



American International University- Bangladesh

Software Requirement Specifications

**Project Title:** Automatic Emergency Alert System

**Section:** E

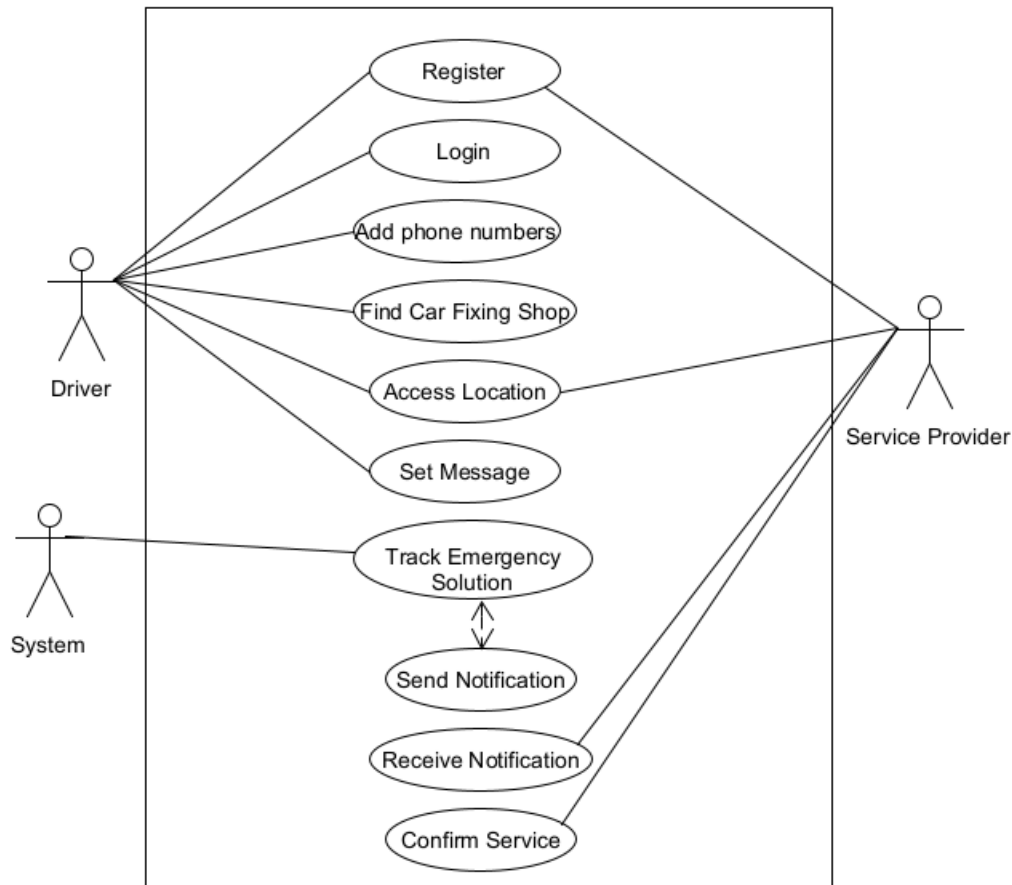
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**Introduction:** SRS means Software Requirement Specifications. It is a document where the requirements are sorted for a better understanding of the product or the project. It is a document that describes what the software will do and how it will be expected to perform. We want to define the purpose of our product, describe what we are building, detail the individual requirements, and deliver it for approval. A good SRS document will define everything from how the software will interact when embedded in hardware to the expectations when connected to other software. Our project is related Automated Alert system. The objective of our project is to construct an efficient system to detect an accident and alert emergency services rapidly. SRS will help to break down the whole requirements of this project into several subsectors. It has to be gone through a lot of testing so the project must be divided into many sectors for testing purposes. In the middle of the development process, there will be many changes that will be stored in the SRS document. The SRS document will also be updated with the requirements changes. SRS documents should be constructed in a way it should be easily readable for the developer and also the client. The reader of our SRS document will be:

1. Developer.
2. Car companies.
3. Client.

**Overview:** A car accident is a common and unexpected occurrence phenomenon in today's world. Sometimes accidents happen in such situations and places that we cannot even identify the spot and people deal with it without getting any help. The most common reason behind this is the lack of response. This issue can only be prevented by taking fast responses to the accident site and helping the victim from the scenario. So, in this project, we are building a helping hand on Car Crashes. It is a car crash detection system that is attached to the safety airbag of the car that will help the victim to get emergency help to safely get out of the accident site. If any accident occurs there will be a high-frequency sound which will attract the people nearby the accident scenario and also it will send a message and share the location via GPS with the relatives and the emergency services. In this case, the emergency service will get the news of the accident rapidly and be able to take responsibility as fast as possible.

