

IoT Based Automatic Vehicle Accident Tracking Down and Alerting System Using GPS and Twilio

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Abstract— The Accident detection used to be a complex system design but using the basic Arduino, GPS NEO 6m and ADXL 335/345 accelerometer sensor we can easily detect the accident occurrence and also can grab the coordinates of the location of the accident. The major reduction of complexity and also the cost is where we totally replaced the high cost GSM module with the software use of the message services like Twilio Messaging API Services.

Keywords—IoT, Web API, Arduino, GPS Module, Accelerometer, Sensors, Instant Alerting, WhatsApp Messaging Services.

I. INTRODUCTION

The development in the automobile industry is highly increasing and which leads to the accidents and so many hazards due to heavy traffic. People's lives are under high risk. This situation prevails, just because there is lack of emergency facilities in our country. In our country, many minors are lost their lives due to accidents. So we are in the process of solving this issue by proposing an efficient solution to rescue the loss of lives. In our theory, the design of the system helps us detect accidents in significantly less time and transfer the fundamental information to the rescue centre within a few seconds covering the geographical coordinates where the vehicle had met with an accident [1-2]. This real time application saves many valuable lives this message is sent through the TWILIO Messaging API Services. Twilio is a software application programming interface which is open source and available in python. With the use of this software API services we can reduce the cost of the system and complexity.

II. EXISTING SYSTEM

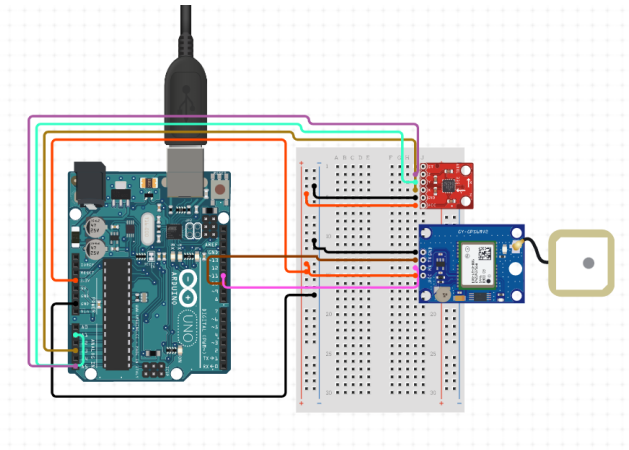
The existing system's design is quite complex and high of cost. Such high complex system might get delayed due to the Arduino response times and the use of an external SIM card will required more wait time to actually find and to connect to the nearest beacon of mobile network [3-4]. Also, the ultrasonic sensor does not seem to be needed. The MEMS Sensor can be easily replaced by the ADXL355/345 accelerometer sensor. We do not need another Wi-fi Module to the system as we will use the python programming to configure about system and communicate the location coordinates to the receiving person or a rescue system. Therefore for smart IoT applications with sensors, the arithmetic circuits like multipliers and dividers should be more energy efficient for real time signal processing applications [5-9].

III. PROPOSED SYSTEM

Our project works on the principle of detection of the location coordinates of the accident location and sending the location to the rescue system using the Python Twilio module with the decoded possible location of the accident with the coordinates. We don't need extra ESP32 Wi-Fi module to connect over the internet and an extra high cost GSM Module with a SIM card to send and SMS of the possible accident location. This is the main motto of us considering to take over this project. The ADXL335 sensor will keep tracking the orientation of the vehicle and also gives an alert when the vehicle flips over more than the normal orientation angle. The GPS NEO 6M is a typically low-cost device which gives the location coordinates of the possible accident place with an accuracy of 90 percent. This is the cheapest accident detection system in the real time against the other accident systems and without any heavy complex interfaces.

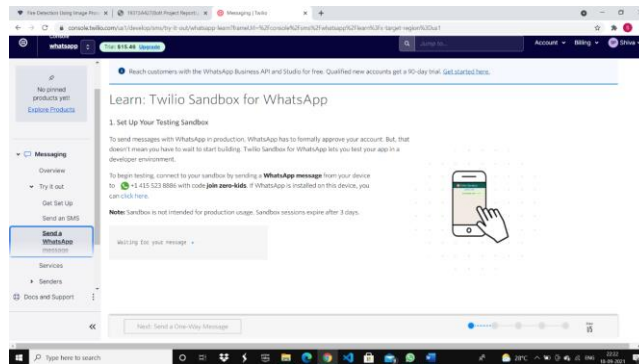
IV. LITERATURE SURVEY

At present criteria we can detect the accidents but we need a response team like to rescue the victims immediately as possible. There are still surveys and the research is going on to understand and minimize the deaths due to the accidents. In literature the number of approaches to provide security and safety through monitoring the vehicle's real time precise positioning and information using different technologies have been proposed. There are a number of good surveys are available but the least is that the system has to use the complex design and the use of high cost modules are still required. So, our team will be focusing on the reduction of the complexity and the cost by using the hardware alternatives like software APIs. The use of the software application programming interfaces is increasing to decrease the actual implementations of the hardware.



