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VEHICAL ACCIDENT AUTOMATIC DETECTION AND WORKING PROCESS OF CRASH SENSOR

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ABSTRACT

Our lives have been made easier by the rapid advancement of technology and infrastructure. The advancement of technology has also increased transportation risks, and road accidents are becoming more common, resulting in significant loss of life and property due to inadequate emergency services. My project will provide the best possible solution to this problem. In a crash sensor application paradigm, an accelerometer can be utilized to identify unsafe driving. During and after a crash, it can be utilized as a crash or rollover detector for the car. A major accident can be detected using accelerometer readings. When a vehicle is involved in an accident, the vibration sensor receives the signal immediately, and if the car rolls over, the Micro vibration sensor recognizes the signal and sends it to the Arduino Uno. Arduino sends an alert message to a police control centre or a rescue squad via GSM MODEM, including the location. As a result, as soon as the police receive the information, they can use the GPS MODEM to track down the location. Following that, the relevant actions will be done after the location has been confirmed. If the person has a minor accident or there is no immediate danger to anyone's life, the alert message can be turned off by the driver using a switch provided, saving the medical rescue team important time. This document can be used to precisely detect an accident using a vibration sensor or an accelerometer. As there is room for development, we can include a wireless webcam for taking images in the future, which will aid in giving driver assistance.

Keywords: Crash Sensor, Working, Arduino, Python, Function, Accident.

I. INTRODUCTION

The growing demand for automobiles has resulted in an increase in traffic congestion and road accidents. This is due to the lack of high-quality emergency services in our country. This study introduces an automatic emergency services delivering mechanism for car accidents.

Crash sensors must detect a collision in milliseconds and turn the data into useful signals. After a collision, the acceleration forces acting on the sensors can reach 200g (200 times the earth's gravitational force). All bodies or things that are not firmly fastened to the car will continue to move at the impact speed when a car is abruptly stopped by an impact. The sensors detect this acceleration and send it as useable data to the control unit.

In the front doors of many of our vehicles, ultra-fast pressure sensors are installed. When these sensors detect a side impact, the outer door panel is pushed inwards, causing excessive pressure. Acceleration sensors are also installed near the C-pillars to detect side accidents that do not cause deformation of the front doors in real time.

This design is a system that can identify accidents in a fraction of the time and delivers basic information to an emergency center in a matter of seconds, including geographic coordinates, time, and angle of the car accident. This alert message is transmitted to the rescue crew in a timely manner, allowing vital lives to be saved. In the unusual instance where there is no casualty, a switch is provided to stop the message from being sent, saving the medical rescue team valuable time. When an accident happens, an alarm message is sent to the rescue team and the police station automatically. The message is sent using the GSM module, and the accident location is determined using the GPS module.

II. METHODOLOGY

The components utilized in the accident detection and message system are vibration sensor, GSM, and GPS, which detect the accident and send signals to Arduino. At this point, the Arduino takes over and begins collecting the GPS coordinates, which are then communicated to the central emergency monitoring station via the GSM module. Because it is integrated with the ECU, it will also monitor the crash direction. The Python programming language is used to programmed the Arduino uno, which is a simple coding language that allows

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for a speedier user-machine interface. It is used to determine the latitude and longitude of any location on the globe, as well as the precise time in UTC (Universal Time Coordinated).

The crash sensor is also linked to a mobile application that keeps all of the user's data. It also provides assistance to the user by displaying the distance between two vehicles.

