Android accident detection and alert system

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Abstract. Android smartphone app will automatically detect the accident that will be occurred. The app immediately retrieves the GPS location and activates an alarm screen. With one tap, the user can request emergency assistance. The app calls the local emergency number and sends SMS alerts to predefined contacts. The alerts provide accident details including location coordinates, number of passengers, and crash characteristics. Development challenges include accurately identifying crashes across varying conditions while minimizing false positives, integrating with onboard vehicle systems for additional data, addressing cybersecurity risks, optimizing for minimal battery usage, and easing privacy concerns over data collection. If technical obstacles can be overcome, such an automated crash detection and emergency alert app could help expedite emergency responses and improve road safety outcomes. Intended as an low-cost, scalable supplementary crash alert system, it has the potential to save lives worldwide.

1 Introduction

There are many accidents that are occuring all over the world. Many people get hurt or even die from these crashes. It is important to get help to accident scenes as fast as possible to save lives. This paper is about making an Android app that can automatically detect a vehicle accident and quickly call for help. The app would use the phone's sensors like the accelerometer and GPS[1]. When a crash happens, the app would detect the sudden stop and impact forces. It would know the exact location from the phone's GPS.The algorithm assesses the impact or sudden deceleration and determines the accident's severity before initiating the emergency response procedure. AADAS transmits a distress signal to emergency dispatch centers in an instant. them to tailor their response accordingly. This knowledge will prove invaluable in saving various peoples lives and decreases the consequences of accidents.

2 Literature Review

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The braking distance has a multiple relationship with velocity, means it increases much faster than its velocity. This is why driving at higher speeds requires significantly longer stopping distances[2]. Consequently, the likelihood of avoiding a collision diminishes. A tabular column is provided for predicting the maximum speed, factoring in deceleration. If the vehicle's speed falls below these calculated maximum speeds, it is assumed that an external force caused deceleration, indicating an accident[3]. While speedometers can identify speed drops, using a GPS eliminates the need for an analog-to-digital converter[5]. The GPS continuously calculates the vehicle's speed, and if there's a decrease in the speed values, an alarm is triggered for accident detection[10]. A 5-second window is provided to abort the emergency; otherwise, the system alerts the Alert Service Centre, sharing the accident location via the received GSM number for timely rescue efforts[8].

3 Implementation of The System

3.1 Requirements for Software and Hardware

3.1.1 *Software Requirements*

- Compatibility
- Integration
- GPS Integration
- User Authentication

3.1.2 Hardware Requirements

- Cellular modem
- GPS module
- GSM module
- Accelerometer and Gyroscope
- Vibration Sensor
- Alert button
- Enclosure

4 Visualisati on and Analysis

4.1 Images Showing Output Screens

The following figure.1 shows the output screen of the Login Page in an Android Mobile Phone.

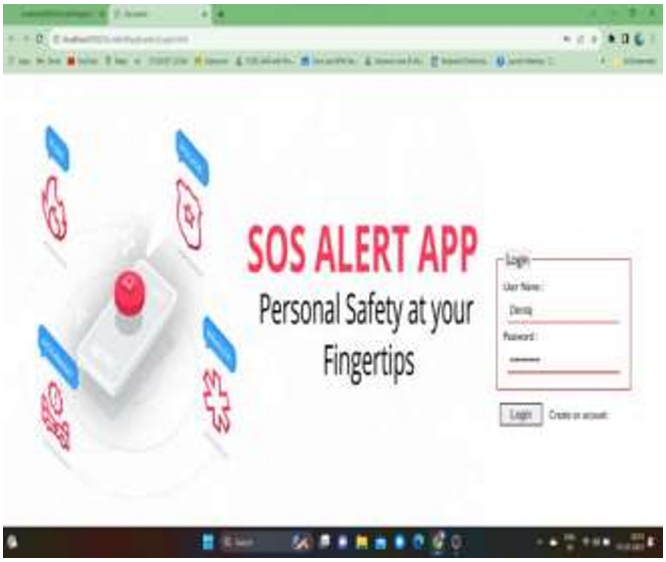

Fig. 1. Output Screen of the Login page

The following figure.2 shows the output screen of the Register Page after completion of the Login Authentication.

