ASSISTING SYSTEM IN CARS WHILE SINKING

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ABSTRACT:

It is often difficult for passengers to escape from a sinking car. So we are to propose a system that would help people to escape in the aforementioned crisis. Most people die in this accident even they know swimming. In this crisis, they should open the window and unlock the seatbelt as early as possible. But in that situation, passengers do not know what to do due to panic. Therefore, this proposed system would automatically release seatbelts and open windows when the car hits water body and starts sinking. Sinking action of the car is identified using cumulative analysis of signals from water level sensors and accelerometer that are placed in the car. Due to this system passengers will have enough time and space to escape out of the car with less difficulty. This system would decrease fatality due to sinking accidents.

Keywords— Water level sensor, Accelerometer, Safe escaping, decrease fatality

I. INTRODUCTION

People all over the world rely on automobiles to get from one place to another. Automobiles are part of our day to day life. The evolution of automobile industry is a revolution in human history. Apart from these advantages, there are some drawbacks associated with their use. The most disappointing fact is that the automobile accidents are increasing in these days. One of such accident is sinking of cars in water bodies. Every year, thousands of vehicles worldwide end up in the water by accident. About 15% of them are fatal. This system aims in reducing the fatalities due to the aforementioned accident. Currently people are using glass breakers and seatbelt cutters to escape out of the sinking car. But this is less reliable. Also breaking the window at a particular part will make the water enter the car at high velocity, therefore making the passengers difficult to escape. So our system unlocks the seatbelt buckle and opens the window automatically with the help of actuators and Microcontroller. The door lock is also unlocked with the help of actuator. However it can be opened manually only when the car is filled with water. Water level sensors and accelerometer are used to detect sinking of car. The entire system is controlled by the Arduino uno R3 based on atmega328.

II. METHODOLOGY

This paper aims at helping the passengers to escape out of sinking car. This system continuously senses whether the car is sinking in water body. Then with the help of actuators the window will be opened and seatbelt will be unlocked. The

components used are Arduino board, accelerometer, water level sensor, ICL293d motor driver, L16 linear actuator, servo motor and 12V rechargeable battery. The entire system will be waterproof insulated.

2.1 ARDUINO UNO:

The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 14 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program.

2.2 ACCELEROMETER:

This Accelerometer module is based on the popular ADXL335 three-axis analog accelerometer IC, which reads off the X, Y and Z acceleration as analog voltages. By measuring the amount of acceleration due to gravity, an accelerometer can figure out the angle it is tilted at with respect to the earth. By sensing the amount of dynamic acceleration, the accelerometer can find out how fast and in what direction the device is moving. The acceleration in all three directions can be measured independently by the accelerometer.

2.3 WATER LEVEL SENSOR:

Water level sensing device is designed to measure the level of flow substances including liquids, slurries and granular materials. This works on the principle of varying resistance across the two electrodes that are placed inside the liquid. This will give the analog signal depending upon the level of water.

2.4 ICL293D MOTOR DRIVE

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. It contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 27 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively. This IC is used to control the power window motor and actuator of the seatbelt buckle.

2.5 SOLENOID ACTUATOR

L16-P linear solenoid actuator of stroke length 50mm with 150:1 gear ratio is used for unlocking the seatbelt lock. The maximum operating voltage is 12v. The maximum force exerted by the actuator is 200N and maximum actuator shaft speed is 8mm/s at no load condition.

III. WORKING

The working model prototype will have accelerometer, actuator, water level sensor and ICL293d interfaced with ATmega328 microcontroller. There are risers placed in each window of car. The water level sensor is placed at the top of

the riser. The electrodes of the sensor will be 3/4th of the length of the riser. Rise in water level is sensed by the water level sensor by changing resistance between the electrodes as the water rises. Most of the cars fall into water bodies from over bridge. Therefore there will be acceleration in the Y-direction when the car falls. This is sensed by the accelerometer placed in the car. The signal from the accelerometer is sent to the microcontroller at first. If the signal from the accelerometer is true then the microcontroller will check the signal from the water level sensor. After the cumulative analysis of the signals from accelerometer and the water level sensor, the microcontroller will actuate the solenoid actuator and the motor driver to open the window of the car. After few seconds the actuator associated with the car door lock will be operated. However the door can be opened only when the car is completely filled with water. [3] discussed about a disclosure which is made regarding a driving alert system which is designed in the form of a neck cushion which has the capability to sense the posture of the drivers neck position so as to identify whether the driver is alert and if he is dozing of. The system is made intelligent to obtain data from the movement so as to produce triggers to alert the user and to keep him/her awake to avoid accidents. The system is also linked to a mobile computing device so as to provide a report of the analysis done. The drivers location can also be tracked using the same. The following shows the circuit diagram of the system:

