

**A REPORT ON THE
ACCIDENT DETECTION AND LOCATION SHARING
SYSTEM
FOR
TWO WHEELERS**

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1. EXECUTIVE SUMMARY:

Our project aims at the prevention of the deaths after the happening of the accident especially to the two-wheeler vehicles. There are many systems and mechanisms employed in the four-wheeler vehicles like Air Bags which aim at the reduction of the damage when the accident happens. But our project is unique in its working wherein it aims at the reduction in the time of arrival of the ambulance after the accident happens. We found this problem to be solved. So, we devised a system which detects an accident and shares the location of the happening of the accident with the timestamp details.

In countries like India, there are many accidents happening per day. Statistics shows that many of the deaths due to accidents are due to the Delayed Ambulance. So, the customers can see a good solution for the delayed ambulance in our project. Because the overall cost of our prototype is around Rs.4000/-. So, as the customers invest more than Rs.50, 000 for a two-wheeler vehicle the cost of the system should not matter much as far as its value is concerned. The efficiency of the product lies in the accurate sharing of the location as easily viewable google maps link and the false accident detection prevention mechanism. The false accident detection preventing mechanism is another feature useful for the customer as well as the ambulance operators. As a whole, our product will be a useful one for customers both financially and as to prevent delayed ambulance.

2.PROBLEM STATEMENT

The number of accidents happening per day is increasing day by day in India. People think that the deaths during accident are only because of the accident. Though, the accident effect is the major cause for the death after accident, the irony is that 30% of the deaths after the accident are due to the delayed ambulance. So, there is a serious problem in the form of the delay in the availability of the proper medication to the injured after the accident. The problem is more evident when the accident happens at a remote area where the traffic is less and the injured is in a position that he may not call using his phone. There may be cases where even if the call is being made to the ambulances finding the exact location is also a difficult task in case of a remote places. So, this problem is also being addressed.

3.PROPOSED SOLUTION

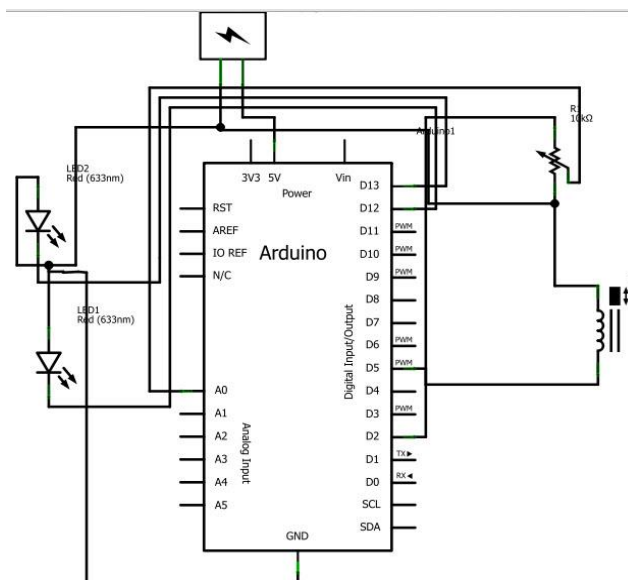
3.1 METHODOLOGY:

The overall design of our system consists of the following four categories of components and their functions in our system are as follows:

- ARDUINO UNO BOARD
- SENSORS
- MODULES
- ELECTRONIC COMPONENTS

a) ARDUINO UNO BOARD:

- Arduino UNO Board interfaces with the Sensors, Modules and other components to perform desired tasks.
- Arduino is used to make the modules work according to the input from the sensors.



b) SENSORS:

ACCELEROMETER:

- The Accelerometer is the sensing device in our system. It consists of inbuilt Gyroscope which is used to detect the orientation of the bike.
- The Gyroscope of the accelerometer gives the angular velocity values in each of the three coordinate axes directions.
- So, if there is a sudden change in the angle in the Y or X direction, then an accident is detected.

c) MODULES:

1)GSM MODULE:

- GSM module sends messages from the sim inside the UNO board to the number specified when all the required conditions are met.
- GSM module is also used to receive messages from the driver of the bike regarding the details of the driver. For sending this, the driver should send message in the format @!(THE REQUIRED MESSAGE).
- So, the GSM module also sends the message regarding the details of the injured after checking the sim card for the message of required format (@!(message)).

2)GPS MODULE:

- GPS module finds the exact location of the bike / accident spot using the information obtained from satellites.
- GPS module uses GSM module to send the location information of the accident spot to the ambulance authorities as a Google Maps link.

d) ELECTRONIC COMPONENTS:

1)BUZZER:

- Buzzer, in our system is used as an indication that the accident has happened and also used for the prevention of sending fake messages to the ambulance.

