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IOT BASED ACCIDENT DETECTION SYSTEM

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Abstract - IoT-based accident detection systems are gaining traction as an innovative approach to prevent road accidents. These systems utilize interconnected sensors and devices to collect real-time data that can detect potential collisions and alert the authorities in case of an accident. This report highlights the advantages of IoT-based accident detection, including its ability to provide instant alerts, enable quick emergency response, and generate data for analysis and insights. The report emphasizes the potential of these systems to significantly reduce the number of accidents and save lives by leveraging the power of IoT in enhancing road safety. The scalability, flexibility, and integration capabilities of IoT-based accident detection systems are also highlighted. The findings emphasize the promising potential of IoT-based accident detection as a key advancement in the field of road safety and a critical tool for accident prevention strategies.

***Key Words*:** Accident, detection, sensors, devices, instant alerts, quick emergency response, data, analysis, insights

1.INTRODUCTION

Road accidents continue to be a pressing global issue, causing immense loss of life, in juries, and property damage. Prompt and effective emergency response is critical in mit igating the impact of accidents and saving lives. However, traditional accident reporting mechanisms may suffer from delays, inaccuracies, and limited coverage, which can hinder timely intervention. To address these challenges, an Internet of Things (IoT) based accident detection system is proposed in this project.

The proposed system utilizes the advancements in IoT, sensor technologies, and com munication networks to enable real-time detection of accidents and automatic alert gener ation. It employs Arduino Uno as the main controller board, and integrates GPS and GSM modules for location tracking and SMS alerting, as well as tilt, impact, and fire sensors for accurate detection of various accident scenarios. ESP32 CAMs are installed around the vehi cle and triggered by the sensors to capture images of the accident scene. When an accident is detected, the system sends SMS alerts with GPS location and vehicle details to emergency services and registered contacts, and captures images of the accident scene using triggered cameras, which are sent as email alerts.

The proposed system aims to provide a reliable and efficient solution for accident detec tion, notification, and emergency response, leveraging the capabilities of IoT technologies. The insights gained from this project are expected to contribute to the field of road safety and emergency services, and can be valuable for researchers in the transportation domain.

2. WORKING

The proposed system is designed to work in two scenarios: when the vehicle is parked or when it is traveling. It utilizes an Arduino Uno as the main controller board, along with GPS and GSM modules for location tracking and sending SMS alerts. Tilt, impact, and fire sensors are connected to the Arduino Uno to detect the tilt, crash, or impact of another vehicle on the system-enabled vehicle, as well as to detect fire. ESP32 CAMs (cameras) are installed around the vehicle and triggered by the impact and tilt switches.

The working of the proposed system can be described in the following steps:

1. Detection of Events: The system constantly monitors the status of the vehicle using the connected sensors. When an event such as a crash or impact is detected by the tilt, impact, or fire sensors, the Arduino Uno receives the corresponding signal from the sensors.

2. Retrieval of GPS Location: Upon receiving the signal from the sensors, the Arduino Uno retrieves the GPS location of the vehicle using the connected GPS module. The GPS module provides the accurate latitude and longitude coordinates of the vehicle's current location.

3. Sending SMS Alerts: Once the GPS location is obtained, the Arduino Uno uses the con nected GSM module to send SMS alerts to the emergency services and registered con tacts. The SMS includes information such as the GPS location, vehicle details, and owner's information. This allows for real-time alerts to be sent to relevant parties about the detected event.

4. Triggering of Cameras: In parallel with sending SMS alerts, the Arduino Uno also trig gers the connected ESP32 CAMs (cameras) installed around the vehicle. The cameras capture images of the accident scene or event and store them for further use.

5. Emailing of Images: The captured images from the cameras are sent as emails to desig nated recipients, providing visual evidence of the accident scene or event. This can be useful for accident investigations and providing additional information to emergency services or registered contacts.

6. System Reset and Standby: After the event has been detected, SMS alerts sent, and images captured and emailed, the system resets and goes back to standby mode, ready to detect and respond to any future events.