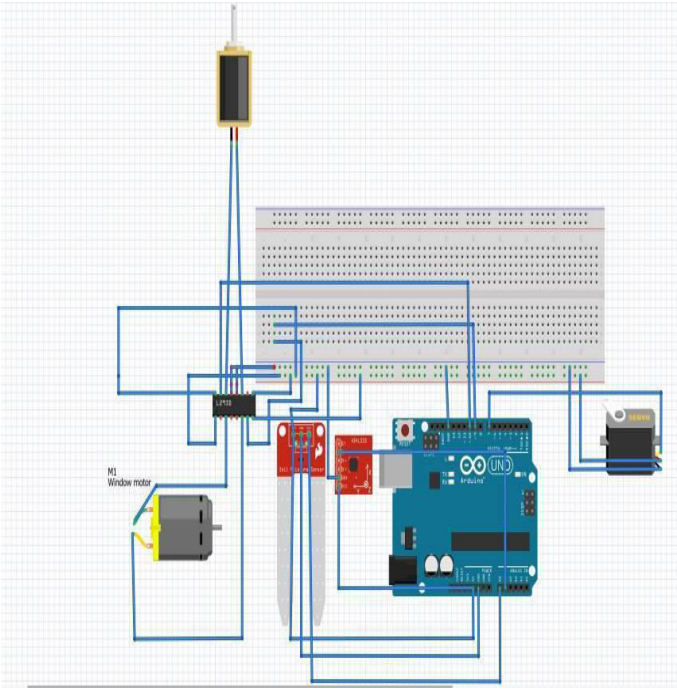

Figure 1: Circuit diagram

IV RESULT

The output during normal condition is shown below:

