VEHICLE CRASH DETECTION DEVICE WITH SOS NOTIFICATION

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Abstract: *This project deals with the vehicle crash detection and sos sms alert. When a crash is detected, the location details, of vehicle is collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale. Thus, collected information is then fed to arduino uno. Necessary processing is done and the information is passed to the GSM modem. The GSM modem collects the information for arduino uno and then transfer it to the mobile phone through the SMS which is in text format. Sends SOS SMS, when a vehicle has goes through crash or if vehicle is in flames. Crash can be determined by two different types of sensors. SOS SMS contains exact location of vehicle with its latitude and longitudes coordinates. Location of the vehicle can also determined by just calling the mobile number.*

Index Terms – *SOS notification, Accelerometer , Arduino Uno, GPS Module, Gsm Module, Crash Sensor, Flame Sensor*

I. INTRODUCTION

Every year the lives of approximately 1.35 million people are cut short as a result of a road traffic crash. Between 20 and 50 million more people suffer non-fatal injuries, with many incurring a disability as a result of their injury. Delays in detecting and providing care for those involved in a road traffic crash increase the severity of injuries. Care of injuries after a crash has occurred is extremely time-sensitive: delays of minutes can make the difference between life and death.

The aim of the project is to provide post-crash care which is to avoid preventable death and disability, limit the severity of the injury and the suffering caused by it, and ensure the crash survivor's best possible recovery and reintegration into society. The way in which persons injured in road traffic crashes are dealt with following a crash determines their chances and the quality of survival.

When accident is occurred, the location details of vehicle/object collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale. Thus, collected information is then fed to arduino uno. Necessary processing is done and the information is passed to the GSM modem. The GSM modem collects the information for arduino uno and then transfer it to the mobile phone through the SMS which is in text format.

II. METHODS AND MATERIAL

A. Software Description

The proposed system makes use of Arduino Integrated Development Environment (IDE)**.** Arduino Integrated Development Environment (IDE) connects to the Arduino hardware to upload programs and communicate with the outside world The programming for the proposed system is done in Arduino IDE so a**s** to interface Arduino Uno with crash sensor, accelerometer sensor, flame sensor, GSM module and GPS module.

B. Hardware Descriptions

1. Arduino UNO R3

The heart of Arduino UNO is a 8-bit ATmega328P microcontroller. It has 14 digital input/output pins, 6 analog input pins, a USB port, a power barrel jack, an ICSP header pins and a reset button. Each of the 14 digital pins and 6 Analog pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller. The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. It also features a serial data (SDA) line and a serial clock (SCL) line. These two lines are required to support I2C communication protocol. The board also allows digital ports to be configured to act as Rx or Tx lines and these lines are required to support SPI communication protocol. It is the central control unit for the project Accident detector and alert system. It basically gathers information from all the three sensor and also collects the GPS location of the crash and send message alert to the mobile.

Figure 1 Arduino UNO R3

2. GPS Module NEO6MV2

The NEO-6 module series is a family of stand-alone GPS receivers featuring the high performance u-blox 6 positioning engine. These flexible and cost effective receivers offer numerous connectivity options in a miniature 16 x 12.2 x 2.4 mm package. Their compact architecture and power and memory options make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints. The 50-channel u-blox 6 positioning engine boasts a Time-To-First-Fix (TTFF) of under 1 second. The dedicated acquisition engine, with 2 million collector, is capable of massive parallel time/frequency space searches, enabling it to find satellites instantly. Innovative design and technology suppresses jamming sources and mitigates multipath effects, giving NEO-6 GPS receivers excellent navigation performance even in the most challenging environments.

Figure 2 GPS Module NEO6MV2

3. **SIM 900A GSM GPRS Module**

GPRS module is a breakout board and minimum system of SIM900 Quad-band/SIM900A Dual-band GSM/GPRS module. It can communicate with controllers via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands). This module supports software power on and reset.