2)PUSH BUTTON:

- Push button is used to stop the fake message from being sent to the ambulance system.

3)POWER SOURCE:

- A power bank is being used to give power supply to the two Arduinos and other components in the system.

4)JUMPER WIRES:

- Jumper wires are being used to connect the components.

OVERALL WORKING & DESIGN:

Whenever a vehicle is met with an accident, then the accident is being detected using the accelerometer's Gyroscope. If there is a change in angle of more than 80 degree per second in the Y direction either positively or negatively else if the change in angle of more than 40 degree per second in the X direction, then an accident is detected.

Once the accident is detected, the buzzer connected to first Arduino is set high so that it starts ringing. The ringing of the buzzer is an indication to the driver that the accident is detected and if he is safe, he should press the push button to prevent the system to send the message to ambulance. If the driver does not press the push button within the 30 seconds of happening of accident, then the message consisting the Google maps link of the location and the timestamp is sent to the ambulance care. Following that, another message is sent consisting of the details of the driver as provided before in a given format. If the driver presses the push button within 30 seconds, it will continue to work as before.

ARDUINO1 +ACCELEROMETER+BUTTON+BUZZER

First Arduino is connected to the accelerometer, a button and a buzzer. As explained before, the buzzer starts ringing as soon as accident is detected by the accelerometer. The push button is used to prevent sending fake message. Pin 12 of Arduino 1 is connected to RESET pin of arduino2.

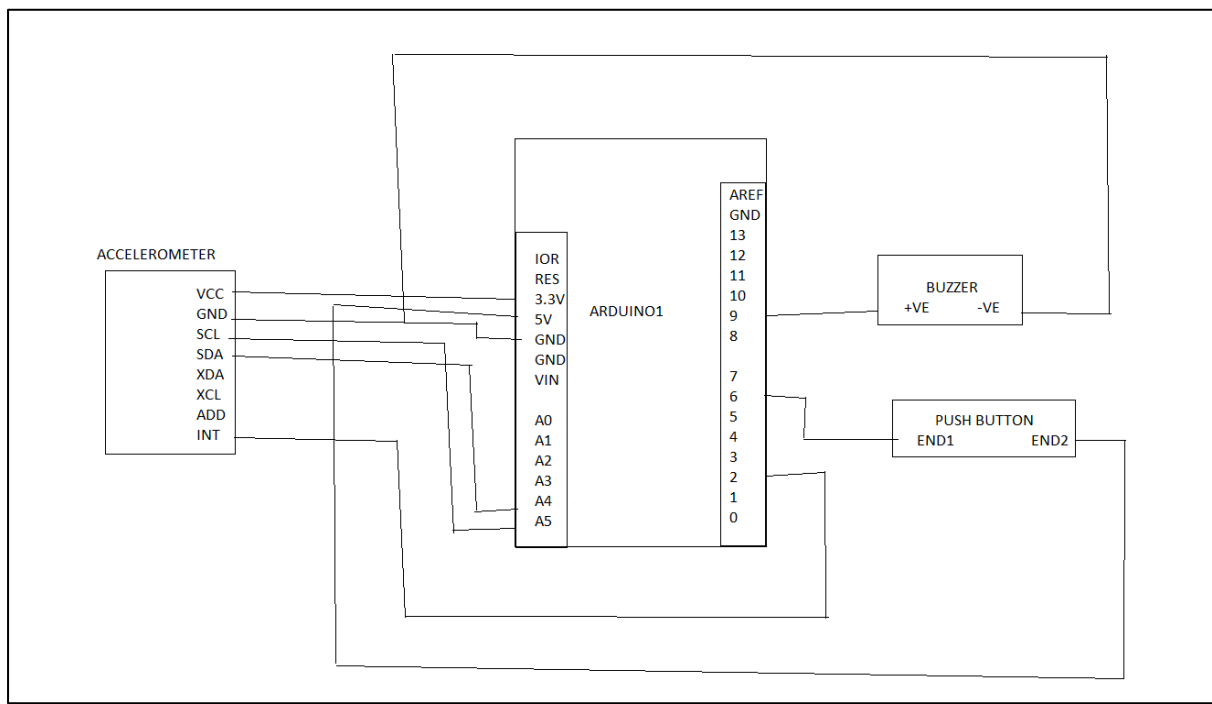


Fig: Arduino UNO 1

ARDUINO2+GPS MODULE+GSM MODULE

Arduino 2 is connected with GPS and GSM modules. These modules work together in order to send the accident location spot as a google maps link and other details. This Arduino starts once RESET pin is set high by the pin 12 of arduino1.

