



## Automated SOS Vehicle Tracking

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# AUTOMATED SOS VEHICLE TRACKING

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**Abstract**—The use of vehicles becomes important everywhere in the world with increase in use of vehicles. There has been a steady increase in accidents as well, vehicle manufacturers are attaining the security features of their products by introducing advanced automated technologies to avoid accidents from occurring but no significant growth has been seen on technologies for the purpose of implementing proper measures to ensure the safety of a person after the accident has occurred. Our solution implements various layers of security measures to prevent an unauthorized person from using a vehicle and at the same time creating a steady communication between accident victims and the emergency responders. Our device uses various sensors to analyze the data live and instantly create a communication between victim and responder which provides detailed information about the intensity of the accident along with the GPS location to increase the possibility of survival in a dire situation.

Keywords: Convolutional Neural Networks, GPS module, GSM module, camera module, Zigbee, IOT, Embedded, Gas sensor, Temperature sensor, Crash sensor, Arduino Mega, MATLAB.

## 1. INTRODUCTION

The main aim of the system is to create communication between victim and emergency responder along with the accurate data about the situation. To tackle this, we have proposed a solution that creates an immediate connection between the victim and emergency responders using 3 different technologies namely GSM, Wi-Fi and Radio communication. The device in the initial phase uses deep learning to recognize the user facially, the vehicle will start only after the user is authorized. As the vehicle starts our device starts collecting live data using different sensors such as crash sensor, temperature sensor and gas sensor, and uses these values to keep track if any dangerous situation occurs. As soon as an accident occurs the arduino chip set composes

an SOS response based upon various inputs given by the sensors including the latitude and longitude using GPS. This message is sent to the emergency responders

- 1) In the form of an SMS using GSM.
- 2) As a prompt to the server using radio frequency.
- 3) As an update to the website using IOT.

## 2. LITERATURE SURVEY

After thorough background work, some of the most valuable recent documents and papers are

G. Hu, X. Peng et al: This work proposes the use convolution neural network algorithm in deep learning to implements facial recognition to prevent unauthorized access to the vehicle. The use of this technology increases the efficiency of facial recognition as well as decreases the space required to store the data as it crops out the redundant data and store only the key value. [1]

A. Anusha et al: This paper implements the use of GPS tracking system to monitor the live movement of the vehicle so that if an accident occurs instant message could be sent to the emergency responders without any delay in procession of location. The quick response makes sure that help will be provided way quicker than traditional methods.[2]

R. C. Gowda et al: This paper presents the use of GSM communication system to create a wireless network between user and emergency responders using SMS. The system contains a sim adapter which is used to create a connect with network towers which then sends the message to the registered number. [3]

S. Gifei et al: This system provides us with efficient way of automating the system in a smart and secure manner, ensuring the efficiency and the accuracy of the system. The project helps us understand how to initialize and organize different processes in an orderly manner to provide user free operations. [4]

H. Pan, J. et al: In this paper they propose developing a system that creates a radio communication between user and server using zigbee. It uses 2.4GHz band to create link to the server. This paper further demonstrates on how to strengthen the connection and expand the range of the system. [5]

A. Anusha et al: This project proposes the use of various sensors along with iot to create an online communication system that can be used to access live data on the vehicle. This system uses iot chip-set that uses Wi-Fi as a means of connecting to the servers which are then updated whenever the sensors get triggered. [6]

### 3. PROPOSED WORK

The main idea of the proposed system is to create a communication between user and emergency responder to maximize the efficiency of emergency services and minimize the risk of getting into an accident. To accomplish this, we use a combination of iot devices, sensors, facial recognition and wireless communication. Thus the six basic modules for our app consists of face recognition which checks whether the person using the vehicle is authorized or unauthorized, sensors such as temperature sensor, gas sensor, crash sensor, arduino mega, microprocessor and GPS, data processing to analyse the live data gathered by these sensors, iot to create a live portal that is updated as soon as Wi-Fi is available, GSM module which is used to generate SMS and zigbee that creates a wireless radio connection between device and server. This thus creates a 3 way communication between user and emergency responder making sure that the users situation and location is conveyed without any hindrance.

#### A. Face Recognition

The face detection is used to prevent unauthorized use of vehicle. The process initiates by capturing image of the user using a camera, this image is then processed using Convolution Neural Network algorithm. This algorithm takes the image, converts it to zeros and ones and then extracts the key features, these key features are then compared to the stored key factors to verify if the user is authorized to use the vehicle or not. Once the verification is done the automobile starts.

