

Accident Detection and Alerting System for Two Wheelers

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Abstract: Speed is one of the basic reasons for vehicle accident. An efficient automatic accident detection with an automatic notification to the emergency service with the accident location is a prime need to save the precious human life. This paper is about accident detection system that how the Rescue team could be alerted for help when the accident occurs. The proposed system deals with accident alerting and detection. It reads the exact latitude and longitude of the vehicle involved in the accident and sends this information to nearest emergency service provider.

Introduction

The development of a transportation system has been the generative power for human beings to have the highest civilization above creatures in the earth. Automobile has a great importance in our daily life. We utilize it to go to our work place, keep in touch with our friends and family, and deliver our goods. But it can also bring disaster to us and even can kill us through accidents. Speed is one of the most important and basic risk factors in driving. It not only affects the severity of a crash, but also increases risk of being involved in a crash. Despite many efforts taken by different governmental and non-governmental organizations all around the world by various programs to aware against careless driving, yet accidents are taking place every now and then. However, if the emergency service could get the crash information in time then many lives could have been saved. A study by Virtanen et al. shows that 4.6% of the fatalities in accidents could have been prevented only if the emergency services could be provided at the place of accident at the proper time. As such, efficient automatic accident detection with an automatic notification to the emergency service with the accident location is a prime need to save the precious human life.

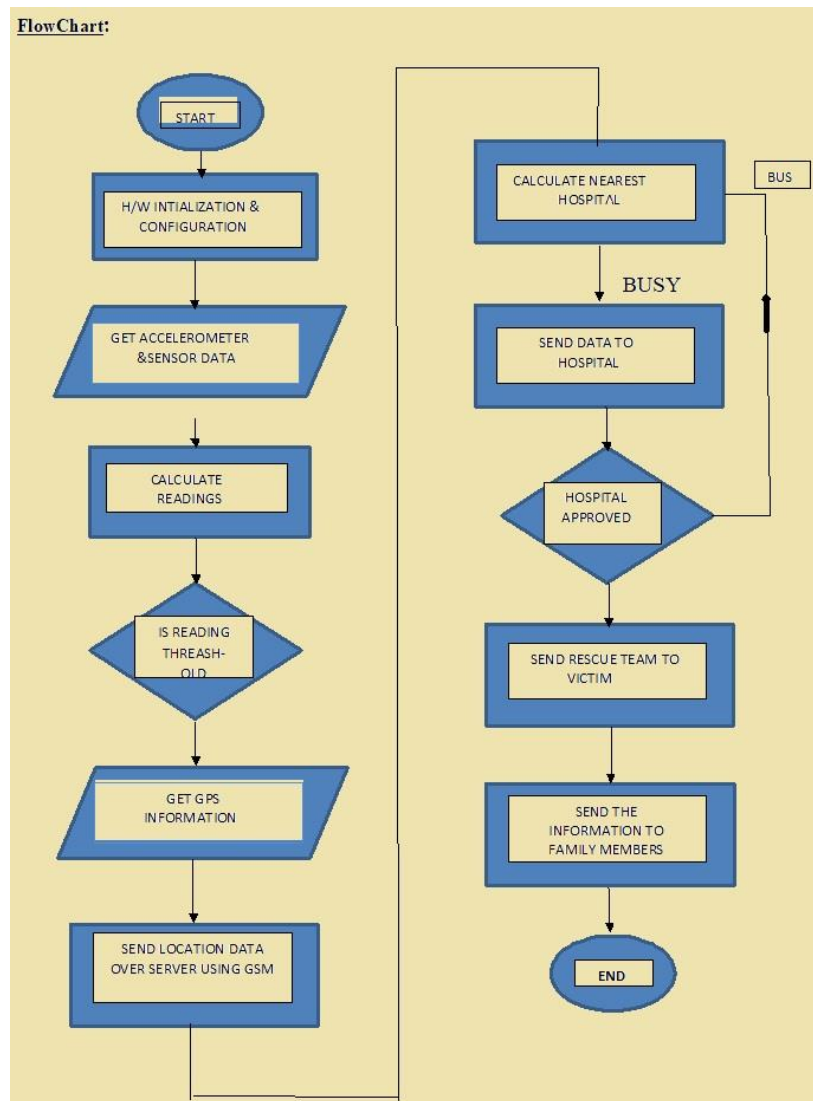
System Description

In the proposed system accelerometer, vibration sensor and gyroscope sensors are used which will provide the information like rapid acceleration, vibrations and orientation of bike. When these readings reach the threshold values, Arduino will send a signal to GPS module to fetch the current location, then information like location of accident and speed of bike is sent to proper authorities through GSM module to ensure help arrives on time. The family of the rider is also informed about the accident along with location of nearest hospital.