Figure 3 SIM 900A GSM GPRS Module

4. **ADXL335 Accelerometer**

An accelerometer is an electromechanical device that will measure acceleration force. It shows acceleration, only due to cause of gravity i.e. g force. It measures acceleration in g unit. The ADXL335 gives complete 3-axis acceleration measurement. This module measures acceleration within range 3 g in the x, y and z axis. The output signals of this module are analog voltages that are proportional to the acceleration. It contains a polysilicon surface-micro machined sensor and signal conditioning circuitry.

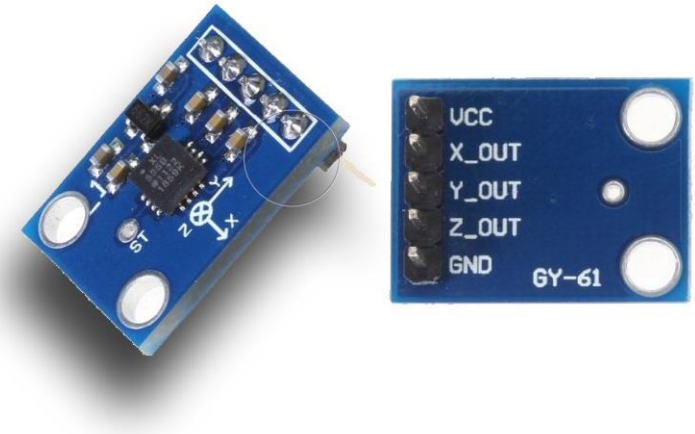

Figure 4 ADXL335 Accelerometer

5. Crash Sensor

Crash sensors need to detect a collision and convert it to usable signals within milliseconds. The accelerating forces acting on the sensors after a collision can be as high as 100g (100 times the earth's gravitational force). When a car is stopped abruptly by an impact, all bodies or objects that are not firmly fixed to the car will continue to move at the impact speed. The sensors measure this acceleration and relay it to the Arduino Uno. The Crash sensor is a miniature snap-action switch, also trademarked and frequently known as a micro switch. It is an electric switch that is actuated by very little physical force. This is a small micro switch sensor designed for the Arduino. It integrates a pull-up resistor and a status indicator LED on board. That makes it easier for testing! The miniature snap-action, micro switch with roller lever make it suitable for many environment detection applications.