## Use Case Diagram:



**Justification:** A car accident is a common reason for death nowadays. According to WHO (World Health Organization) around 1.35 million people died due to car accidents. In this modern world, there are several types of technology to prevent it but they are not well implemented. This project will make an advanced approach to car safety. The main reason for death in a car accident is the delay in the emergency response. The project will give an advanced safety system implemented on the vehicle. It will give an emergency message to the emergency service rapidly if an accident occurs. The main advantage of this project is it will decrease the delay of the help reaching to the victim. It will notify the emergency service and also the relatives of the victim and acknowledge them about the accident. Also, it will emit a high-frequency sound to attract the people around the scene. It also helps the victim to reach for help easily.

## Stakeholders:

Stakeholders are those people who are directly or indirectly involved in the project and who are positively and negatively affected by the performance and the completion of the project. Stakeholders are important because they can have a positive or negative influence on the project with their decisions. A stakeholder can be a wide variety of people impacted or invested in the project. For example, a stakeholder can be the owner also can be employees, customers, suppliers, and vendors. Identifying the stakeholders in our project is key as the project's success depends on it. If our stakeholder isn't happy, the project isn't a complete success.

1. **Primary Stakeholders:** Primary stakeholders directly participate in the operations of a business. This includes owners, employees, customers, suppliers, and vendors. All of these people have a direct financial interest in the success or failure of the company through their investment in the business itself. In our project Drivers is the primary stakeholder.
2. **Secondary Stakeholders:** Secondary stakeholders are those individuals, groups, or entities that are invested in the social transactions of an organization. Typically, secondary stakeholders aren't directly involved with the financial actions of an organization. In our project, the Insurance Company is the Secondary stakeholder.
3. **Internal Stakeholder:** Internal stakeholders are within the organization. The project directly impacts them as they serve and are employed by the organization managing it. In our project, Developers are the internal stakeholder.
4. **External Stakeholder:** External stakeholders are outside of the organization and are indirectly impacted by the project. They're influenced by the organization's work but are not employees of the organization. In our project, a Car manufacturing company is the external stakeholder.

## **Product Vision and Scopes:**

**Vision:** Our vision is to construct a system to detect car crashes and send a rapid emergency help alert to help the victim. This system will hold the data of the car credentials ex. Speed, Location, State of the vehicle, etc. This system will detect if there is any severe car crash and send an emergency alert to the nearest police station and produce a high-frequency sound to attract the attention of the surroundings to find help immediately. With this system, emergency help will be managed rapidly and the chances of survival will be increased.

