AUTOMATIC ACCIDENT DETECTION AND AMBULANCE RESCUE SYSTEM

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Abstract: The Intelligent Accident Detection and Ambulance Rescue System (IADR) aims to enhance emergency response efficiency by utilizing advanced technology for timely accident detection and swift dispatch of medical aid. In recent years, the rapid development of the Internet of Things (IoT), machine learning algorithms, and real-time communication systems has paved the way for innovative solutions in emergency services. The proposed system consists of three main components: accident detection, emergency signal generation, and ambulance dispatch. Firstly, utilizing IoT sensors and vehicle-mounted cameras, the system detects accidents in real time based on sudden changes in velocity, abnormal vehicle orientation, or impact force. Once an accident is detected, the system generates an emergency signal containing precise location coordinates and critical information about the accident, such as severity and number of casualties.

IndexTerms - Accident detection, Abnormal vehicle orientation, Emergency signal generation, IoT sensors, Traffic management integration, Wireless communication.

1 INTRODUCTION:

1.1 Traffic Challenges in India:

India, with its burgeoning population and rapidly expanding urban centers, is facing a significant challenge in managing the escalating traffic congestion across its road networks. The country's economic growth, coupled with urbanization and the increasing affordability of vehicles, has led to a surge in the number of cars, motorcycles, and commercial vehicles on the roads. This unprecedented growth in vehicular population has outpaced the development of infrastructure and transportation management systems, resulting in severe traffic gridlock in many cities and highways. Despite recognizing the urgency of addressing this issue, the management of traffic in India often falls short due to various systemic challenges. These challenges include inadequate road infrastructure, insufficient public transportation options, ineffective traffic management strategies, and limited enforcement of traffic regulations. Additionally, rapid urbanization and unplanned development exacerbate the complexities of managing traffic flow and ensuring road safety

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1.2 Causes of Road Accidents in India:

Human Error:

Human error remains a significant contributing factor to accidents in India. This includes reckless driving, over speeding, driving under the influence of alcohol or drugs, fatigue, and distractions such as mobile phone usage while driving.
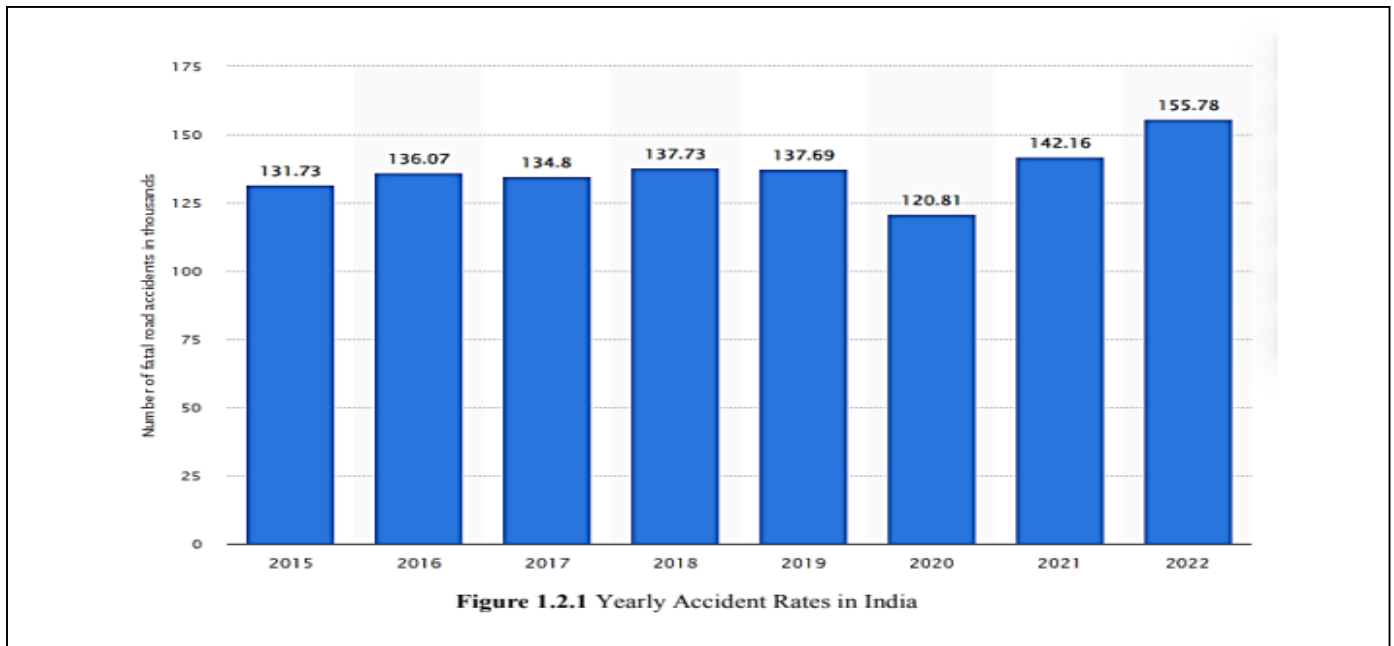
Poor Road Infrastructure:

Many roads in India suffer from poor design, inadequate maintenance, and lack of proper signage or lighting. Potholes, uneven surfaces, and m narrow roads contribute to accidents, particularly in rural areas.

Non-Adherence to Traffic Rules:

Many drivers in India disregard traffic rules and regulations, such as lane discipline, traffic signals, and speed limits. This disregard for traffic laws contributes to chaotic road conditions and a higher incidence of accidents.

Inadequate Emergency Response:
Delays in emergency response and inadequate medical facilities along highways can exacerbate the severity of injuries sustained in accidents, leading to higher mortality rates.

Figure 1.2.1 Yearly Accident Rates in India

Addressing these factors requires a multi-pronged approach, including stricter enforcement of traffic laws, investments in road infrastructure and safety measures, public awareness campaigns, improved emergency response systems, and measures to promote responsible driving behavior among motorists.

1.3 Aim behind the project:
The aim of an Accident Detection and Ambulance Rescue System (ADARS) is to enhance public safety and reduce the response time of emergency services in the event of road accidents. This system integrates advanced technologies, such as IoT sensors, real-time communication networks, Machine learning algorithms, to achieve its objectives.

2 LITERATURE SURVEY:
[1] **Title**: "A Review on Accident Detection and Alert Systems for Motorcyclists " Authors: Pradeepa, P., et al. Publication: International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT) Year: 2020 Summary: This paper provides an overview of accident detection and alert systems specifically designed for motorcyclists. It reviews various technologies and methodologies employed in these systems, including IoT sensors, smartphone applications, and wearable devices. The study evaluates the effectiveness of existing solutions and discusses challenges and future research directions.

[2] **Title**: "A Survey on Accident Detection and Emergency Response Systems Using IoT and Machine Learning" Authors: Deshpande, S. S., et al. Publication: International Journal of Computer Applications Year: 2019 Summary: This survey paper explores the integration of IoT and machine learning techniques in accident detection and emergency response systems. It discusses the architecture, components, and communication protocols used in these systems .The paper also reviews the role of machine learning algorithms in improving the accuracy and efficiency of accident detection and ambulance dispatch.

[3] **Title**: "Smart Vehicle Accident Detection and Notification System Using IoT and Android Application" Authors: Munde, V. P., et al. Publication: International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE) Year: 2018 Summary: This paper presents a smart vehicle accident detection and notification system based on IoT and an Android application. It describes the design and implementation of the system, which uses accelerometer sensors to detect accidents and sends alerts to emergency contacts via SMS or calls. The study evaluates the system's performance and usability.

[4] **Title**: "A Review of Smart Accident Detection Systems for Vehicular Communication Networks" Authors: Khan, M. F. A., et al. Publication: Procedia Computer Science Year: 2018 Summary: This review paper examines smart accident detection systems deployed in vehicular communication networks. It discusses different approaches, such as roadside infrastructure-based systems and vehicle-to-vehicle communication systems, and evaluates their effectiveness in detecting accidents and facilitating emergency response. The study also identifies challenges and opportunities for future research in this area.

3 RESEARCH METHODOLOGY:

This proposed system aims to leverage Internet of Things (IoT) technology to enhance the efficiency of accident detection and ambulance rescue operations. By integrating IoT sensors, real-time communication, and data analytics, the system will enable swift detection of accidents, precise location tracking, and rapid dispatch of emergency services, thereby reducing response times and saving lives.

IoT Sensor Network:

The system will utilize a network of IoT sensors installed in vehicles and along roadways to detect accidents. These sensors will be equipped to detect sudden changes in velocity, abnormal vehicle orientation, and impact force, allowing for accurate accident detection in real-time.

Real-Time Communication:

Upon detecting an accident, the IoT sensors will transmit emergency signals to a centralized control center via wireless communication protocols such as GSM or LTE. These signals will contain vital information including the location of the accident, severity assessment, and the number of vehicles involved.