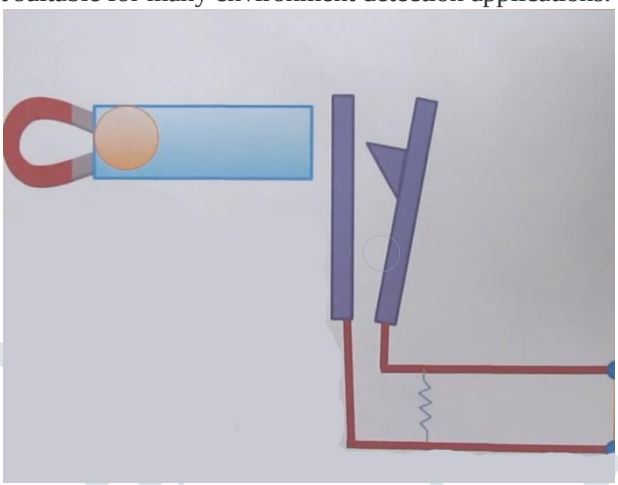

Figure 5 Crash Sensor

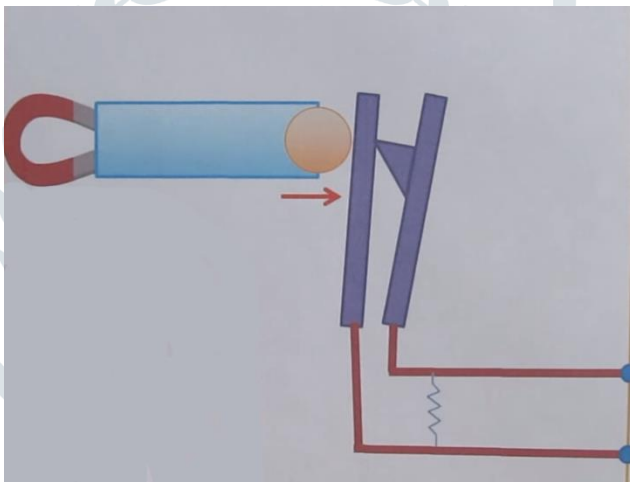

Figure 6 Triggered Crash Sensor

6. Flame Sensor

Flame sensor module has photodiode to detect the light and op-amp to control the sensitivity. It is used to detect fire and provide HIGH signal upon the detection. Arduino reads the signal and provides alert by turning on buzzer and LED. Flame sensor used here is an IR based flame sensor. When fire burns it emits a small amount of Infra-red light, this light will be received by the Photodiode (IR receiver) on the sensor module. Then we use an Op-Amp to check for change in voltage across the IR Receiver, so that if a fire is detected the output pin (DO) will give 0V(LOW) and if the is no fire the output pin will be 5V(HIGH).