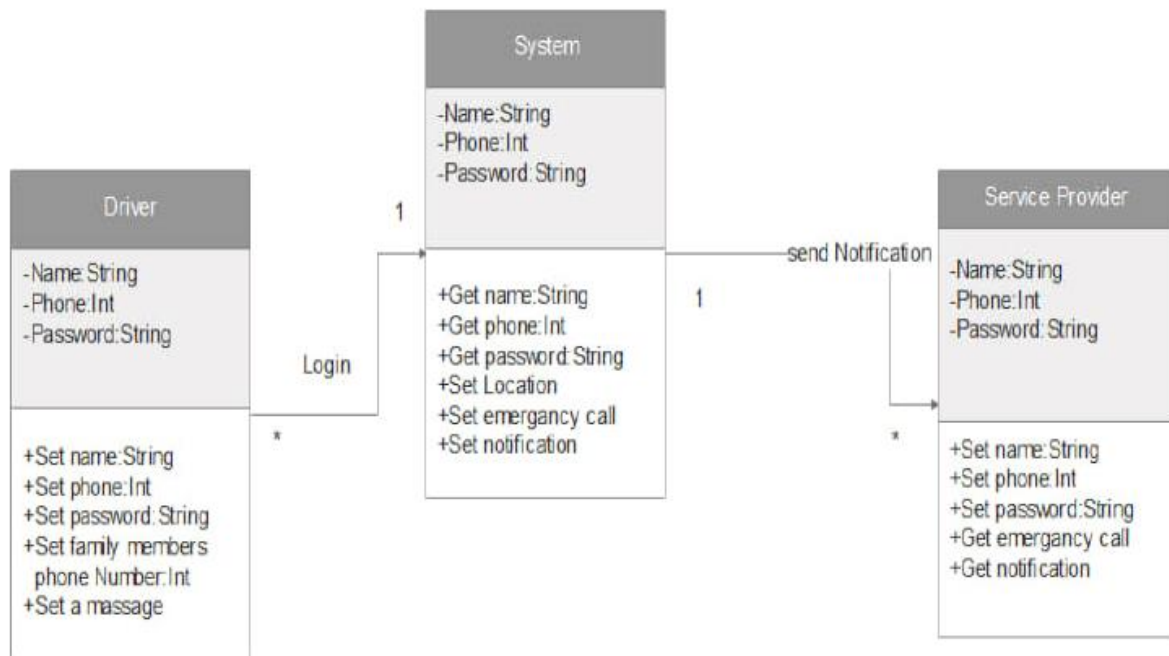
### **Scope:**

1. Affordable for all vehicles.
2. Efficient tracking system.
3. Scheduled data collection.
4. Rapid Notification.
5. GPS integration.
6. Easily accessible by smartphone.

**Component/Modules of the system:** The project is based on hardware and software integration. The software will be triggered if there is any kind of accident occurs. The component used in this project are:

1. GPS
2. Gyro Sensors
3. Speedometer
4. Thermocouples
5. High-frequency buzzer
6. Raspberry-pie system

## Class diagram:



## Functional Requirement:

1. Scheduled location tracking
2. Speed tracking
3. Collect data on the state of the vehicle
4. Trigger alarm after detecting an accident
5. Send an emergency message to the police station.
6. Notify the relatives about the accident

### Req ID: HR 1

Date: 12/12/22

Req Description: The scheduled location tracking delay should be 10 minutes in the cycle

Dependencies: Network

Originator: GPS

Testing Criteria: Regulation

**Req ID: HR 1.1**

Date: 14/12/22

Req Description: Buzzer should be only alarmed if any odd sign is detected by gyro sensors.

Dependencies: State of car

Originator: Gyro Sensors

Testing Criteria: State

**Req ID: HR 1.2**

Date: 15/12/22

Req Description: An emergency message should be sent at a delay of 10 seconds.

Dependencies: User interaction

Originator: Raspberry OS

Testing criteria: Efficiency

**Req ID: HR 1.3**

Date 16/12/22

Req Description: The speedometer should alert the driver about the speed.

Dependencies: Over speed.

Testing Criteria: Efficiency

**Prioritization:** According to the list of functional requirements there is a priority basis to sort those. According to the Moscow rule, we can prioritize the requirements. By following the MoSCoW rules sorting of the requirements according to the priority will be:

1. Scheduled Location tracking
2. Send an emergency message
3. Collect data on the state of the vehicle.
4. Trigger alarm
5. Notify relatives
6. Tracking speed

**Non-Functional Requirements:** This system is totally automated. So, the quality depends mostly on the device and its intelligent system. Our system is very quality oriented. When the car airbag is open the automatic alarm system will be activated. Furthermore, this device uses GPS to track the location and network system to call nearby hospitals, police stations, and relatives. So, it will be ensured that the intelligence system and car safety system everything work properly to avoid damage. That's how the quality of the device will be improved over time. We use high-security systems so that Hackers cannot try to interfere with our security system. So, in this automatic alarm system, each of those problems will be solved and handled properly. So, it will be much more secure to use.

**System Requirements:** Alerts that go to the hospital police station and relatives are sent automatically via email, phone call, or web service. If it uses email or web-based services, then it links to the direct portal system of the main server where detailed journey or accident data are saved to ensure safety. And in the workstation, there will be well-trained analysts who will provide descriptive information concerning the accident to the insurance, hospital, or relative. Also, those analysts will check through the records of the passenger who had any accidents before. Analysts can detect the location of the victim in real-time thus it relies on GPS, motion sensors, and accelerometer.