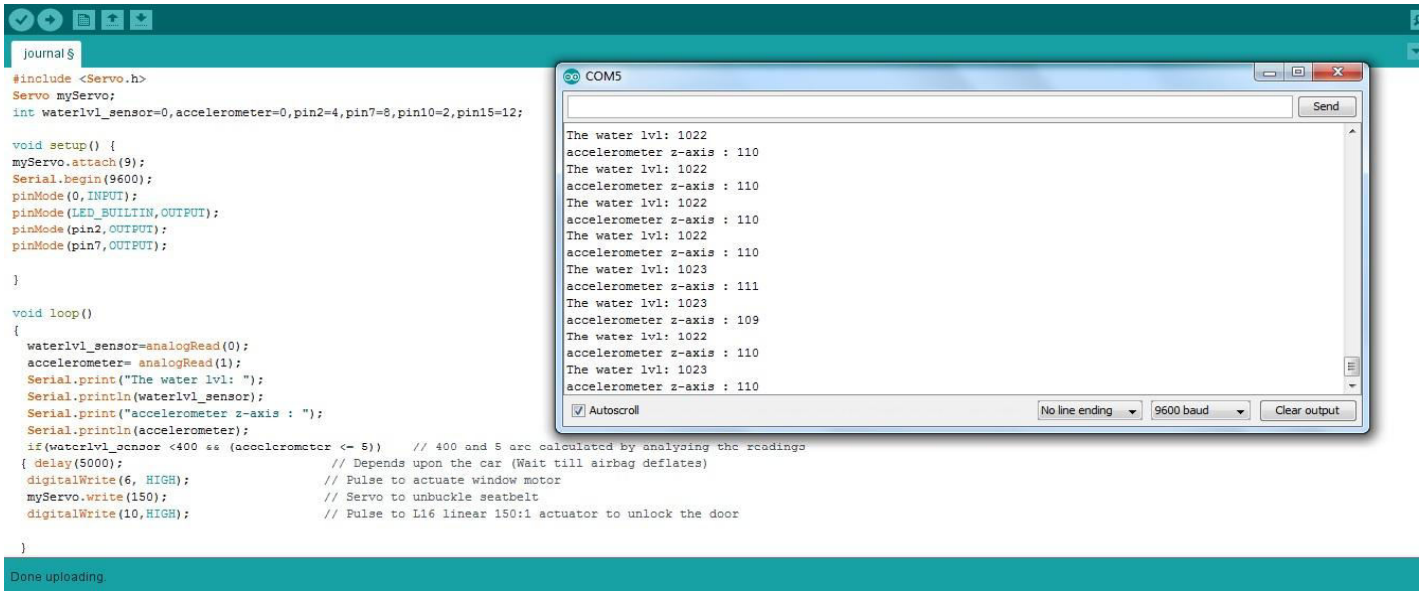

Figure 2: Output in normal condition

In the above output we can see, the readings of both accelerometer and water-level sensor. During normal condition, the accelerometer reading along z-axis is around 100. When there is no water in the rise, the analog value returned by the water-level sensor is 1023. The value decreases with proportion to the water level in the riser.

The output for falling of car followed by sinking is given below:

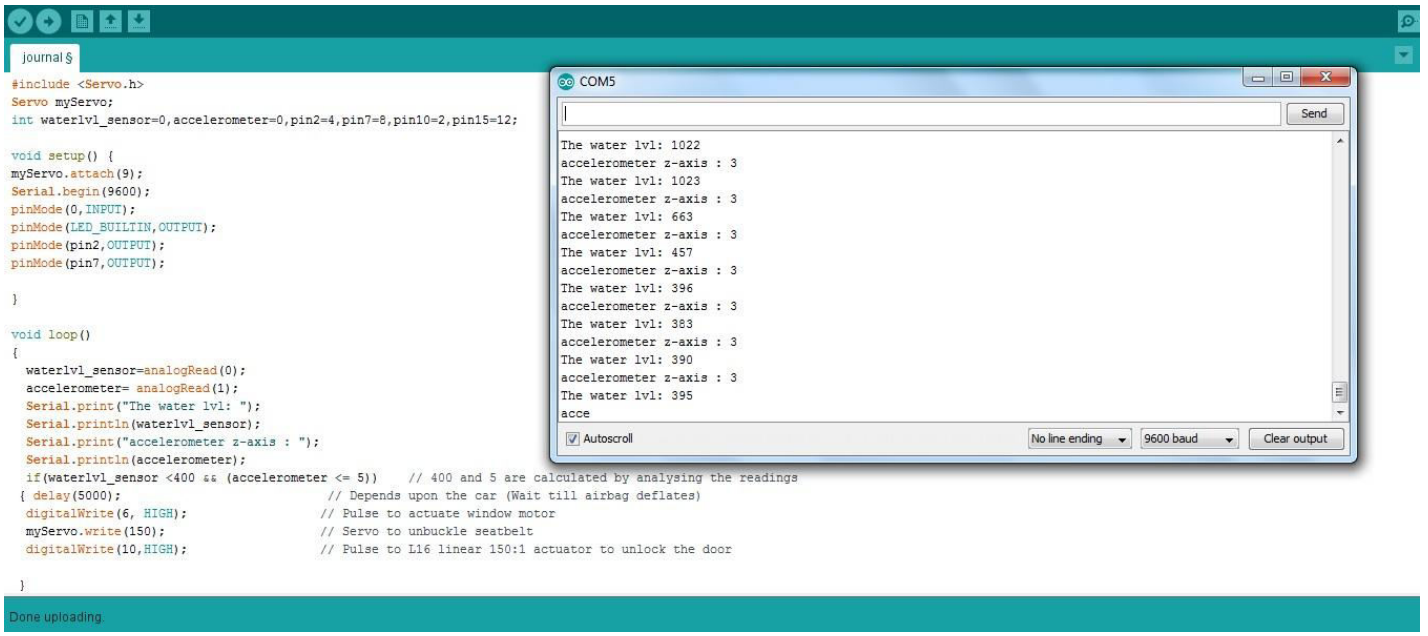

Figure 3: Output for sinking condition

IV CONCLUSION:

Thus the system for assisting the passengers to escape out of the sinking car is simulated as shown above. This would reduce the fatality due to sinking of car in water bodies.

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