Figure 7 Flame Sensor

C.Flowchart

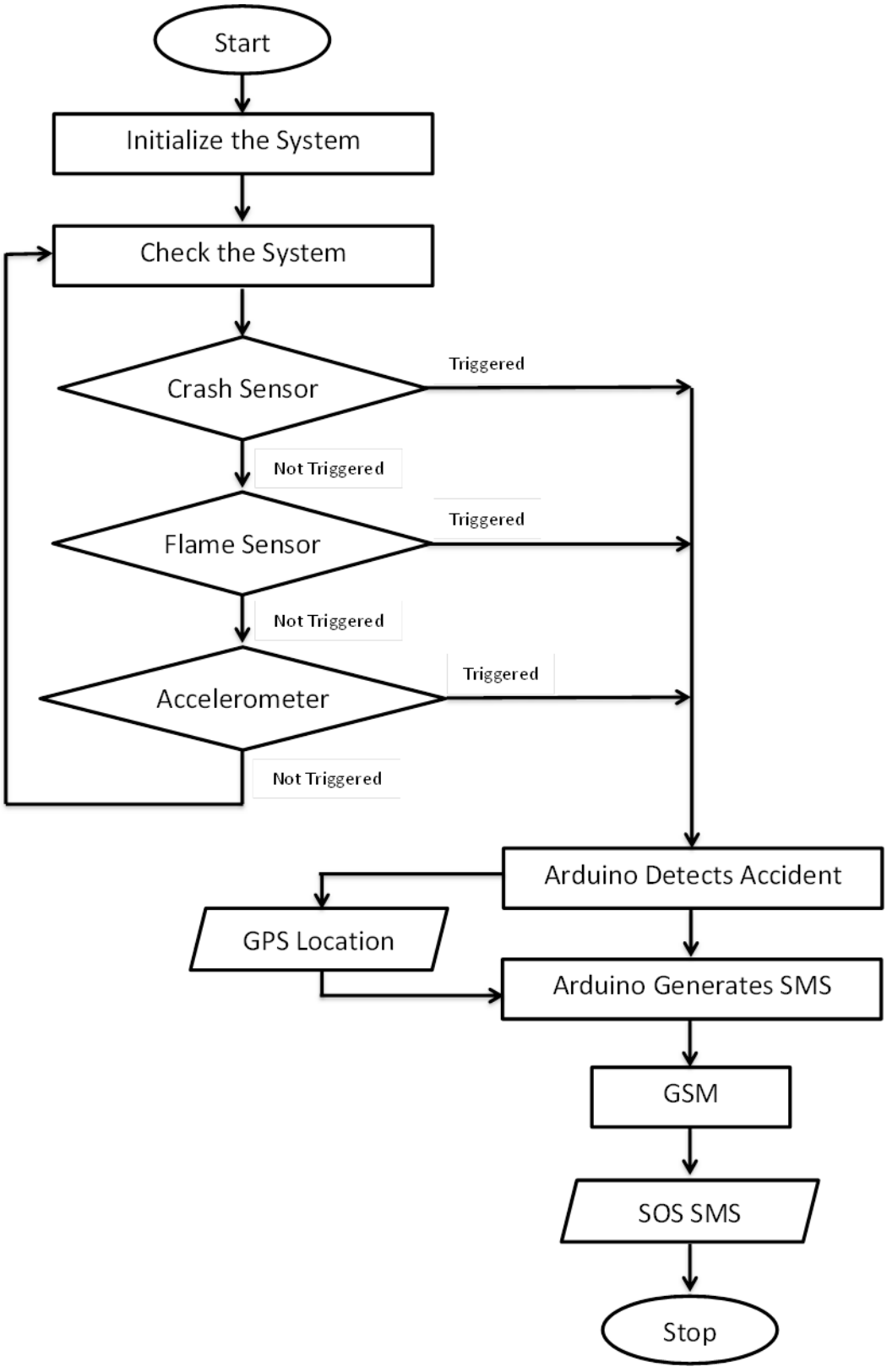

Figure 8 Flowchart of Proposed Model

III. Working of the Proposed Model

The working of the project Accident Detection and Alert System using Arduino can be summarized in 6 points below:

- When Crash sensor detects the crash, the location details of vehicle/object collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale.
- When accelerometer detects the crash, the location details of vehicle/object collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale.
- When Flame sensor detects fire emergency, the location details of vehicle/object collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale.
- If anyone above condition is detected it would be taken as emergency.
- Thus, collected information is then fed to arduino uno. Necessary processing is done and the information is passed to the GSM modem.
- The GSM modem collects the information for arduino uno and then transfer it to the mobile phone through the SMS which is in text format

IV. Results and Discussion

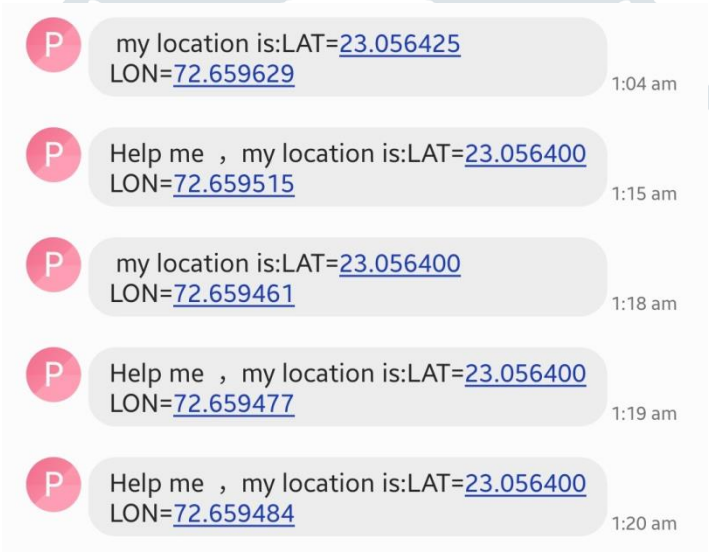

Figure 9 SOS SMS in latitude and longitude form

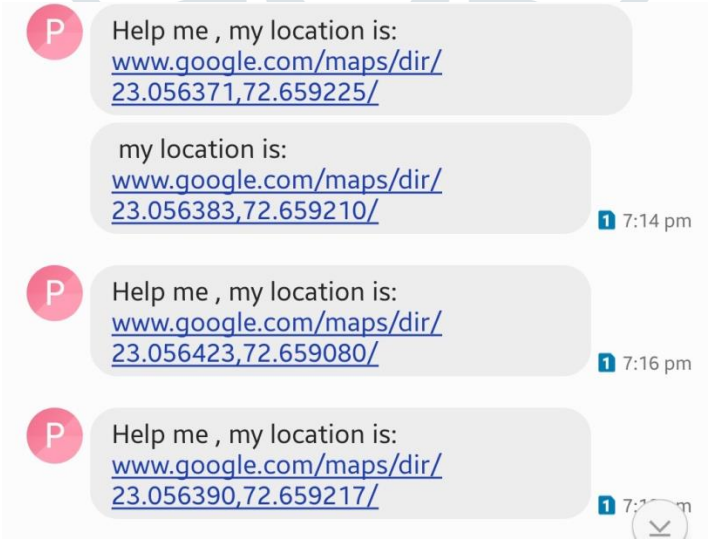

Figure 10 SOS SMS in forms of google Link.