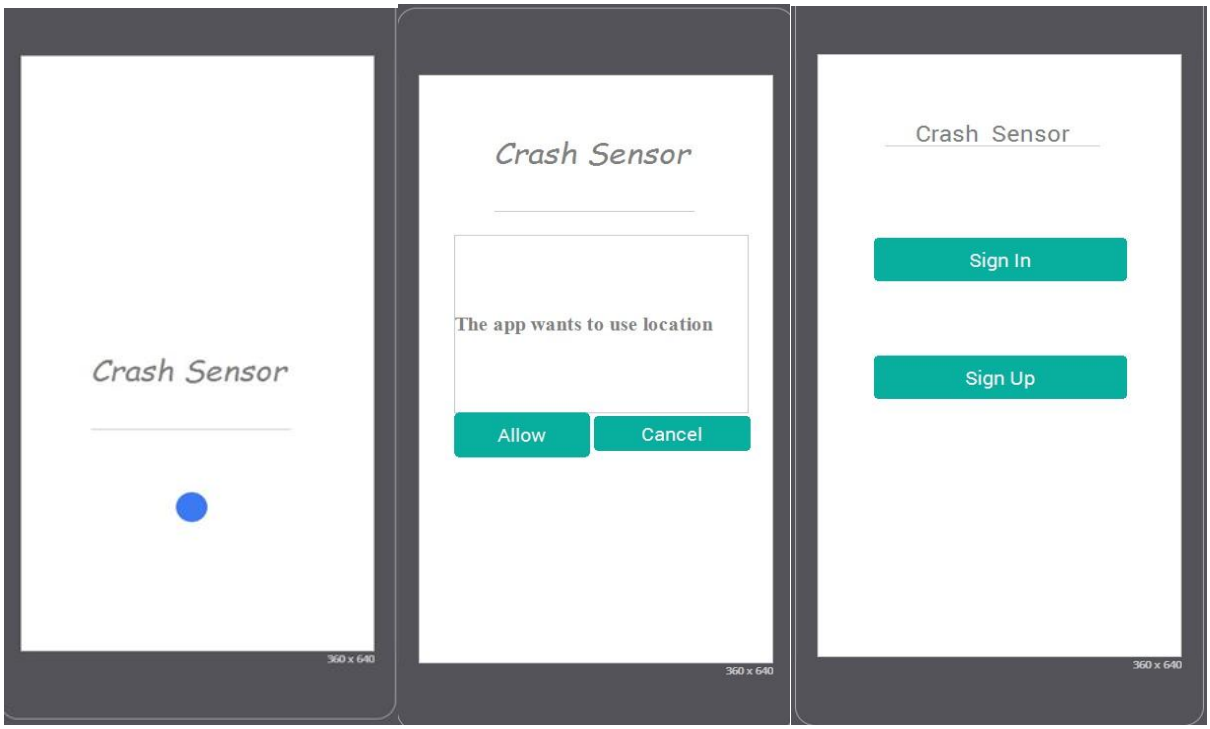

Fig.-1: Mobile Application

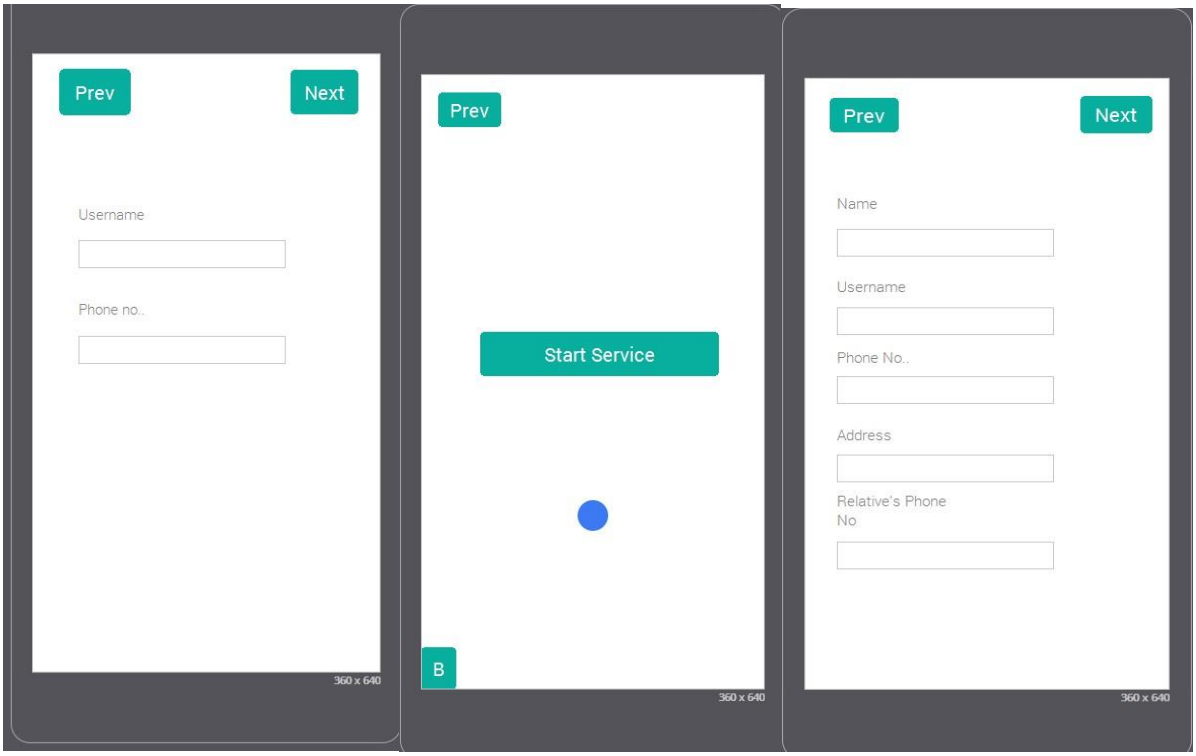

Fig.-2: Mobile Application

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Fig.-3: Mobile Application

III. MODELLING

Arduino Uno

The Arduino UNO is an Arduino standard board. UNO is an Italian word that signifies "one." The first release of Arduino software was given the designation UNO. It was also Arduino's first USB-connected board. It is regarded as a powerful board that is employed in a variety of tasks. The Arduino UNO board was created by Arduino.cc. The ATmega328P microcontroller is used in the Arduino UNO. In comparison to other boards, such as the Arduino Mega board, it is simple to use. Digital and analogue input/output pins (I/O), shields, and other circuits make up the board. The Arduino UNO has six analogue pin inputs, fourteen digital pins, and one USB port.

GSM Module

GSM (Global System for Mobile Communications) is an open, digital cellular technology that allows mobile voice and data services to be transmitted. GSM (Global System for Mobile Communication) is a digital mobile phone system popular in Europe and other areas of the world. GSM is the most frequently used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). It is based on a version of Time Division Multiple Access (TDMA). It uses the 900 MHz or 1,800 MHz radio bands to communicate. It allows voice calls as well as data transfer speeds of up to 9.6 kbit/s and SMS messaging (Short Message Service). SIM300 is a Tri-band GSM/GPRS message transmitting module that operates on the frequencies EGSM 900 MHz, DCS 1800 MHz, and PCS1900 MHz. SIM300 supports GPRS coding methods and has GPRS multi-slot class 10/class 8 (optional) functionality. The SIM300 has two options for RF antenna interface: antenna connector and antenna pad. MM9329-2700 is the antenna