Department of Information Technology

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A Presentation on
IOT based Accident Alert System
Submitted in partial fulfillment of the degree of
Bachelor of Engineering(Sem-8)
in
INFORMATION TECHNOLOGY
By

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1.Project Conception and Initiation

1.1 Abstract

The Indian Ministry of Road Transport and Highways reports that around 4,06,730 accidents take place each year and close to 86,000 are killed! In frequently crowded areas like cities or highways, more than 65% lives are lost due to delay in the arrival of emergency services. If we consider accidents taking place in secluded areas,then the percentage of lives lost is even more. With an aim to reduce these numbers to as little as possible, we propose a system which makes use of IoT sensors along with Cloud Computing.

1.2 Objectives

- To develop a cheap, state-of-art accident detection system for vehicles.

- To provide smart assistance to the car crash victim.

- To contact the concerned emergency authorities on the victim's behalf.

1.3 Literature Review : Paper 1

Title: Real-Time Crash Detection Analysis and Emergency Alert Using Smartphone
Authors: Harit Sharma, Ravi Kanth Reddy, Archana Karthik

Publication Details : International Conference on Connected Vehicles (ICCVE), 2016

Findings: Detecting car crashes using sensors present inside mobile phones.

Advantages: Makes use of in-built sensors, so does not require any addidtional components/modules.

Disadvantages: Makes use of a mobile device for car crash detection.

Paper 2

Title: Intelligent Accident Management System Using IoT and Cloud.
Authors: Akriti Singhal, Sarishma, Ravi Tomar

Publication Details : 2nd Intl. Conference on Next Generation Computing Technologies (NGCT), 2016

Findings: Detecting car crashes using IoT sensors and uploading the data on Cloud using GSM module.

Advantages: Data is uploaded to cloud.

Disadvantages: Low processing speed and internet speed due to microcontroller and GSM module respectively.

Paper 3

Title: A Smart Accident Detection and Control System in Vehicular Networks

Authors: Md. Saeef Abdul Hadi, Abhijit Saha, Faysal Ahmad, Mohammad Shahriyar Hasan, Mehebub Hasan Milon

Publication Details : 5th International Conference on Networking, Systems and Security (NsysS), 2018

Findings: Developed an accident management system for accidents taking place at a junction**.**

Advantages: Driver's are alerted about the exact lane number in which the accident has taken place via a message.

Disadvantages: In case of heavy traffic, a slight delay in broadcasting the message can lead to even more people getting involved in car crash.

Paper 4

Title: A Comprehensive Solution to Road Traffic Detection and Ambulance Management

Authors: Hari Sankar S, Jayadev K, Suraj B, Aparna P

Publication Details : International Conference on Advances in Electrical, Electronic and System Engineering, 14-16 Nov 2016

Findings: Developed a system to address the problem of delay minimization right from when an accident occurs till the time when the patient is handed to the casualty.

Advantages: Using Google Maps API only the ambulances nearest to the accident spot are informed.

Disadvantages: None.

1.4 Problem Definition

- To create an assistive system for car crash victims which will automatically alert nearby authorities that can arrive on the scene in quick succession of time, thereby possibly saving the victim's life.

- Based on the impact of collision, the system will automatically send a notification to the service stations, local clinics, police stations, hospitals, etc.

1.5 Scope

- With the ever increasing number of vehicles, the number of accidents taking place is also increasing exponentially. In order to aid the car crash victims, we propose a system that makes use of various IoT sensors that are capable of determining the collision impact and sending automatic alerts to the help providers.

- Also, the implemented system will be a lot more cheaper than the automatic accident detection systems that are currently present only in high-end cars.

