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Automatic Fatality Prevention and Emergency Aid System

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Abstract:

The main aim of this project is to develop an automatic fatality prevention and Emergency AID system using sensors like ADXL345 MEMS accelerometer, SR04 Ultrasonic sensor, IR Flame sensor for preventing accident and fire detections. The project also aims in tracking of the vehicle using GPS and GSM modules. In case of emergency situations it sends an automatic SMS alerting message to the authorities. Ultrasonic sensor is an echo based sensor which can transmit the sound waves and receives in an echo by using this we can find the distance of the object and prevent the vehicle to hit the object.

MEMS is a Micro electro mechanical sensor which is a high sensitive sensor and capable of detecting the tilt used for accident detection. The system consists of cooperative components of MEMS accelerometer sensor, Ultrasonic sensor, IR flame sensor, Arduino microcontroller unit, GPS device and GSM module. In the event of accident, this wireless device will send to mobile phone as a short message indicating the position of vehicle by GPS system to respective authorities, emergency medical service (EMS) and nearest hospital. The threshold algorithm and speed of motorcycle are used to determine fall or accident in real-time.

The system also alerts through SMS messages when any fire accidents occurred was detected using IR flame sensor. This project makes use of an onboard Arduino microcontroller, which is commonly termed as micro controller. Features of the project are MEMS based user-friendly interfacing, SR04 Ultrasonic sensor for obstacle detection, Detection of Dangerous driving, IR flame sensor for fire detection.

Keywords:

Ulterasonic sensor, IR Flame Sensor, GPS and GSM Modules, MEMS Accelerometer Sensor, Arduino Micro Controller unit, Emergency Medical Service.

Introduction:

GPS is the acronym for global positioning system which receives the information from the satellite anywhere in the world and provides the same for controller. The GPS provides us the data like location, time, and speed. The system is compact and easy to install under rider seat. An accelerometer can be used in a car alarm application. Dangerous driving can be detected with an accelerometer. It can be used as a crash recorder of the vehicle movements before, during and after a crash. With signals from an accelerometer, a severe accident can be recognized.

The system also alerts when engine gets over heated or any fire accident was detected using IR flame sensor. This project makes use of an onboard Arduino microcontroller, which is commonly termed as micro controller. It acts as heart of the project. This onboard computer can efficiently communicate with the output and input modules which are being used. The controller is provided with some internal memory to hold the code. This memory is used to dump some set of assembly instructions into the controller. And the functioning of the controller is dependent on these assembly instructions.

LITERATURE SURVEY:

Literature Survey This section gives a comparative study of the formerly developed algorithms for accident detection.

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The survey throws light on the key aspects of the papers studied and also highlights their positive and negative points. Reference [1] proposed a Mobile Application for automatic accident detection and multimodal alert which uses an Accident Detection Algorithm. It uses eCall system to automatically detect Vehicle accidents along with Collisions and Roll-overs. The Acceleration Severity Index (ASI) evaluates the potential risks for occupants. In [2], a Communication Flow Algorithm has been proposed in which Backend Systems interact with IoT using Database Management Systems and Web sites. Gateways inter-connect the end devices to the main communication infrastructure of the system. IoT peripheral nodes produce the data that is to be delivered to the control center. [3] proposed an Incident Detection Algorithm to identify incidents, verify the nature of incidents and provide emergency services based on the nature.

IMPLEMENTATION:

Ultrasonic sensor is an echo based sensor which can transmit the sound waves and receives in an echo by using this we can find the distance of the object and prevent the vehicle to hit the object. MEMS is a Micro electro mechanical sensor which is a high sensitive sensor and capable of detecting the tilt used for accident detection. Ultrasonic sensor is an echo based sensor which can transmit the sound waves and receives in an echo by using this we can find the distance of the object and prevent the vehicle to hit the object.

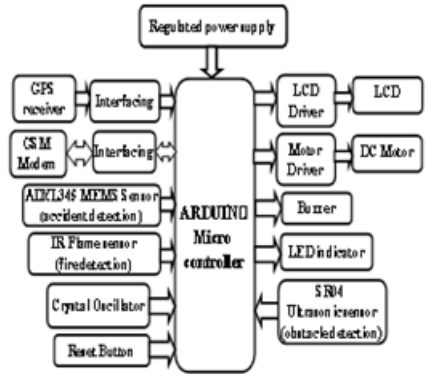

Fig1: Block Diagram of Emergency aid system

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Related Work:

The brief introduction of different modules used in this project is discussed below:

LCD:

One of the most common devices attached to a micro controller is an LCD display.

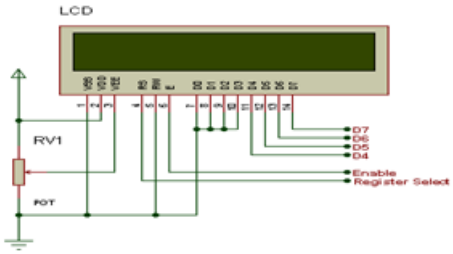

Fig 2 : LCD display

Some of the most common LCD's connected to the many microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

Arduino:

Arduino Uno is the ideal board for getting started with electronics, through fun and engaging hands-on projects.