connection. Additionally, the antenna pad can be soldered to the customer's antenna. In SLEEP mode, the SIM300 is designed with power saving techniques, with current usage as low as 2.5mA.The SIM300 is compatible with the TCP/IP protocol. Customers may utilize the TCP/IP protocol with ease thanks to the Extended TCP/IP AT commands, which are particularly beneficial for data transfer applications. Serial communication protocol is used to connect GPS and GSM to the control unit.

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GPS Module

The Global Positioning System (GPS) is a radio signal transmission and reception system based on satellites. These signals are acquired by a GPS receiver, which then sends information to the user. Freely, 24 hours a day, in any weather condition, anywhere in the world, one may ascertain location, velocity, and time using GPS technology. NAVSTAR was the previous name for GPS (Navigation Satellite Timing and Ranging). The Global Positioning System (GPS) was created with the military in mind. The government made the system available for civilian usage because to its popular navigation features and the fact that GPS technology can be accessed using modest, inexpensive devices. The United States owns GPS technology, which is maintained by the Department of Defense. The GPS system is based on a network of 24 satellites that are constantly orbiting the planet. These satellites have atomic clocks and transmit radio signals that indicate the exact time and location. The GPS receiver picks up these radio waves from the satellites. Once the GPS receiver has locked on to four or more of these satellites, it can use the known positions of the satellites to triangulate its location. It's a satellite-based model with good performance and minimal power consumption. It is a portable and cost-effective technology that accurately detects the location.