Fig -1: Vehicle Body

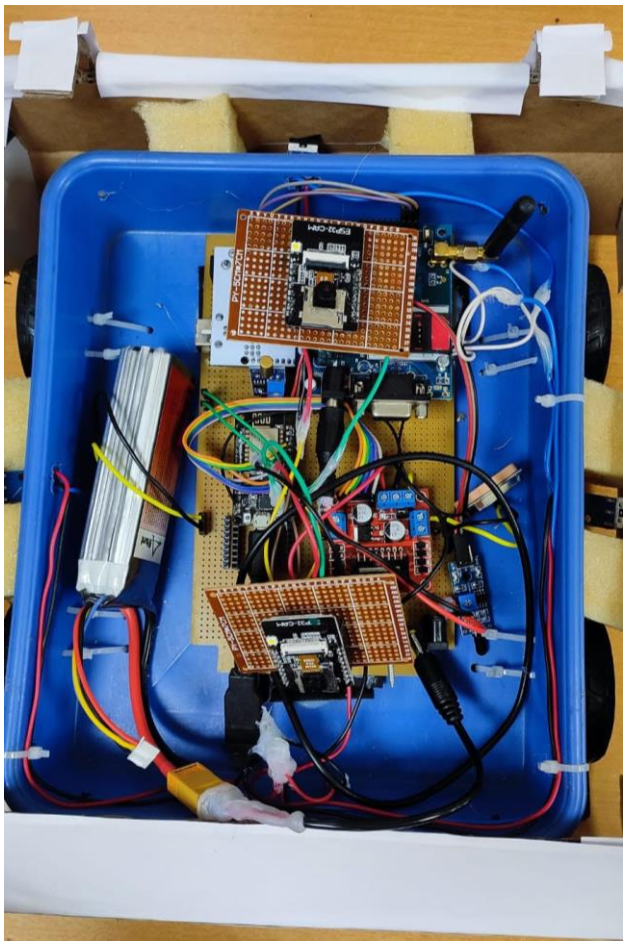

Fig -2: Circuit

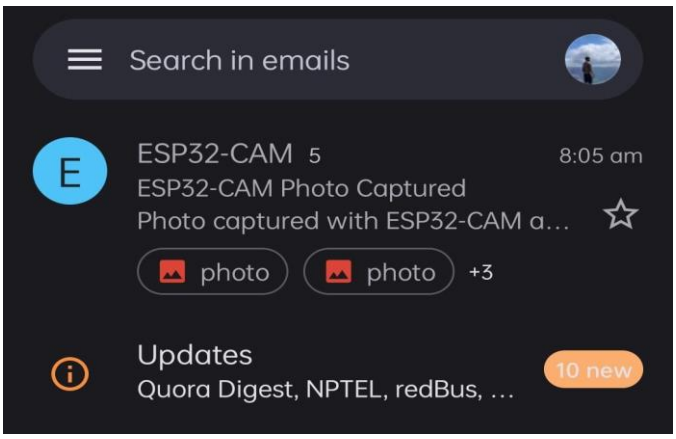

Fig -3: Email Received

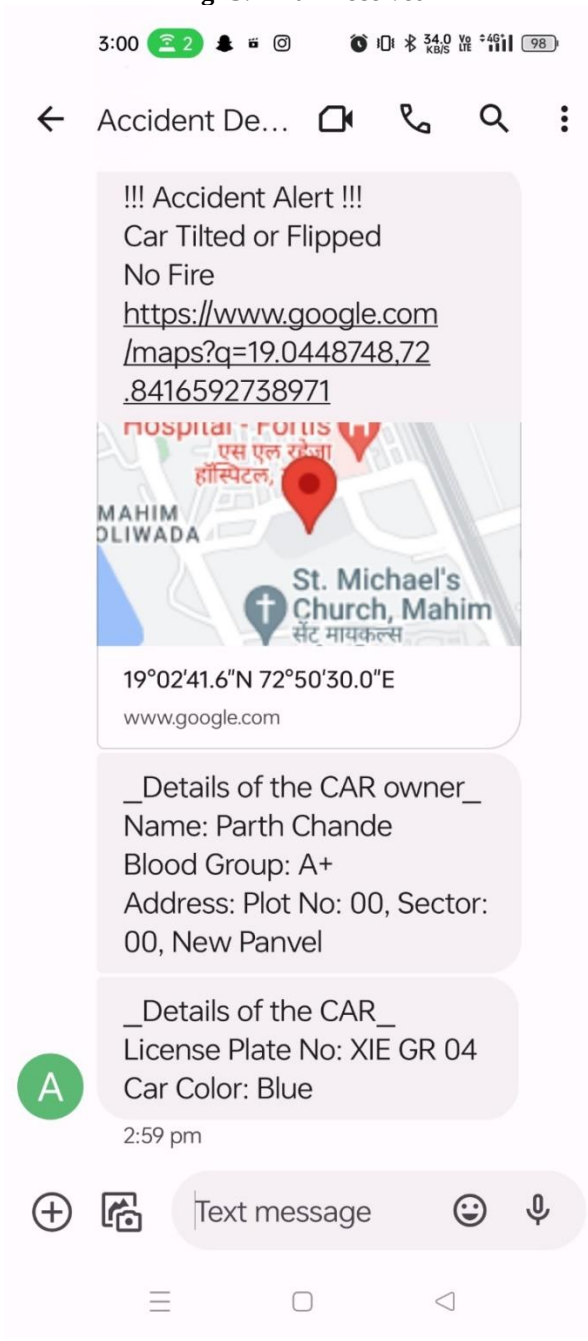

Fig -4: Text Message (Vehicle Flipped)

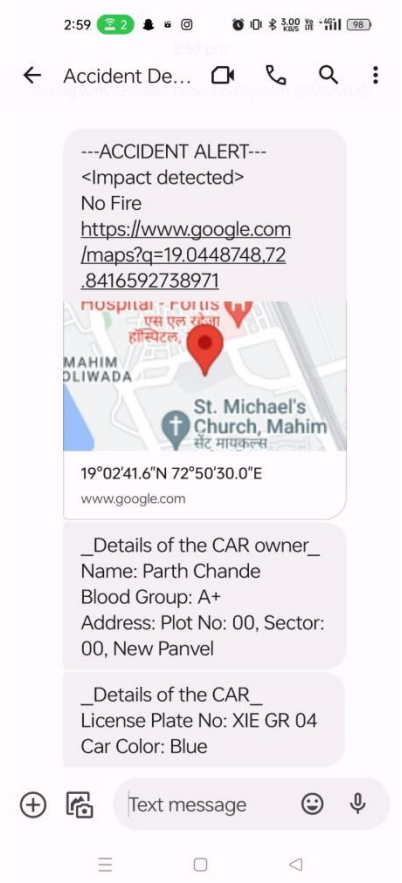

Fig -5: Text Message (Vehicle Crashed)

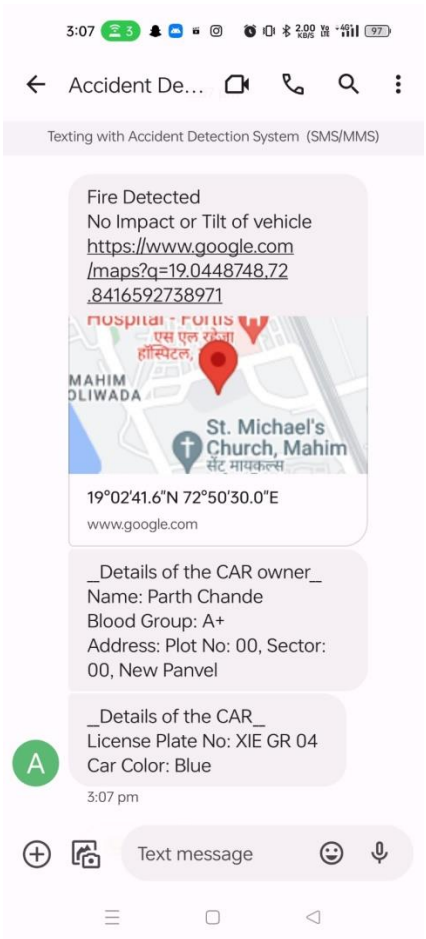

Fig -6: Text Message (Fire Detected)

3. CONCLUSIONS

The proposed system is designed to provide comprehensive accident detection and re sponse capabilities in both parked and traveling scenarios. By utilizing an Arduino Uno as the main controller board, along with GPS and GSM modules for location tracking and SMS alerts, as well as tilt, impact, and fire sensors for detecting various types of accidents, the system aims to provide real-time alerts and visual evidence to aid in rescue operations and accident investigations. The integration of ESP32 CAMs triggered by impact and tilt switches allows for capturing images of the accident scene, which can be sent as emails along with the SMS alerts containing GPS location, vehicle details, and owner's information to the emer gency services and registered contacts. Overall, the system seeks to enhance the efficiency and effectiveness of accident response and investigation processes by leveraging IoT tech nologies for timely and accurate information dissemination, contributing to improved road safety and emergency management.

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