A secondary safety feature is also included in the system, in case of any malfunction in GSM module or if the accident occurs in region with low signal strength it will make it harder to contact with the family to overcome this problem, the proposed system also includes a display which will display contact information of rider's family.

In the proposed system, following mentioned hardware components are used:

1. **GSM:** For providing communication between the GPS, GSM and the allocated mobile number GSM SIM900 module is preferred. The name SIM900 says that, it is a tri band work ranging a frequency of 900MHz to 1900 MHz such as EGSM900 MHz, PCS 1900 MHz and DCS 1800 MHz. Receiving pin of GSM module and transmitting pin of GPS module are used for communication between the modules and the mobile phone.
2. **GPS:** To find the location on the earth the whole is divided into some coordinates where the location can be easily captured by a module called GPS module. Here the GPS used is SIM28ML. This GPS module will find the location of the vehicle and the information fetched by the GPS receiver is received through the coordinates and the received data is first send to Arduino and the information is transmitted to the saved contact through GSM module. The frequency is operated in the range of 1575.42 MHz and the output of GPS module is in NMEA format which includes data like location in real time.
3. The **Arduino UNO** is a widely used open-source Microcontroller board based on the ATmega328P Arduino.cc. The Arduino, the major control unit that can detect or alert when an accident occurs. It collects the data from vibration sensor, GPRS and GSM modules and reflects the output either in Display system or through a message. Here vibration sensor plays a major role. This vibration sensor will receive the vibrations of the vehicle which in turn acts as an accident detection module. Arduino gathers the information from all other modules and sends the message to the receiver though GSM module.
4. **Accelerometer:** The basic underlying working principle of an accelerometer is such as a dumped mass on a spring. Piezoelectric, piezo resistive and capacitive components are generally used to convert the mechanical motion caused in accelerometer into an electrical signal. Piezoelectric accelerometers are made up of single crystals.
5. A **gyroscope** is designed to have a wheel or spinning disc mounted on a base in a way that its axis can turn freely in one or more directions so to maintain its orientation regardless of any movement of the base. However, the orientation changes in a different direction in response to an external torque.
6. The **vibration sensor** or a piezoelectric sensor. These sensors are flexible devices that can be used for measuring various processes. This sensor uses the piezoelectric effects while measuring the changes within pressure, temperature, acceleration, force otherwise strain by changing to an electrical charge. This sensor decides fragrances within the air by immediately measuring quality as well as capacitance. The vibration sensor is a sensor which operates based on different optical otherwise mechanical principles for detecting observed system vibrations. These sensors sensitivity normally ranges from 10 mV/g to 100 mV/g, and there are lower and higher sensitivities are also accessible. The sensitivity of the sensor can be selected based on the application. So, it is essential to know the levels of vibration amplitude range to which the sensor will be exposed throughout measurement.

Flow Chart:**Result & Conclusion**

While riding a bike if a biker met an accident, the proposed system will detect exact location of accident and notify proper authorities and family members to ensure the safety of the biker. Also it will display phone numbers of victims family members in case of any technical failure or network issue.

A system to detect an event of accident has been developed. The proposed system deals with accident alerting and detection. It reads the exact latitude and longitude of the vehicle involved in the accident and sends this information to nearest emergency service provider. Arduino helps in transferring the message to different devices in the system. Accelerometer monitors the accident happening direction and gyroscope is used to determine rollover of the vehicle. The information is transferred to the registered number through GSM module. Using GPS, the location can be sent through tracking system to cover the geographical coordinates over the area. 8.2 Contribution The proposed system contributes to decreasing death rate caused by accidents. It detects the accidents occurred with the help of proposed methodology, It also fetches the location of the accident using GPS module and sends the alert message using GSM module to the medical emergency which can get to the location of accident in time which can also save lives of people. By this feature the death rate caused by accidents can be reduced.

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