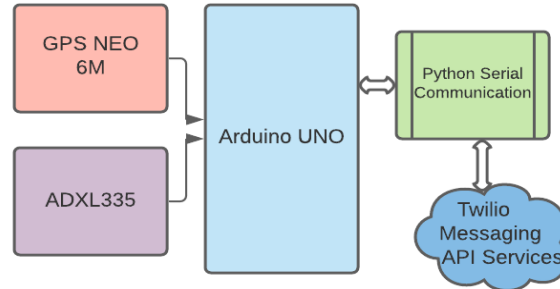
V. CONNECTIONS

The connections on the hardware side are simple and quite clear. The rest of the operation will take part on the software side. The Arduino gets the information of the car position and the orientation when the car flips over then the huge changes of the orientation will indicate that there has been a possible accident occurred.



The Twilio will be responsible for the alerting part of the user. We have to setup and account and register for the API services and we can find the documentation of how to use the Twilio WhatsApp message services here for the use of the Twilio API in Python, we specifically require the python version less than the latest Python 10.0.

VI. BLOCK DIAGRAM



VII. WORKING

A. Step-1

Initially when the system is on, the python will start running in the background and the Arduino will keep tracking the orientation of the vehicle weather it is in regular position.

B. Step-2

The python will be running on the inbuilt vehicle computer interface and will be running on until the car engine turned is off.

C. Step-3

When the major accidents occurred then the orientation levels of the ADXL335 sensor readings will change and the Arduino will fetch the location.

D. Step-4

Then the Arduino integrated serial communication port will send out the possible accident location with coordinates and the python's serial module which is defined to look for the available location coordinates on the same port that the Arduino is connected.

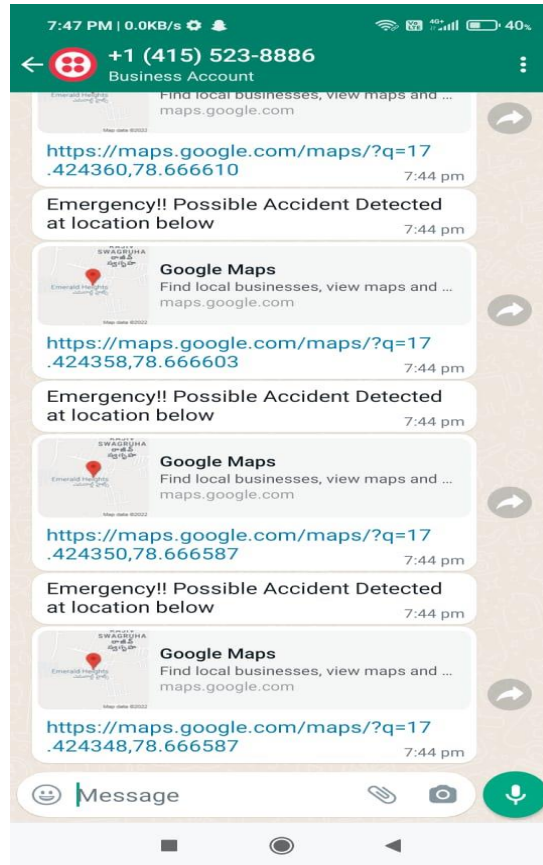
E. Step-5

Then the python will use Twilio module which is defined to send an SMS via WhatsApp will be sent as an Alert.

F. Step-6

The SMS contains an address with also the coordinates of the accident location.

VIII. RESULTS



This is the output of the system even without the GSM and ESP32 Wi-Fi modules. Using the internet, we can simplify the system cost and we can get the fast results as there are less algorithms to process.

IX. ADVANTAGES

- The exact location of the accident can be identified.
- The information can be passed over the internet to the rescue team
- Low of cost and system complexity
- Simple implementation.

X. FUTURE SCOPE

As the electric cars and vehicles are emerging into the market, the use of the internet and the integrated computer for the vehicles will also be a part of the vehicle. Then the implementation of our system is very easy to the advanced electric vehicles.

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