Emergency Response Coordination:

The centralized control center will coordinate with emergency services including police, ambulance, and fire departments to facilitate a swift response. Automated alerts will be sent to nearby hospitals to prepare for incoming patients, ensuring seamless coordination and timely medical treatment.

4 Circuit Diagram:
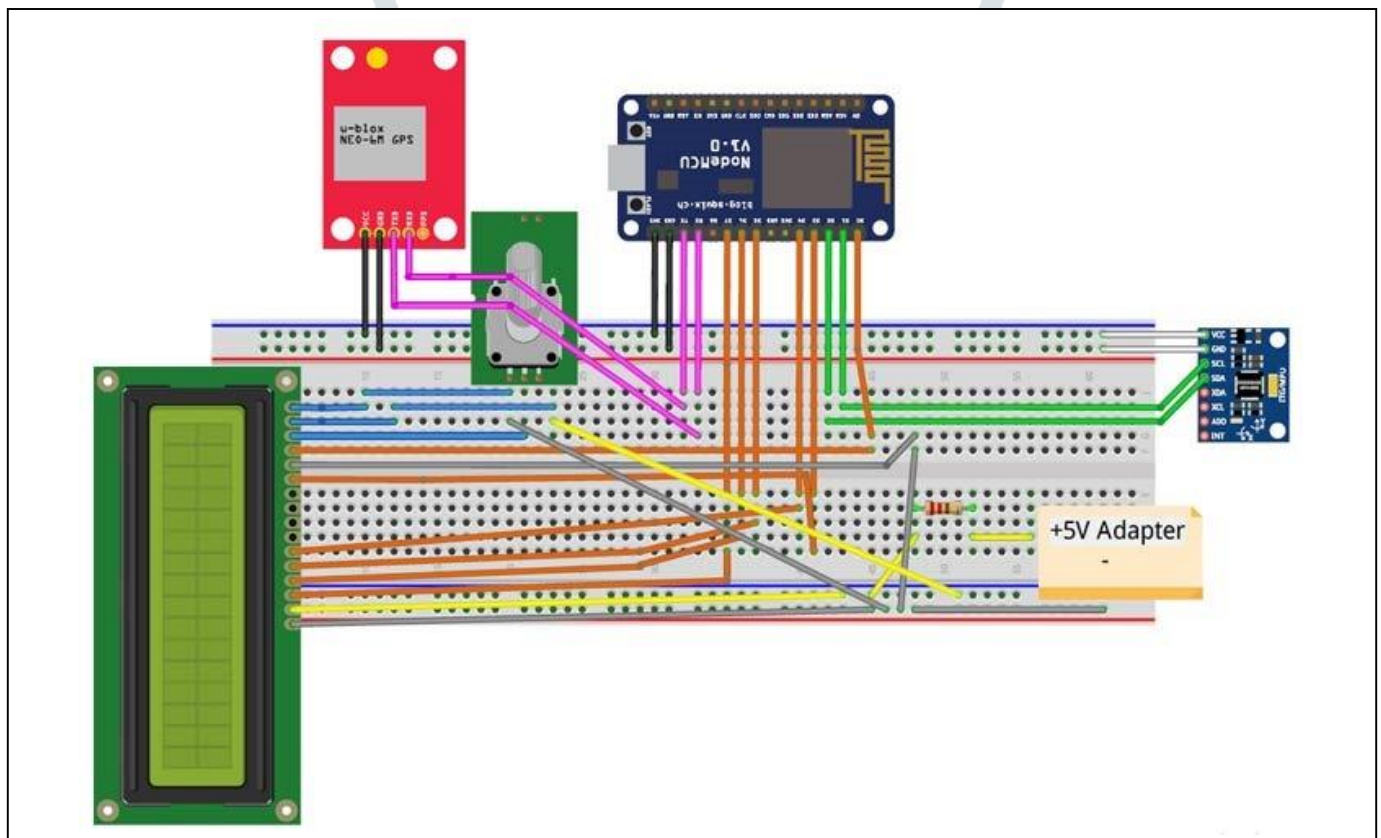