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Fig 3 : Ardunio Module

This board is your entry to the unique Arduino experience: great for learning the basics of how sensors and actuators work, and an essential tool for your rapid prototyping needs. Arduino Uno Rev3 is the most used and documented board in the Arduino family Arduino Uno Rev3 is a microcontroller board based on the ATmega328P, an 8-bit microcontroller with 32KB of Flash memory and 2KB of RAM. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

GSM:

GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. 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 pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

Fig 4: GSM module.

USB to Serial Converter:

This USB to Serial converter allows you to connect a RS-232 serial device such as a modem to a USB port on your Desktop or Laptop PC. A USB adapter is a type of protocol converter which is used for converting USB data signals to and from other communications standards. Commonly, USB adaptors are used to convert USB data to standard serial port data and vice versa.

Fig 5: USB to serial converter cable

Ultrasonic sensor:

Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes the distance to the target based on the Time-span between emitting the signal and receiving the echo.

Fig 6: Ultrasonic Sensor

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IR SENSOR:

This sensor is a short range obstacle detector with no dead zone. It has a reasonably arrow detection area which can be increased using the dual version. Range can also be increased by increasing the power to the IR LEDs or adding more IR LEDs

DC Motor:

This DC or **direct current motor** works on the principal, when a current carrying conductor is placed in a magnetic field, it experiences a torque and has a tendency to move.

Fig 7: DC Motor

The direction of rotation of a this motor is given by Fleming's left hand rule, which states that if the index finger, middle finger and thumb of your left hand are extended mutually perpendicular to each other and if the index finger represents the direction of magnetic field, middle finger indicates the direction of current, then the thumb represents the direction in which force is experienced by the shaft of the **DC motor**.

GPS:

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location.

Fig 8 : GPS Module

Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.

MEMS:

The ADXL345 is a small, thin, low power, 3-axis accelerometer with high resolution (13-bit) measurement at up to ±16*g*. Digital output data is formatted as 16-bit twos complement and is accessible through either a SPI (3- or 4-wire) or I^2C digital interface.The ADXL345 is well suited for mobile device applications. It measures the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion or shock. Its high resolution (4 m*g*/LSB) enables measurement of inclination changes less than 1.0°.

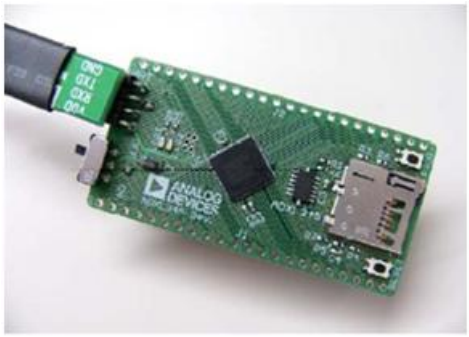

Fig 9 : MEMS Module

Several special sensing functions are provided. Activity and inactivity sensing detect the presence or lack of motion and if the acceleration on any axis exceeds a user-set level. Tap sensing detects single and double taps. Free-fall sensing detects if the device is falling. These functions can be mapped to one of two interrupt output pins. An integrated, patent pending 32-level first in, first out (FIFO) buffer can be used to store data to minimize host processor intervention. Low power modes enable intelligent motion-based power management with threshold sensing and active acceleration measurement at extremely low power

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dissipation. The ADXL345 is supplied in a small, thin, 3 mm × 5 mm × 1 mm, 14-lead, plastic package.

Conclusion:

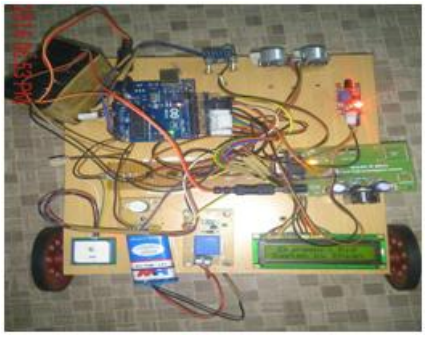
Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

Future Scope:

Our Project "Automatic Fatality Prevention And Emergency Aid System" is mainly intended to find the location and the position of the vehicle is transmitted to the owner on his mobile phone as a short message (SMS) at his request using GPS and GSM modems This project can be extended using high efficiency GPS receiver and a GSM module. The GSM module gives the intimation of the person with this system through SMS. The project can be extended using GPS module using which the live tracking of the vehicle can be viewed on Google maps. The project can also be extended using Wi-Fi wireless communication for live tracking in android mobile phones. We can monitor live video in mobile using camera interfacing

Result:

The Project "Automatic Fatality Prevention And Emergency Aid System" was designed such that the location and the position of the vehicle is transmitted to the owner on his mobile phone as a short message (SMS) at his request using GPS and GSM modems.



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