Convolution Neural Network deep-learning algorithm which feeds any image as it's input and then assigns the order of importance to it in the form of Learn-able Weights and biases compared with various aspects/areas of image and performing optimal Differentiation. This comes with a benefit of minimum core-processing when compared with other classification algorithms.

#### B. Sensors:

- i. Temperature sensor: This sensor is responsible for tracking the current temperature of the vehicle.

Whenever the temperature crosses the fixed threshold, the sensor send the digital signal to arduino.

- ii. Gas sensor: This sensor is used to detect any kind of harmful gas that can be building up in the vehicle, this includes smoke, fumes and alcohol.
- iii. Crash Sensor: The crash sensor is implemented on the surface of the vehicle to detect high intensity force. The sensor gets activated whenever a crash occurs and sends analogue value to the arduino mega.
- iv. Arduino mega: This arduino chip-set works as the main processing unit, it gathers all the data from sensors and analyses the data constantly, whenever an abnormal data is detected, it is analyzed and a SOS message is generated based on the different values gathered from all the sensors.
- v. GPS: The use of GPS comes after the accident occurs, as soon as an accident is detected, arduino chip-sets generates a SOS message and instructs GPS sensor to gather the current location coordinates which are then added to the message and sent to the receiver.

#### C. Data Processing

This is the step where all the data is being analyzed constantly for any anomalies. All the sensors send their individual data in forms of either digital value of analogue value, this data is segregated on the basis of its representation and then is analyzed continually, whenever the data deviates from the expected values, it is analyzed and an SOS message is generated using input data which then is sent to the receiver.

#### D. IoT

As the SOS message is generated, it needs to be transmitted to the receiver as quickly as possible. For this purpose we use IoT module to search for any open Wi-Fi network available, as soon as the system finds a Wi-Fi it sends the details to the cloud which is then stored and updated on the online website that gives detailed information about the accident containing temperature data, gas data, crash data, and current location of the user, providing immediate information about the accident to multiple receivers at the same time.

The site also contains accident details that took place in the past thus providing user with previous records regarding the accident, that can be analyzed to generate an organized data-set that can be further used for research studies.

LogID	DATA	DATE TIME
1	ACCIDENT HAPPENED AT	13/3/2020 - 10:18:34
2	LATITUDE: 12.8230, LONGITUDE: 80.0414	13/3/2020 - 10:18:38
3	ACCIDENT HAPPENED AT	13/3/2020 - 10:22:22
4	LATITUDE: 12.8230, LONGITUDE: 80.0414	13/3/2020 - 10:22:26
5	ACCIDENT HAPPENED AT	13/3/2020 - 10:24:23
6	LATITUDE: 12.8230, LONGITUDE: 80.0414	13/3/2020 - 10:24:30
7	ACCIDENT HAPPENED AT	13/3/2020 - 10:25:9
8	LATITUDE: 12.8230, LONGITUDE: 80.0414	13/3/2020 - 10:25:13
9	ACCIDENT HAPPENED AT	13/3/2020 - 10:34:53
10	LATITUDE: 12.8230, LONGITUDE: 80.0414	13/3/2020 - 10:35:0
11	ACCIDENT HAPPENED AT	13/3/2020 - 10:36:1
12	LATITUDE: 12.8230, LONGITUDE: 80.0414	13/3/2020 - 10:36:5
13	ACCIDENT HAPPENED AT	13/3/2020 - 10:37:13
14	LATITUDE: 12.8230, LONGITUDE: 80.0414	13/3/2020 - 10:38:26
15	ACCIDENT HAPPENED AT	13/3/2020 - 10:38:30
16	LATITUDE: 12.8230, LONGITUDE: 80.0414	

Fig.1: IoT module sending output to cloud database

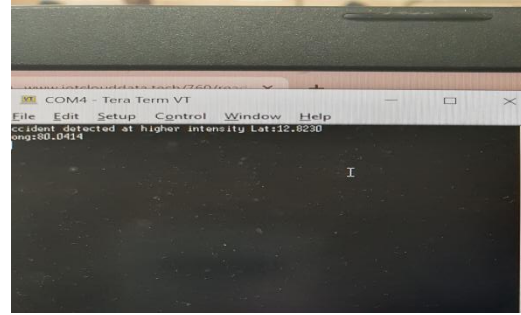


Fig.3: Zigbee generated message to receiver

### E. GSM

The main purpose of this system is to create a communication network between user and receiver and using a single communication channel as a last measure becomes very risky as there is always a possibility if Wi-Fi not being available in the region. This problem can easily be tackled by adding another mode of creating connection between user and emergency responder.