5 SENSOR CONNECTIVITY:
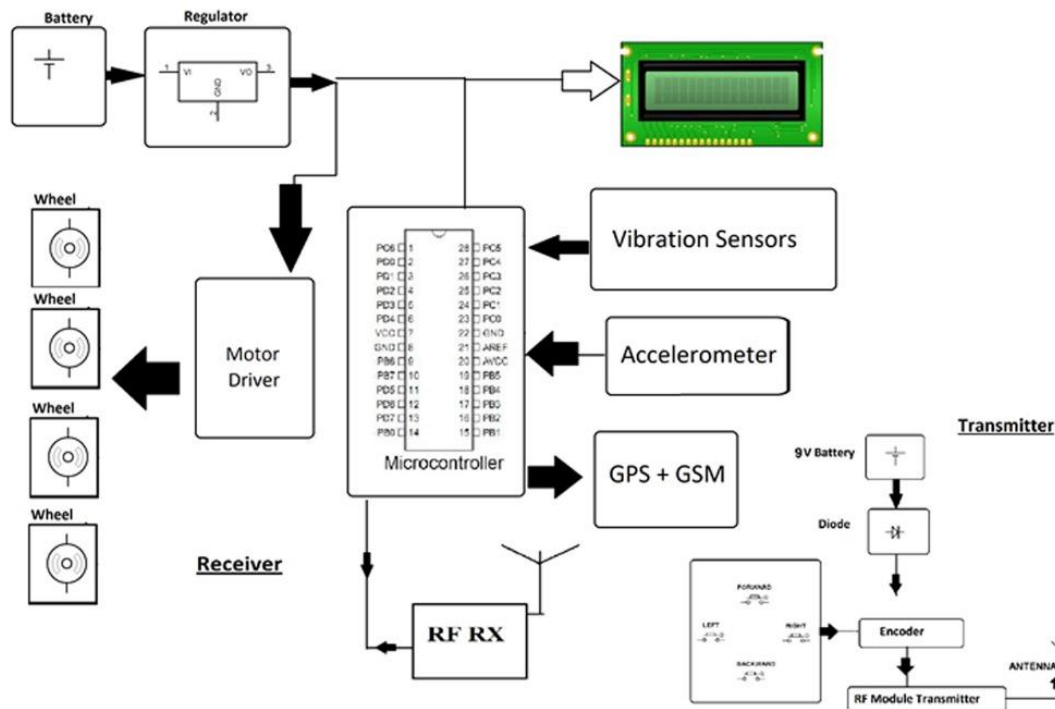
By implementing this IoT-based Accident Detection and Ambulance Rescue System, we aim to revolutionize emergency response mechanisms, minimize response times, and ultimately save lives on the roadways. This proposed system represents a significant step towards enhancing road safety and improving the overall efficiency of emergency services.