1.6 Technology stack

Hardware :

● **NodeMCU :** Acts as the main microcontroller to integrate functioning of other components
● **GSM Module :** For automatic emrgency calling
● **GPS Module :** For providing geographical location
● **Accelerometer :** For measuring change in acceleration
● **Vibration Sensor :** For detecting change in various physical parameters such as acceleration, temperatue, etc.
●

1.6 Technology stack

Software :

● **DynamoDB :** For database storage
● **AWS :** For providing services related to the system like Simple   Notification   Server, etc.
●**Google location API :** For providing latitudinal and longitudinal coordinates on the map and also for locating services nearby

●

1.7 Benefits for environment & Society

Accident Alert Systems are not a recently discovered mechanism,they have been around for quite some time now and yet a lot of the people are unaware of it. This is because such an accident detection system is only present in Luxury tier cars like BMW, Maseratti to name a few. With our project, we aim to develop an affordable Accident Alert System that can be externally fitted into vehicles of all tiers. The system will ensure that emergency services are contacted automatically without wasting any precious time. Thereby hoping to reduce the number of car crash fatalities by a considerable amount.

2. Project Design

2.1 Proposed System with Flow of modules
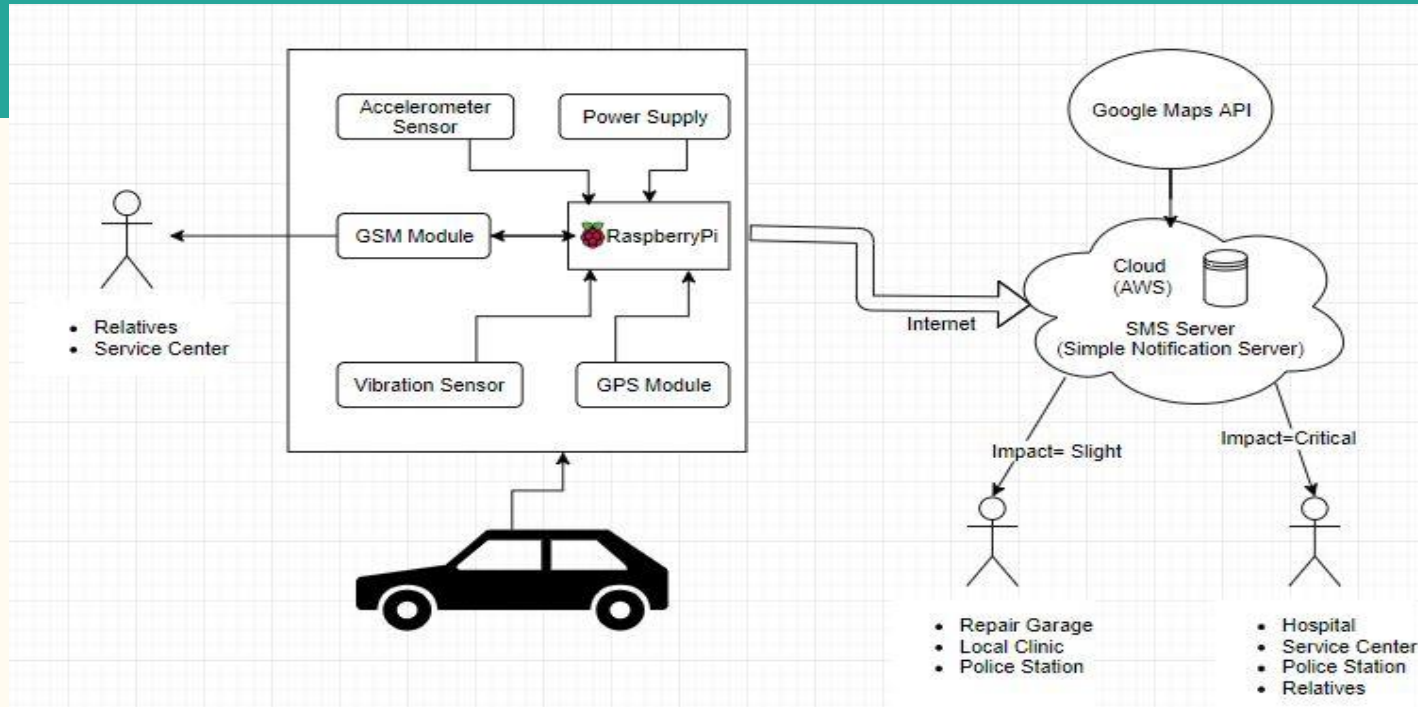
2.2 Use Case
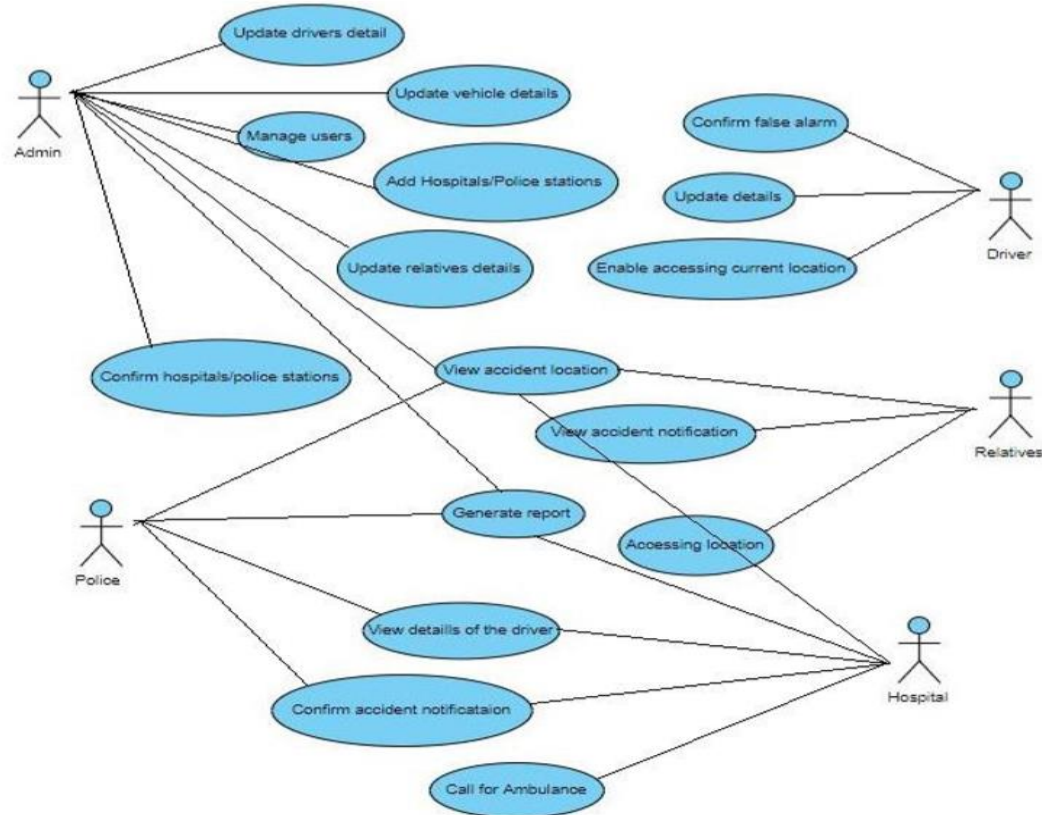
Description Of Use Case