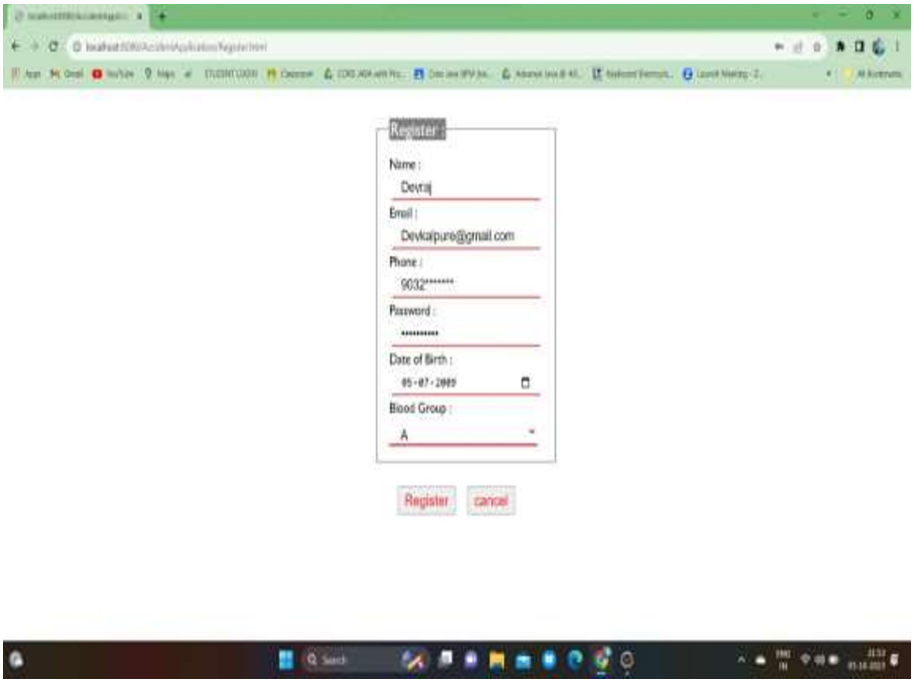

Fig. 2. Output Screen of theRegister page

The following figure. 3 shows the output screen of the Home Page with the details about

information and Emergency.

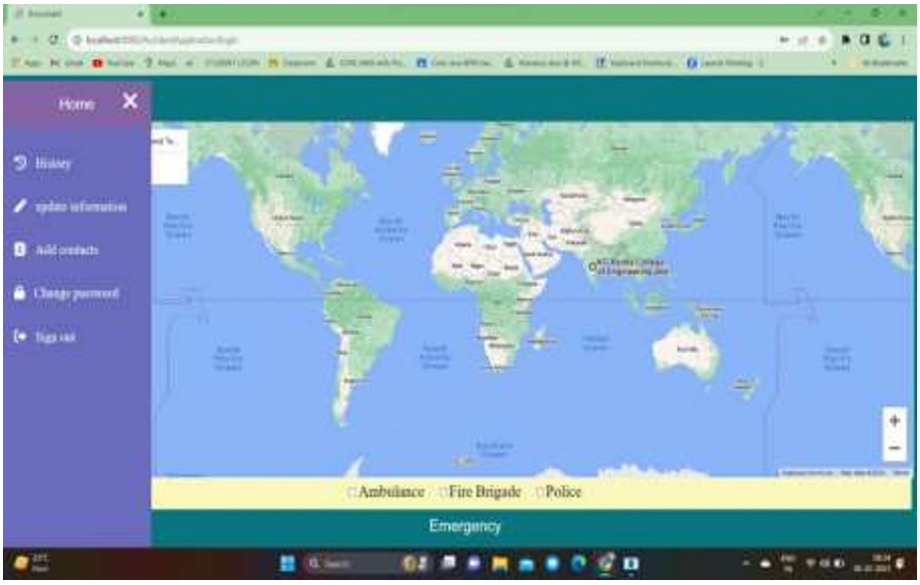

Fig 3. Output Screen of theHome Screen

The following figure.4 shows the output screen of the User Location by using GPS.

