Road Accident Rescue System Implementation

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ABSTRACT

The "IoT-Based Road Accident Rescue System" is an innovative project designed for enhancing emergency response in smart cities. This system utilizes Internet of Things (IoT) technology, integrating an ADXL sensor for detecting abnormal accelerations indicative of a road accident. In the event of a detected accident, the system uses a GSM module to send an emergency message to a predefined number. This project aims to improve the efficiency of accident response systems in urban areas, contributing to increased safety and reduced response times.

Keywords: ADXL Sensor, GSM Module, Power Source, ThingSpeak, Microcontroller Unit.

1. INTRODUCTION

The "IoT-Based Road Accident Rescue System" employs IoT technology, utilizing an ADXL sensor for real-time accident detection. In the event of an accident, a GSM module sends an emergency message to a predefined number, enhancing emergency response in smart cities and reducing response times.

In recent years, the increasing rate of road accidents has posed a significant challenge to public safety and emergency response systems. In response to this pressing issue, there is a growing need for innovative technologies to enhance the efficiency and effectiveness of rescue operations. The integration of the Internet of Things (IoT) into road accident rescue systems represents a ground breaking approach to address these challenges.

The IoT-based Road Accident Rescue System is designed to leverage interconnected devices and sensors to facilitate swift and accurate responses to road accidents. By seamlessly integrating smart devices, vehicles, and communication networks, this system aims to revolutionize the way emergency services are coordinated and delivered.

2. LITERATURE REVIEW

Smart Sensors and Devices: Embedded sensors in vehicles and on roads collect real-time data related to accidents, such as impact force, location, and severity.Wearable devices for drivers and passengers transmit vital health data to emergency services, enabling better-informed medical responses.

Communication Networks: High-speed and reliable communication networks facilitate instant data transfer between vehicles, emergency services, and centralized control centers. 5G technology plays a crucial role in ensuring low-latency communication, enabling rapid response times.

Data Analytics and AI: Advanced analytics processes the vast amount of data collected, providing actionable insights to emergency responders.Artificial Intelligence algorithms predict accident severity, optimize route planning for emergency vehicles, and assist in resource allocation.

Automated Emergency Notifications: The system automatically detects and notifies emergency services about accidents, reducing response time and increasing the chances of saving lives.Integration with existing emergency response systems ensures seamless coordination with law enforcement, medical personnel, and other relevant agencies.

Vehicle-to-Everything (V2X) Communication:V2X communication allows vehicles to exchange information with each other and with the surrounding infrastructure, enabling proactive accident prevention measures.

User-Friendly Mobile Applications: Mobile applications provide a user-friendly interface for reporting accidents, checking real-time traffic updates, and accessing emergency services.Citizens can contribute to the system by providing valuable information and receiving alerts about potential hazards on the road.

ThingSpeak Integration: Sends real-time updates to ThingSpeak for remote monitoring and analysis.
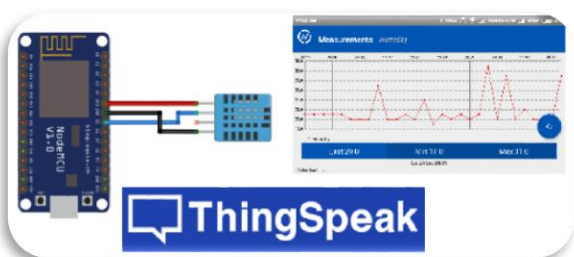
Software Tools for Road Accident Rescue System & Hardware Tools for Road Accident Rescue System

Microcontroller Programming: programs a microcontroller to process data ADXL Sensor, GSM

Module, Power Source and communicate with ThingSpeak

The Internet of Things (IoT) holds tremendous potential across various industries and applications, and its use in a road accident rescue system can significantly enhance the efficiency, effectiveness, and overall safety of emergency responses. Here are key use cases for IoT in such a system:

- ADXL sensor
- GSM module
- Emergency Responce
- Alcohol Sensor
- Smart Cities
- Real-time accident detection

3.EXISTING SYSTEM

ADXL Sensor: It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

GSM module: Plays a crucial role in the communication between devices and the GSM network.

Alcohol Sensor: When a drunk person breathes near the alcohol sensor it detects the ethanol in his breathe and provides an output based on alcohol concentration.

Smart cities: A smart city uses Internet of Things (IoT) sensors in urban areas to collect data and automate systems such as traffic, energy use, and waste management**.**


Real-Time Accident Detection: Smart sensors installed along roads and highways can detect abnormal events, such as sudden changes in speed, collision impact, or unusual patterns in vehicle behavior.

How Road Accident Resuce System Works In IOT: Road accidents are one of the biggest problems in the world, in which many precious lives have been lost. This work proposes a road vehicle accident detection system with location alerts to rescue accident victims.


