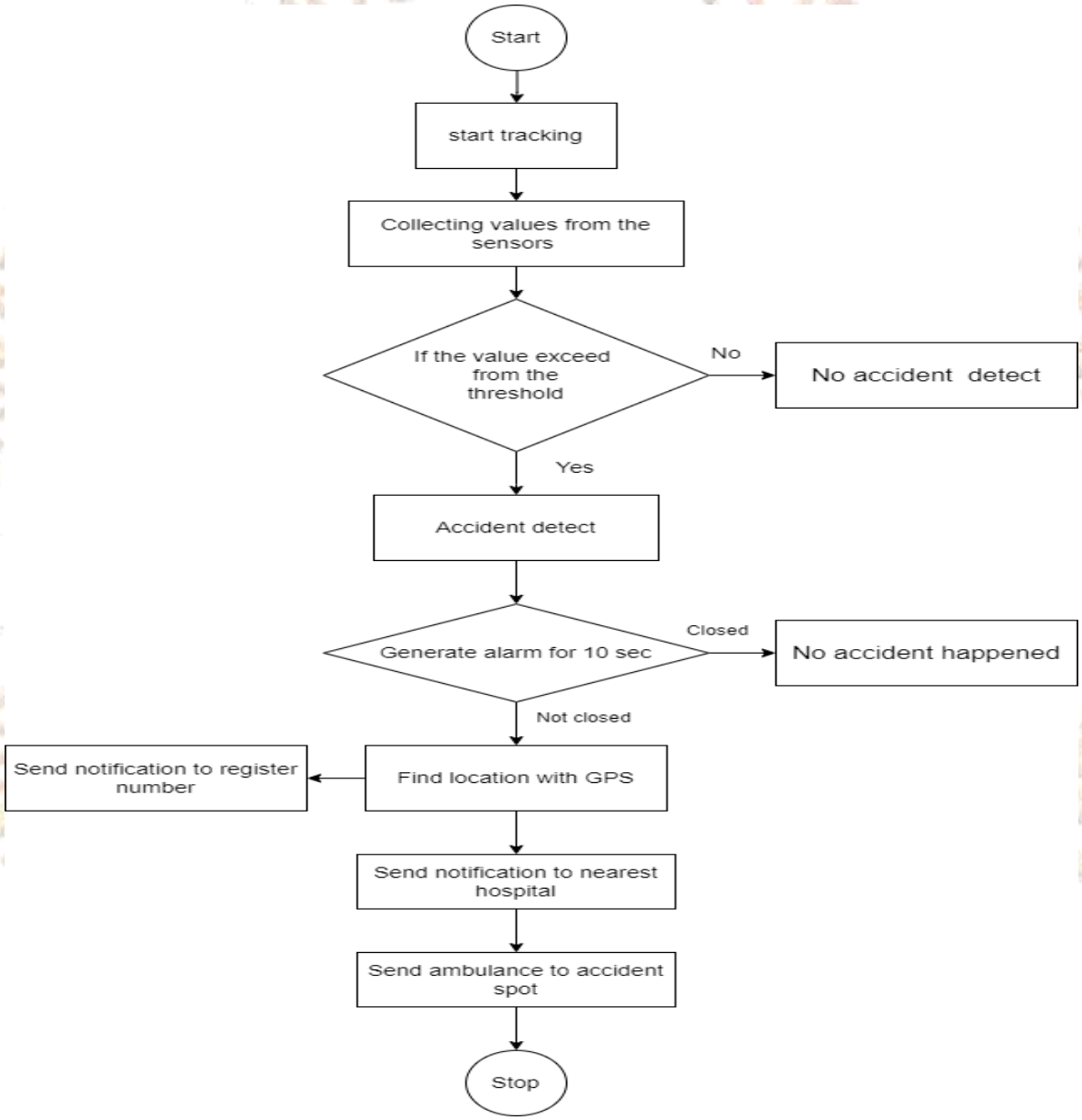
The system must recognise all relevant information about surrounding hospitals in order to alert them to the emergency scenario. In order to send an SMS or Fax to the closest hospital after our system sends a note to the cloud server, it must first determine which hospital is closest.



In the context of accident detection, the shortest path typically refers to the fastest route for emergency responders to reach the accident site. GPS (Global Positioning System) sensors can be used to detect the location of the accident and the location of the emergency responders. By using GPS data and mapping algorithms, the shortest route can be calculated and displayed to the responders. In addition to GPS, other sensors can be used to detect the location of the accident and to assist in calculating the shortest route.

For example, cameras or sensors that detect sounds (e.g. microphones) can be used to identify the location of the accident based on visual or audio cues, respectively. This information can then be fed into an algorithm that calculates the shortest route to the accident site.

It is worth noting that the detection of the shortest path for accident detection is just one component of an accident response system. Other factors, such as traffic conditions, road closures, and the type of emergency vehicle being used, may also be taken into consideration when calculating the best route for .




The technology presents a particular prevention and detection system that gives drivers the ultimate cure, ensuring safety and preventing loss of life by taking the right actions at the right moment.

CONCLUSION

IoT is a technology field that is expanding quickly. A commodity must have transportation in order to travel from one location to another. Consequently, several kinds of vehicles are employed for transportation. It has been used effectively in an automobile.

The several accident indication system techniques are examined and compiled.Accident notice and GPS position were immediately transmitted to the cloud upon accident trigger. A notice of the accident was sent right away to surrounding hospitals and mobile phones associated with the car number via GPS position, and we will be given advice on the fastest route to go to the hospital on time.

Only the incidence of accidents is tracked by our system, and only accident-related data is sent for follow-up actions. In the future, we may also use a technology to keep track of the passengers who were in the accident's health. This can help the hospital's administrators react wisely, which is more beneficial.

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