Accelerometer

An accelerometer is a type of electrical sensor that monitors the acceleration forces acting on an item to determine its position in space and track its movement. The rate of change of an object's velocity, which is a vector quantity, is called acceleration.

Static and dynamic acceleration forces are the two forms of acceleration forces. Static forces are forces that are applied to an item on a continuous basis. Dynamic forces are "moving" forces that are applied at different rates to an item. This is why, for example, accelerometers are employed in automotive collision safety systems. When a car is hit by a powerful dynamic force, the accelerometer transmits an electronic signal to an embedded computer, which triggers the airbags to deploy.

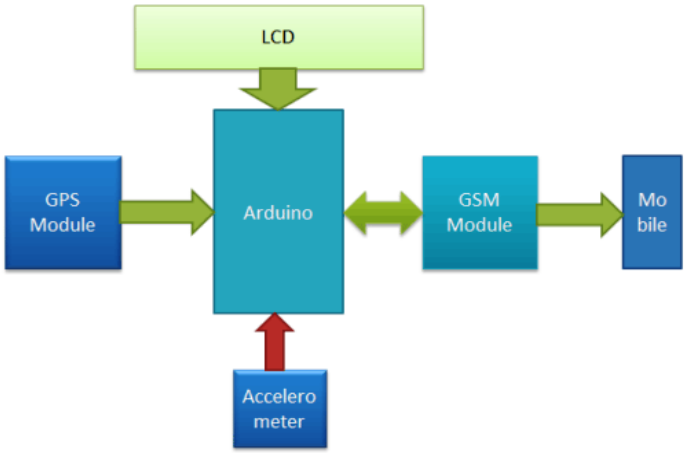

Fig.-4: Prototype Model

IV. RESULTS AND DISCUSSION

This paper proposes a novel approach to the problem. Unlike previous systems, when accident detection was done by one of the two sensors, the site of the accident may be easily determined, and the detection of the accident is precise. The vibration detects the mishap in this approach, and there is an alternative way to stop the entire messaging process via a switch. The other options, on the other hand, only provide one method of discovering the accident. As a result, this paper has an advantage over previous techniques.

V. CONCLUSION

This crash sensor can be utilized by anyone in need, and they won't have to rely on others to notify their relatives in the event of an accident because their relatives will receive a message directly from the crash sensor. Even sensors are placed all around the vehicle so that when a collision occurs, the sensor can detect it. This study presents a design that offers the following benefits: low cost, portability, compact size, and ease of expansion. The Vibration sensor, GPS, and GSM interface significantly reduces the alarm time and properly

locates the accident scene. This technology can address the lack of an automated system for detecting accident locations. As a result, the time it takes to locate the individual is minimized, and the person can be treated as quickly as possible, potentially saving many lives. Because it incorporates positioning systems and a network of medical-based services, this system has a wide range of applications. The vibration sensor can identify the accident and provide precise information. The data is processed by the controller, and as soon as it is received, the alarm is activated and a message is delivered via the GSM module. The GPS module detects the geographical coordinates and time of the accident location. In the event that there is no casualty, an alternate condition is set by pressing a switch to block the flow of transmitting the message; this will save time for the medical rescue team and prevent undue alarming, which can cause havoc in such uncommon circumstances. The automatic detection of accident locations will aid us in providing safety to vehicles and people's lives. The lives of the people are given first attention. As a result, this article offers a practical answer to traffic dangers, ensuring vehicle security and reducing the loss of valued lives and property.

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