6 RESULTS:
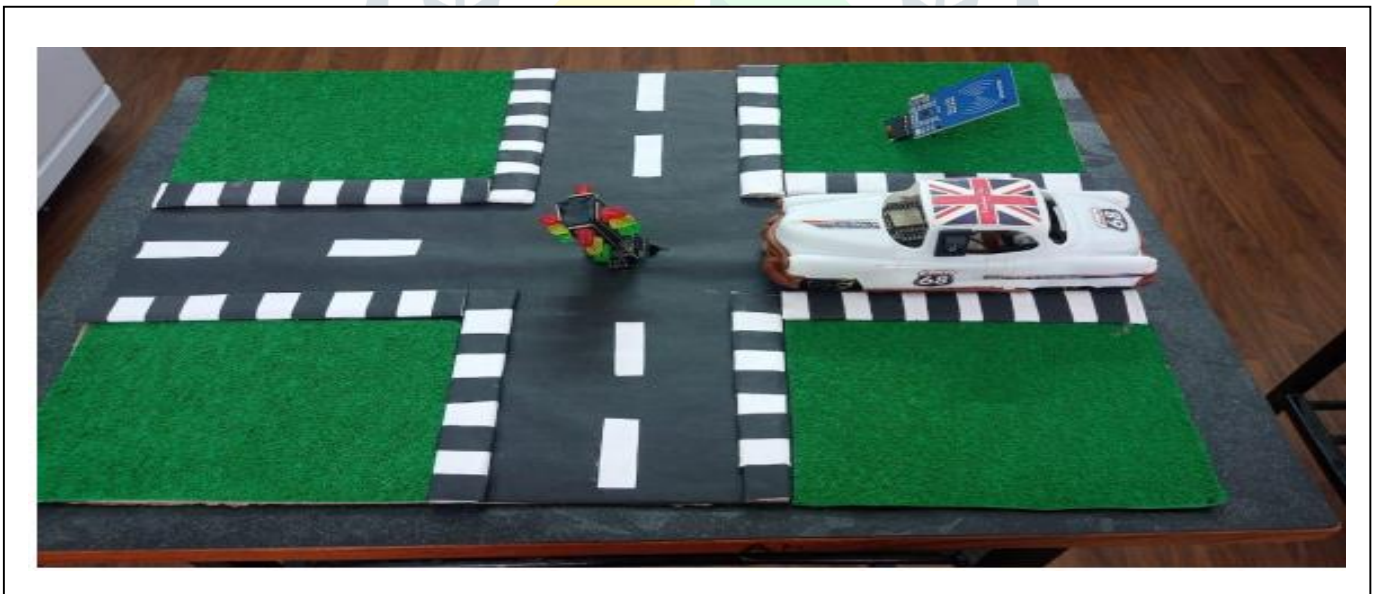
7 CONCLUSION:

Accident Detection and Ambulance Rescue Systems represent a crucial advancement in enhancing road safety and emergency response effectiveness. By leveraging technologies such as the Internet of Things (IoT), real-time communication, and machine learning algorithms communication, and machine learning algorithms, these systems offer the potential to significantly reduce response times to accidents, thereby saving lives and minimizing injuries. Overall, Accident Detection and Ambulance Rescue Systems have the potential to revolutionize emergency response mechanisms, making roadways safer for all users. However, their successful implementation requires collaboration between stakeholders, including government agencies, technology developers, and transportation authorities, to overcome challenge such as infrastructure limitations and regulatory hurdles. With continued innovation and investment, these systems can play a vital role in saving lives and reducing the impact of road accidents on society.

8 REFERENCES:

1 Chen, G., Yu, J., Fu, X., et al. (2019). "Smart Vehicle Accident Detection and Reporting System Using Internet of Things." IEEE Access, 7, 119222-119230.

2 Sheng, W., Zhou, M., Yu, S., et al. (2020). "A\ Vehicle Collision Detection Method Based on Deep Learning for Internet of Vehicles." Sensors, 20(4), 1102.

3 Mungroo, R. R., Bhajanthri, P. L., & Shankar, N. (2019). "An IoT-based Vehicle Accident Detection and Notification System using AWS." Procedia Computer Science, 165, 363- 372.

4 Singh, J., Agarwal, A., & Kataria, A. (2019). "Vehicle Accident Detection and Remote Alarm System Using IoT and Cloud Computing." International Journal of Engineering and Advanced Technology, 9(2), 231-238.

5 Jangra, A., & Chawla, R. (2020). "Vehicle Accident Detection and Notification System using IoT." International Journal of Recent Technology and Engineering, 8(6), 1154-1159.

6 Zhou, X., Yu, J., Feng, Y., et al. (2019). "Smart Car Accident Detection and Tracking System Based on Video Analysis." IEEE Access, 7, 117300-117308.

7 Chandrakar, P., Choudhary, A. K., & Jain, A. (2020). "Accident Detection and Reporting System using IoT and Cloud." International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 5(1), 75-79.

8 Islam, M. S., & Hossain, M. S. (2020). "A Survey on Vehicle Accident Detection Systems using IoT and Machine Learning Techniques." Journal of Information and Communication Technology Research, 12(5), 605-619.
9 Suh, Y., Lee, J., Kim, J., et al. (2020). "Vehicle Collision Prediction System based on Deep Learning with IoT Sensors." Sensors, 20(14), 3922.

10 Lathia, T. P., Shrivastava, A., Thakkar, P. S., et al. (2019). "Vehicle Accident Detection and Rescue System Using GPS and GSM." International Journal of Computer Applications, 181(22), 25-29.

11 Roy, M., Ghosh, D., Dey, N., et al. (2020). "Smart Car Accident Detection and Rescue System Based on IoT." Wireless Personal Communications, 110(4), 2149-2168.

12 Kaur, P., & Mittal, N. (2019). "An Intelligent Vehicle Accident Detection and Rescue System using IoT and Android." International Journal of Recent Technology and Engineering, 8(4), 5294-5298.

13 Akhter, S., Rahman, M. M., Sarker, K. P., et al. (2020). "An Intelligent System for Vehicle Accident Detection and Rescue Operation using IoT and Machine Learning." In Proceedings of the 2020 IEEE International Conference on Informatics, IoT, and Enabling Technologies (IC IoT), pp. 1-6.

14 Reddy, S. R., S. R., & Banu, M. S. (2019). "Accident Detection and Alerting System for Vehicles using IoT and Raspberry Pi." International Journal of Recent Technology and Engineering, 8(3), 6291-6296.

15 Mandal, S., Mukherjee, P., & Bar, A. K. (2020). "A Smart Accident Detection and Rescue System using IoT and GSM." In Proceedings of the 2020 International Conference on Computational Intelligence and Sustainable Technologies (ICCIST), pp. 184- 189.