- **Update driver details :** For updating details of the driver like city,car,etc.

- **Update vehicle details :** For updating the details of the vehicle.

- **Manage users :** To add or delete a user.

- **Add Hospital/Police Station :** To add a new Hospital/Police station into the database.

- **Update Relatives details :** For updating details of the driver's relatives.

- **Confirm Hospital/Police Station :** To confirm if the hospital/police station will send emergency services to the accident spot.
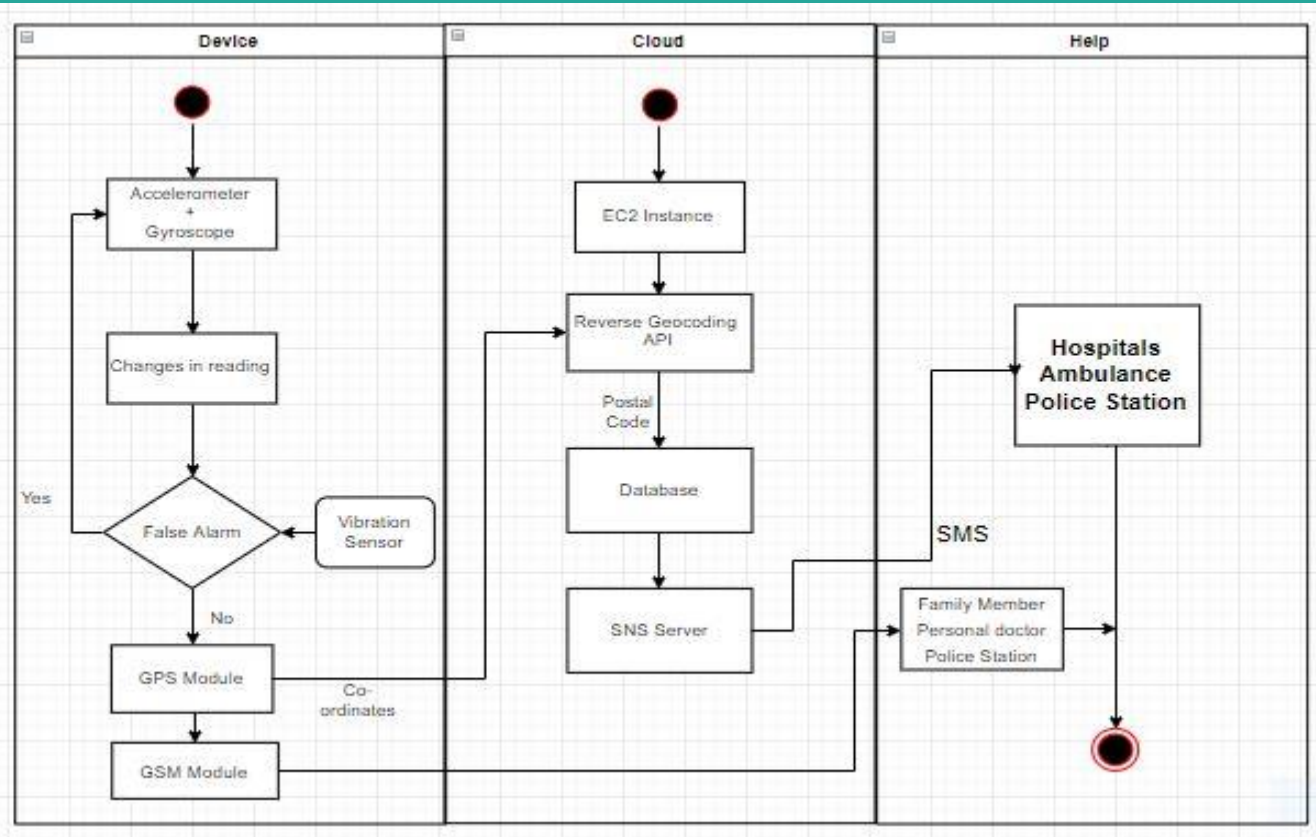
.

- **Generate Report** : To generate an entire report about the accident.