GSM is used as the second mode of communication, here the SOS message is kept as sms and is sent to the registered mobile number containing all the detected information about the accident. It uses cellular network as a means of wireless network to establish communication.

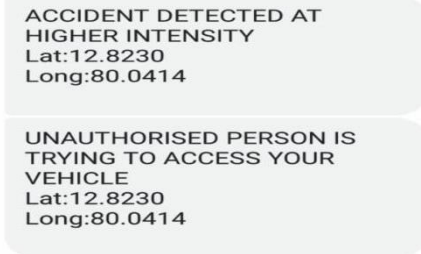


Fig.2: SMS generated by GSM module

### 3. ARCHITECTURE

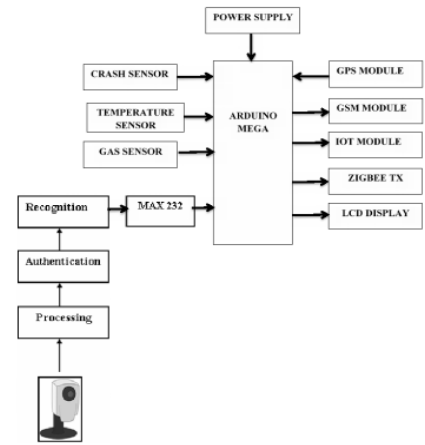


Fig.4: Architecture of the proposed system

### F. Zigbee

Zigbee is a low cost mesh network device which is used to control and monitor applications. The network is price efficient and more reliable than Bluetooth or Wi-Fi as it is less power consuming and creates automatic connections to the nearby receivers. Zigbee uses 2.4 GHz radio waves to create connection to the devices.

Zigbee adds a third layer of protection to the communication between user and receiver. It uses radio frequency as a means of communication and pushes the gathered information to the server.



Fig.5: Zigbee receiver

### 4. RESULT

For Automated SOS Vehicle Tracking, the user authorization becomes quicker with regular use. Temperature sensors get accurate value with a deviation

range of 0.25 degrees Celsius, Gas sensor is able to create quick response even with very little exposure to smoke. Crash sensor generates analog response as soon as it is put under pressure. IoT module easily connects to Wi-Fi and updates the cloud data within 5 seconds. GSM module works efficiently on sending sms to the registered receiver but is dependent upon cellular network which when not available prevents message from being sent. Zigbee gives the quickest response when activated and pops the information to the server in less than a second.

During the trial of the project all the 3 communication modules: Iot, GSM and Zigbee were able to communicate with the emergency responders very quickly and were able to provide the accurate location of user.

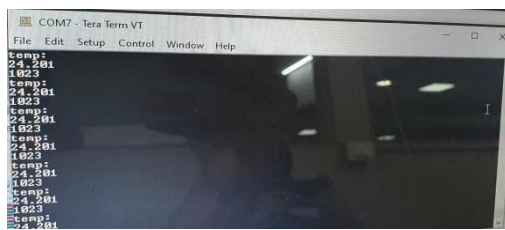


Fig.1: Architecture of the proposed system

## 5. CONCLUSION

There are few papers that try to provide support to the user in times of emergency but they often do not have multiple backup systems if in case their connection method fails, this creates a very dangerous situation for the person facing life threatening emergencies. Our proposed model takes this issue under consideration and creates a three layered communication consisting of IoT, GSM and Zigbee independent of each other, thus providing with a more efficient and reliable system to depend upon.

### ◇ Future Scope

There are multiple directions in which this project can move ahead in the future, some of them are listed below

- i. Face Recognition can be further modified to detect if a person is sleepy or not looking towards the road, then the system can sound an alarm to wake up the driver or stop the vehicle from moving at all, thus reducing the amount of road accidents significantly.
- ii. The sensors can be used to collect weather data and can act as weather hotspots. As of now every city has one weather hot spot and combination of these hotspots is used to predict the weather for the entire region. By converting every vehicle as a weather hotspot we make the calculations so precise that we will be able to

predict the weather to an extraordinary level of accuracy which can be used by farmers to predict the best time to farm crops and also provide an accurate analytical data on climate change. The reason it can not be done now is because our current technology does not have the computational power to process this much data at once.

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