 Emergency response: An immediate, systematic response to an unexpected or dangerous occurrence.
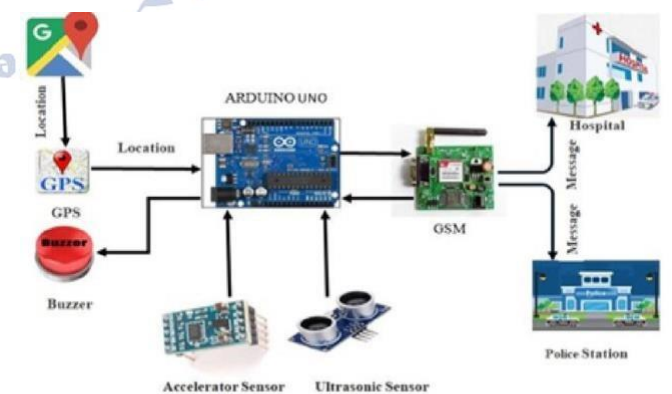
The main hardware modules include the MPU9250, a 9 degree-of-freedom (9-DoF) micro electro mechanical system (MEMS) based inertial measurement unit (IMU), Arduino nano with ESP8266 microcontroller and GPS.

The IMU's three axis accelerometer, gyroscope and magnetometer data are programmed to determine the orientation and position of the vehicle.
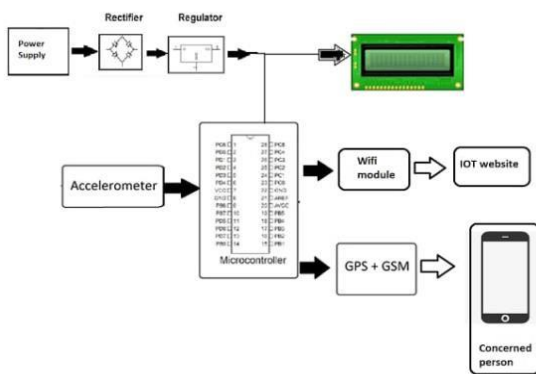
A Wi-Fi-based communication is established using ESP8266 to send data received from sensor units to Google Firebase cloud servers in real-time. The performance of the developed device has been evaluated using a laboratory setup and also in real-time driving scenarios. The developed sensor module performs well on accident detection and emergency alert generation, which can be used in vehicles to save many lives in the event of an accident through its automatic alert service.

Example Model For Road Accident Resuce System: The controller get the input from sensors and send the accident alert information to road side unit and then message is send to the rescue team and also WIFI and GPS finds location of the vehicle and that also send to the rescue team.
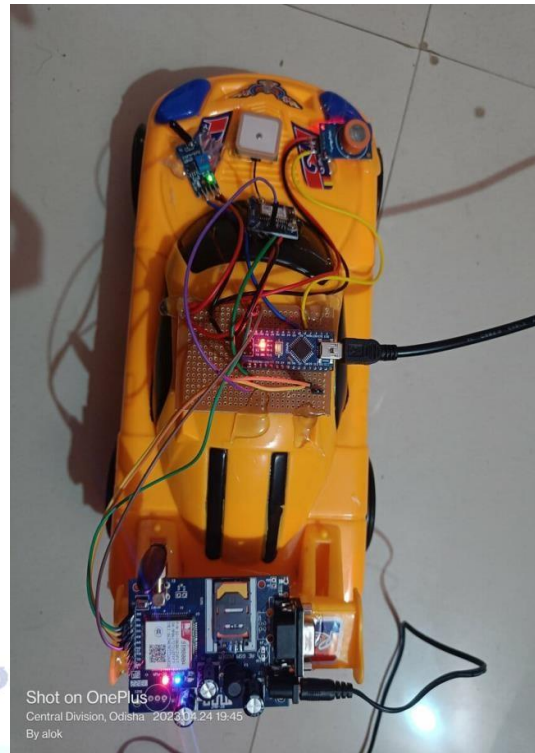
Notification:

The notification about the accident is sent to the user and it is also updated in the IoT. The client-side representation where the individual receive the message or the notification from the data end which is noted as the vendor side for the individual based on the duration of the vehicle involved in the accident is been laid based on the slab scheme where the individual gets the location of the accident occurred during the time extended the individual is shown in the Fig.

Accident Location sent through SMS.

4. CONCLUSION:

The IoT-Based Road Accident Rescue System represents a significant advancement in urban emergency response. Real-time accident detection and prompt alerting contribute to increased safety and reduced response times, addressing the challenges of existing systems. The proposed IoT-Based Road Accident Rescue

System integrates an ADXL sensor with a GSM module for real-time accident detection and emergency alerting. The ADXL sensor continuously monitors accelerations, and if it detects abnormal values indicative of a road accident, the system uses the GSM module to send an emergency message to a predefined number. This project aims to enhance the responsiveness of emergency services in smart city applications.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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