**Manpower:** Manpower is the backbone of any company therefore they can manage to create successful software which plays a major role in deciding the success of an organization. Manpower is the reason behind any popular software. In our project, there are 2 kinds of manpower. Engineers who attach the software to the car's airbag system and developers who develop the whole system.



## **Budget:**

Development salary 9 months: Considering 600 taka per developer

$$600 * 1584 = 950400 \text{ taka}$$

Requirement analysis: Hourly=400 taka

$$\text{Analysis expense} = 400 * 176 = 70400 \text{ taka}$$

Transportation cost: 15500 takas

Training and hardware cost: 150000 takas

Rent expense:  $18000 * 9 = 162000$  taka

Total utilities: 60000 takas

Maintenance cost: Expense per hour =1500 taka

Extra hours needed for maintenance 80 hours

$$\text{Total maintenance} = 80 * 1500 = 120000 \text{ taka}$$

Other human resource: Project manager =  $1 * 28000 * 9 = 252000$  taka

$$\text{Accountant} = 1 * 22000 * 9 = 198000 \text{ taka}$$

$$\text{Technical staff} = 2 * 15000 * 9 = 270000 \text{ taka}$$

$$\text{Total cost} = 252000 + 198000 + 270000 = 720000$$

taka

Total estimate expense:

$$950400 + 70400 + 15500 + 150000 + 162000 + 60000 + 120000 + 720000 = 2248300$$

taka

$$\text{Profit: } 2248300 * 25\% = 562075 \text{ taka}$$

$$\text{Final project budget: } 2248300 + 562075 = 2810375 \text{ taka}$$

## **Finding and Analysis:**

Due to some studies, the alarm system has been done with the help of various sensors like PIC 16F microcontroller, GPS, and GSM modules to detect accidents.[2][4] Few journals show some other detection processes like if any accident is coming nearby or not.[3] In that case, people can take precautions to avoid unexpected scenarios. We found some similar work that is still in the process to be implemented but not yet done.

## **Challenges:**

- Might arise some security issues.
- Need long-term financial support.
- Maintenance is difficult since it includes a large number of users.
- Keeping up with the proper requirements is another challenge. It will have to deal with a huge database.

**Limitations:** Sometimes the automatic alarm system does not work correctly. If somehow the car goes out of the network coverage area, then the GPS service will not work properly which is a very frustrating thing. Sometimes there are no hospitals or police stations nearby when it creates the occurring situation. Our system is an automatic alarm system that is attached to the safety airbag of the car but if the car's front side gets heavily pressured the airbag may be open. Sometimes maintenance is difficult since it includes a large number of users. Keeping up with the proper requirements is another challenge.

**Conclusion:** To sum up, it can be argued that the project's sole goal is to help victims as soon as possible, with the potential to save thousands of lives over time with the appropriate combination of effective implementation and service delivery. This initiative doesn't specifically target anyone's age range. Therefore, if this project is successfully completed, it may serve as everyone's most reliable kind of protection when riding.

## References:

1. <https://safer-america.com/car-accident-statistics/#:~:text=Every%20year%2C%20roughly%201.3%20million%20people%20die%20in,th%20leading%20cause%20of%20death%20for%20all%20people.>
2. N. Ya'acob, A. E. Azhar, A. L. Yusof, S. S. Sarnia, D. M. Ali and A. Anuar, "Real-time wireless accident tracker using a mobile phone," 2017 7th IEEE International Conference on System Engineering and Technology (ICSET), 2017, pp. 111-116, DOI: 10.1109/ICSEngT.2017.8123430.
3. Arsalan Khan, Farzana Bibi, Muhammad Dilshad, Salman Ahmed, Zia Ullah, and Haider Ali, "Accident Detection and Smart Rescue System using Android Smartphone with Real-Time Location Tracking" International Journal of Advanced Computer Science and Applications (IJACSA), 9(6), 2018. <http://dx.doi.org/10.14569/IJACSA.2018.090648>
4. Norsuriati Mohd Saufi et al 2020 IOP Conf. Ser.: Mater. Sci. Eng. 917 012054