ARM Based Vehicle Theft Control, Positioning and Collision Detection System

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Abstract - *Many accidents occur on highways nowadays as a result of increased traffic and also owing to aggressive driving by drivers, and in many cases, family members, ambulances, and police authorities are not notified in time. As a result, the assistance provided to the accident victim is delayed. This could result in death. Our project, Vehicle Positioning System with GPS and GSM Modules is meant to avoid such scenarios so that a person who has been in an accident can receive immediate medical attention and be saved. Theft prevention is another application of this project. Here, an encryption module will be introduced to give increased security against code cracking and theft, as well as an alarm system. It's also aimed at finding the dynamic live location of vehicles in. the cases of accidents and vehicle theft. The whole scenario is implemented using an arm controller.*

***Key Words*: GSM and GPS modules, ARM controller**

1. INTRODUCTION

Quick and easy transportation has become an integral component of our daily lives. Many accidents occur on highways as a result of increased traffic and rash driving by vehicles, and in many cases, family members, ambulances, and police authorities are not notified in a timely manner. As we've noticed, vehicle theft is on the rise these days, so we're introducing our project, which is a theft control, accident detection, and vehicle locating system. The manual process of calling an ambulance causes delays in patient rescue and medication, we want to make the process more efficient by implementing automatic accident detection by using an accelerometer sensor, which is used to detect the accident. In case if the accident is not severe the system will discontinue the process or else alert messages will be sent to family or friends, nearby hospitals, and nearby police stations to notify them as soon as an accident is detected. An embedded system with a global positioning system and a worldwide mobility system is used to develop effective vehicle security for anti-theft. Through this technology, the client communicates with automobiles and determines their current location. When the appliance detects theft, it will send a notification SMSt ot he owner, informing him of the theft. This can be done using a fingerprint module.

Here we are using the fingerprint module because it provides high security than keypad interface. Keypad interface is a low-level encryption module so there may be chances of increasing the vehicle theft if the key is misused. In case the vehicle is theft by damaging the fingerprint module, here comes into picture of vehicle tracking system where the dynamic live location of the vehicle is shared to the owner and the concerned police authorities A GPS tracking system uses the Global Positioning System(GPS), as well as microwave signals,to determine the accuracy of a target's location and record its location. After that, the data can be retained in memory, which is known as a passive GPS tracking system, or it can be broadcast and shown in real time, which is known as an active GPS tracking system. When the owner requests the location of the vehicle, a message via mobile phone will be sent, and the response will be a message containing the coordinates (longitude and latitude) of the vehicle using a worldwide map. The above interaction is done by using the GSM module.

1.1 methodology
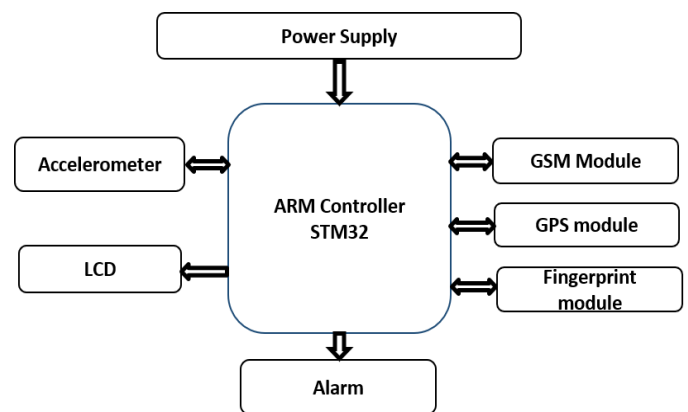
Block diagram

The project comprises three features: accident detection, theft control and vehicle positioning system. It consists of an ARM controller (STM32), power supply, accelerometer sensor, fingerprint module, buzzer, LCD display, GPS and GSM modules. For accident detection this technology uses an accelerometer sensor to detect accidents. When the engine is running and the vehicle hits

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the ground, the controller reads the accelerometer inclination. The controller reads data from the accelerometer sensor and triggers an alarm (buzzer) based on the condition specified in the code. For example, while riding the bike will be at a 90-degree angle to the road; however, when the bike falls on the road, the angle will be much less or much more than 90 degrees, causing the angle to differ greatly. At that point, the controller processes the data from the accelerometer sensor and turns on the buzzer. If the motorcyclist is alright and the injury isn't too serious, he will be supposed to turn off the alarm, and the system will continue as normal. If the results are bad, the controller will activate the GPS and GSM module, and the exact location of the person who got an accident will be sent to his family members, concerned authorities like police officers, and ambulance services so that they can arrive as soon as possible and there may be a chance of saving his life by providing immediate medical assistance which will be incorporated in the ambulance. This is how the project's accident detection is achieved.

The project includes a fingerprint module, an alarm (buzzer), GPS, and GSM module for theft control. When unusual activity occurs in the surroundings of the vehicle, the man who is trying to steal will be required to impress his finger into the fingerprint module, where he will be permitted five to six attempts. Obviously, he will fail in the attempts, he will give up his plan to steal the vehicle; however, if he continues to impress his finger, the controller will activate an alarm, notifying both the user and a nearby police station of the unusual activity, allowing both to try to catch the thief and save the vehicle from the robber. Or else if he damages the vehicle lock the same action will take place mentioned above. In the worst-case scenario, if the vehicle is snatched by the thief, the vehicle positioning system will play a critical role, providing users and police officers with the exact live location of the vehicle through Google maps anytime they need it, allowing them to quickly retrieve the vehicle.