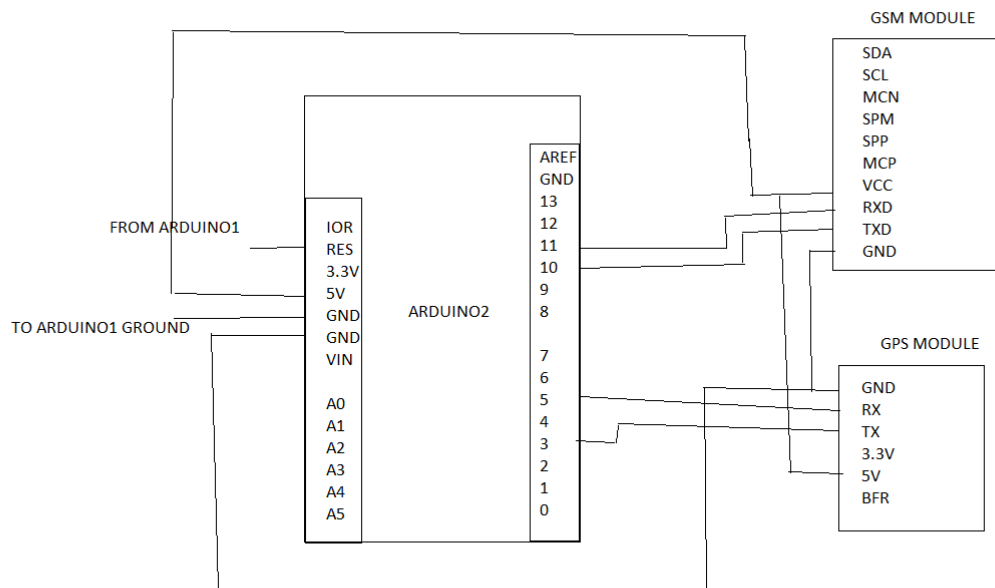


Fig: Arduino UNO 2

3.2. Results and Discussion

In this section, some use cases are being discussed.

1)Whenever a vehicle falls normally in the parking area our system won't detect it as accident because our system only detects sudden change in the angle not just the change in angle in a direction.

2)Whenever a vehicle in stationary position is met with an accident, then the accident can be detected because our system checks the sudden change in the orientation of the bike in any of the Y and X directions.

3)Whenever the bike or any other two-wheeler suddenly falls and it is being detected as an accident, the driver of the vehicle can prevent this fake accident message by pushing the button provided near the handle within 30 seconds.

Following are the improvements made,

1)Previously, the latitude and the longitude values at the location where the accident is happened is shared as a raw data. Now, the exact location of the accident happening is being shared as a google maps link directly for convenience.

2)Previously, the time of happening of the accident was not sent as part of the message. But the code is improved to achieve this functionality so that the ambulance care centre will get to know about the correct time of happening of the accident even in case of delay in message sending and respond accordingly.

3)Another feature added is sending the details related to the accident like the bike number using the sim card memory. First, at the time of buying the product the customer should send a message to the sim inside our system with starting @! So that later when accident happens these details are sent to the ambulance care.

4) We received message like:

“ACCIDENT HAPPENED!!!!!!!@

<https://www.google.com/maps/?q=10.729658,79.022659>

at 17:08:23 “

3.3 Benchmarking:

As of now, there are no products commercially available and used in the two wheeler vehicles. But there are some prototypes being made by individuals which follows different mechanism for solving the same problem. The list of such prototypes are as follows:

- 1) There are some products which uses Vibration sensor to detect the accident. But, the drawback with such type of systems is that the vibration sensor may even be sensitive to the vibration caused when vehicle crosses speed breaker.
- 2) There are some products which uses Microcontroller 8051 in the place of Arduino UNO board. But the drawback is that 8051 is just a single microcontroller while Arduino is a development board which comes with various series of microcontrollers. And Arduino has a common IDE which is easy to use.

The main drawback of the above-mentioned systems is the lack of the mechanism to prevent the fake messages being sent. Our system is unique in its ability to give the driver the option to stop the message from being sent to the ambulance care. Because there may be some abnormal cases where the sensor detects the accident even when there is no accident occurred actually. So in such cases this mechanism is useful.

Our system sends messages to the ambulance which are clear and precise. The messages consists of the Google Maps link which will direct to the browser so the ambulance care takers can easily locate

the accident spot. In addition to the location message, it also sends the details of the bike or driver as provided by the customer in the specified format.

4.CONCLUSION:

So, this report presented the overall design of the accident detection and location sharing system. There is a unique fake message prevention system in our system. So, if fine tunings are made in the hardware selection and further mechanisms are developed, our system will help save many lives and in turn many families thus causing a social change. In addition to that, having an accident detection system will also be useful as a sign of caution to the drivers that they need to drive carefully.