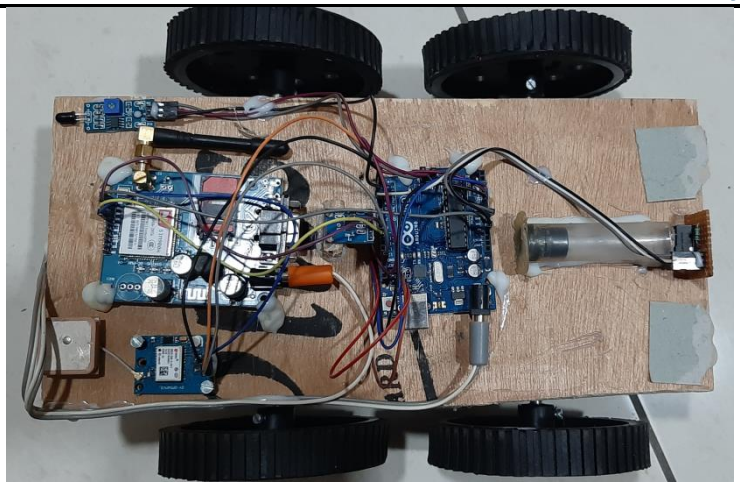

Figure 11 Complete Project

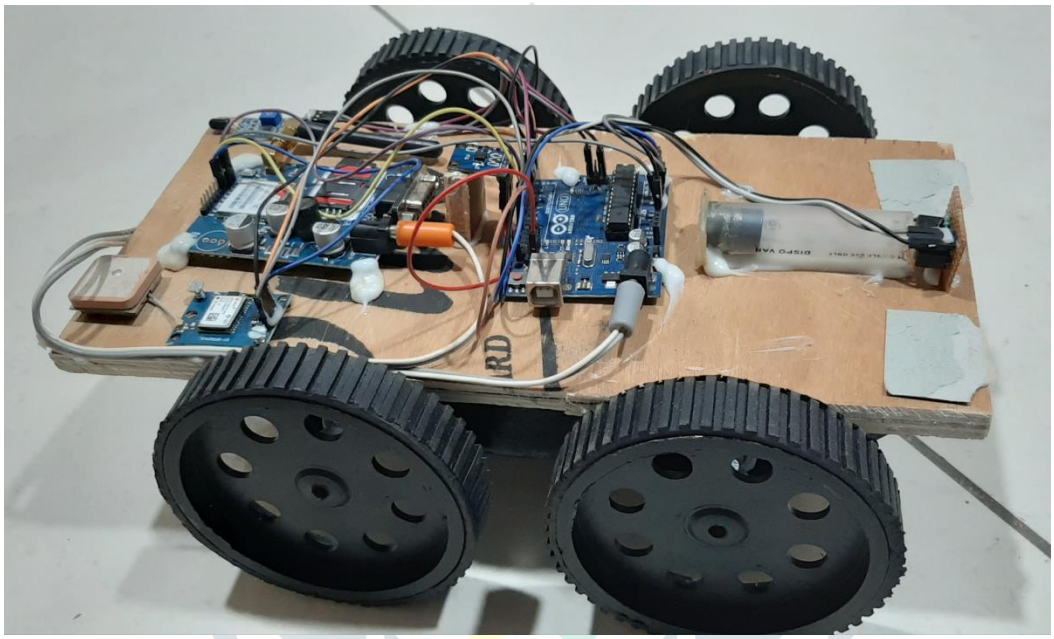

Figure 12 Complete Project

V. Conclusion

As per the above report I hear conclude that "Vehicle Crash Detection Device" which is created by me is 100 percent reliable according to my research and development. Any further large scale integration can be done with further research and development. This devise can be installed in bikes, car, heavy vehicles, etc. to detect crashes. In future this concept can be applied at much higher level integrating emergency services like police, hospital, etc.

VI. REFERENCES

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