1.2 Flowchart

Describing the above flow chart for accident detection initially the system will be in normal state. if the ignition is off this particular detection system doesn't work, if the ignition is on the system continuously monitors the accelerometer sensor once the threshold exceeds and the pushbutton is not pressed the GPS coordinates will be sent, else if the pushbutton is pressed in case the GPS is requested GPS coordinates will be sent or the system will return to its original state.
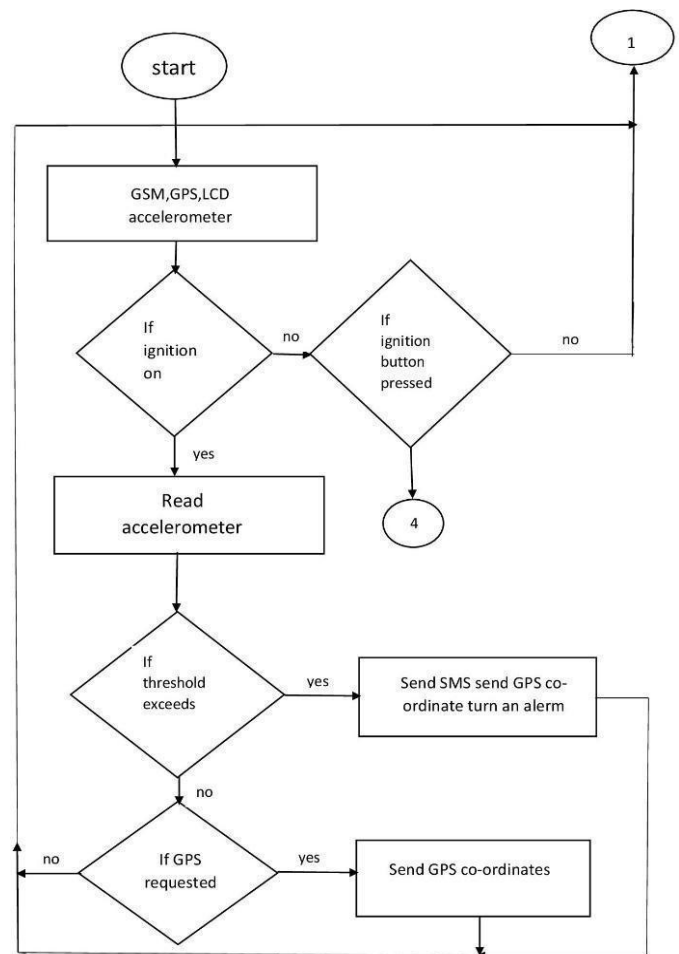
Accident detection
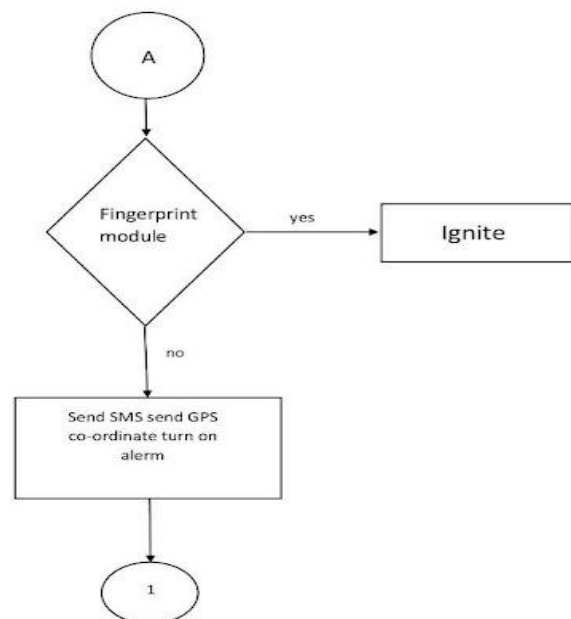
Theft control

Describing the flowchart for theft control initially the system will be in normal state if the fingerprint module accepts the fingerprint the system doesn't perform any action or else if the operation fails, if the fingerprint module is not ignited the SMS will be sent along with the GPS coordinates.

3. CONCLUSIONS

When the user requests it, the GPS module will send the vehicle's current location coordinates. If the user is safe, then the alarm will be activated, and if he discard the alarm, the SMS will not be sent to the appropriate authorities; otherwise, the SMS will be sent to the rescue team (Police authorities, Ambulance etc.) If the vehicle is stolen, the owner should be notified via SMS or alarm and also he can monitor the live location of his vehicle at any time. By going through all these papers we came to know that many of them have not integrated 3 features in one project so we are going to develop all three features like accident detection, theft control, vehicle positioning in the single model, so that our project will provide higher end security to the user and vehicle, also we have observed that for theft control they have not included higher end encryption module, so we are increasing the security of a vehicle by implementing a fingerprint module in which user can only access the vehicle, also in case of theft the police will be notified regarding the vehicle theft so that police can take action immediately.

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