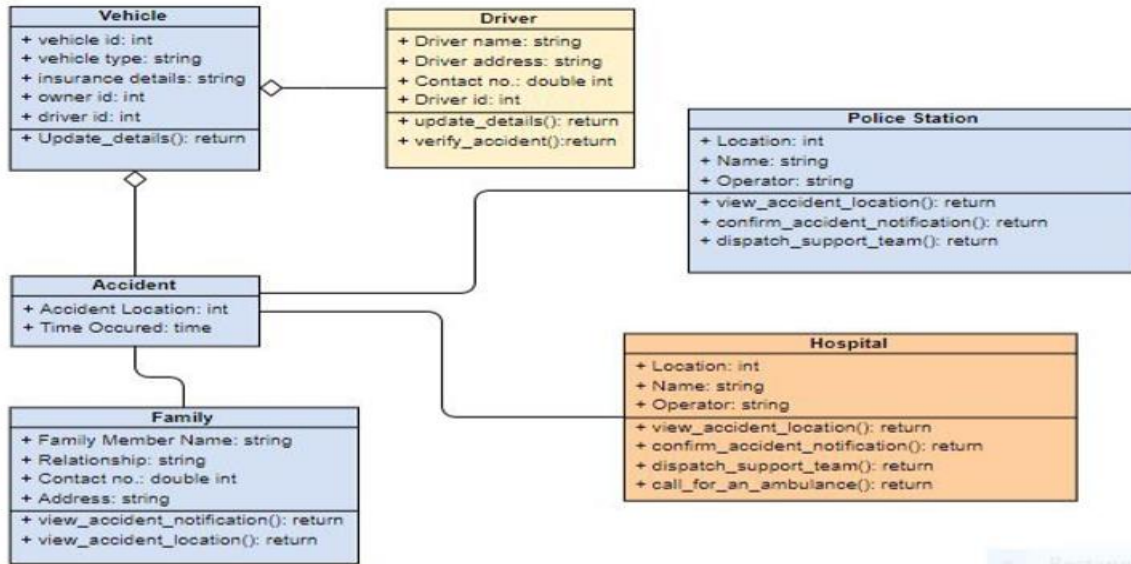- **View details of the driver :** For viewing the details of the driver.

- **View Accident Location :** For viewing the exact location of the accident spot.

- **Confirm False alarm:** Can be used only by the driver to confirm if the emergency alert is a false alarm.

2.3 Activity diagram

2.4 Class Diagram

2.5 Modules : NodeMCU

Description : A small microcontroller that integrates various sensors together for a common purpose.

Integration in our project : It will act as the main microcontroller for integrating other sensors like accelerometer,vibration sensor,GSM and GPS modules. It also offers wifi connectivity which will be used for accessing the Cloud.

Accelerometer

Description : A sensor used for measuring change in acceleration.

Integration in our project : It will be connected to the Raspberry Pi, so if any sudden change is detected it will broadcast the data to the other sensors in order to trigger the accident alert system.

Vibration Sensor

Description : For detecting change in various physical parameters.

Integration in our project : The vibration sensor is capable of detecting changes in temperature, acceleration, etc. So it will be vital in case of determining if the crash is a false alarm or not.

GPS Module

Description : A module used for detecting the geographical location of an object on the map

Integration in our project : With the help of a GPS module, the exact coordinates in terms of latitude and longitude will be obtained. After acquiring the coordinates, they will be sent to the Cloud.

GSM Module

Description : A module used for establishing connection between a computing device and a GPS/GSM system

Integration in our project : In our project, the GSM module will be used a backup for Cloud Computing. In geographical locations where Cloud connectivity is not possible, the GSM module will be used to send alerts to the mobile numbers that are already stored.

Cloud Computing

Description : The practice of using a network of remote servers hosted on the internet for computing

Integration in our project : For our project, we will be using the following Cloud services:

.EC2 Instance : To host an environment that will be useful for integrating other Cloud services.

.Reverse Geocoding : The coordinates received from the GPS module will be processed using this service to obtain the Name of the geographical location.

3. Future Scope

For our future work, we would like to make an application on all mobile phone platforms, wherein the user can gain access to all the services offered by our current system, but with a GUI. The application will also monitor the speed, routes, nearby destinations,etc and provide the driver with a complete driving experience.

2.6 References

- Akriti Singhal, Sarishma, Ravi Tomar, "Intelligent Accident Management System using IoT and Cloud Computing" , 2nd International Conference on Next Generation Computing Technologies (NGCT-2016) Dehradun, India 14-16 October 2016

- Harit Sharma, Ravi Kanth Reddy, Archana Karthik, "S-CarCrash: Real-time crash detection analysis and emergency alert using smartphone" , International Conference on Connected Vehicles and Expo (ICCVE), 2016

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- Hari Sankar S, Jayadev K, Suraj B, Aparna P, "A Comprehensive Solution to Road Traffic Detection and Ambulance Management" , International Conference on Advances in Electrical, Electronic and System Engineering, 14-16 Nov 2016

Thank You!!