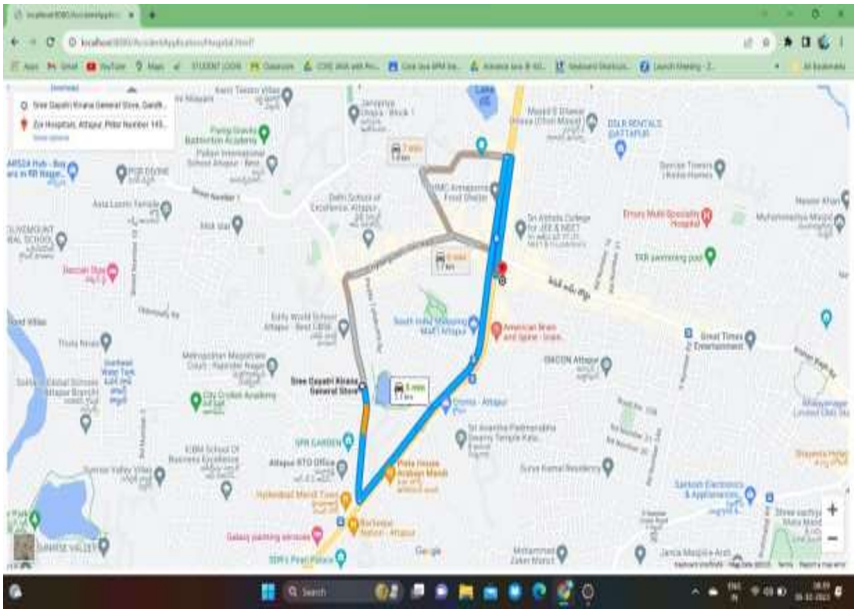

Fig. 4. Output Screen of the User Location

The following figure.5 shows the output screen of the Warning page

Fig. 5. Output Screen of the Warning page

5 Result

Accelerometers and gyroscopes detect crashes and rollovers by sensing abrupt changes in movement and orientation. GPS provides real-time location data to pinpoint the accident site for emergency responders. Cellular modules like GSM or LTE enable wireless connectivity to phone networks. Microcontrollers process sensor data, run detection algorithms, and control system operation. Sufficient onboard memory and storage allow the system to run software and log data. Rugged enclosures protect the electronics from damage in a crash. Backup batteries supply power if vehicle electricity is lost. Automated SMS and phone call alerts to emergency services reduce response times. Alert messages can include accident location details from GPS. GSM modules provide global 2G connectivity for simple voice and text alerts. LTE modems enable faster 4G data transmission and more advanced messaging. Overall, the system leverages sensors and wireless technology to quickly summon help after accidents, saving lives.

6 Conclusion

In conclusion, an effective Android-based accident detection and alert system requires several key hardware components. A low-power microcontroller manages the sensors, processes data, and controls the system functions. Sufficient memory and storage are needed to run the detection algorithms and software.All the electronics should be enclosed in a rugged, automotive-grade enclosure that can withstand vibration, shock and temperature extremes inside a vehicle. A backup battery supplies power if the vehicle's electrical system is damaged.The system leverages the built-in sensors and wireless connectivity of an Android device to detect accidents and automatically notify emergency responders of the incident location. This can greatly reduce emergency response times and save lives. With thoughtful hardware design and data analysis, such systems have the potential to make driving much safer.

7 FutureScope

Expand sensor capabilities - Add additional sensors like cameras, infrared sensors, microphone arrays to gather more data about the accident scene and injuries. This can improve situational awareness.
Enhanced algorithms - Use machine learning and AI techniques to improve the accuracy of crash detection and reduce false alerts. Train models on real-world crash data.
Detailed accident reports - Provide in-depth post-accident reports documenting sensor logs, G-forces, collision objects, etc. to aid insurance/legal processes.
Crash reconstruction - Use collected sensor data to digitally reconstruct the accident sequence and dynamics. This can provide valuable insights.
Enhanced alerts - Expand two-way communication with emergency services, share photos/video, injury assessment data for better response.

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