



Electronics and Communication Engineering

**TITLE : IOT BASED SMART AIRBAG DEPLOYMENT SYSTEM WITH
INSTANT EMERGENCY ALERT AND HOSPITAL INTEGRATION FOR
ENHANCED AUTOMOTIVE SAFETY**

UNDER THE GUIDENANCE OF,
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Objective

- ❖ The objective of the proposed Smart Airbag Deployment System is to revolutionize automotive safety by seamlessly integrating advanced components such as a reliable power supply unit, controller with sophisticated processing capabilities, precision ADXL accelerometer, GPS module, and IoT connectivity. Through precise crash event detection and swift airbag deployment, coupled with accurate location tracking and real-time communication capabilities, the system aims to enhance passenger safety and enable immediate emergency response, thereby exemplifying a holistic approach towards automotive safety optimization.

Abstract

- ❖ This research presents a groundbreaking "Smart Airbag Deployment System with Instant Emergency Alert and Hospital Integration for Enhanced Automotive Safety." The system is designed to revolutionize automotive safety by integrating cutting-edge sensor technologies, real-time communication protocols, and seamless hospital integration. The primary focus is on optimizing airbag deployment through the analysis of precise sensor data, ensuring an immediate emergency alert system for timely response, and establishing a direct link with hospital systems to expedite medical assistance. By amalgamating these elements, the proposed system aims to significantly reduce response times during critical events, ultimately enhancing overall automotive safety and contributing to a more efficient emergency medical response network. The potential impact of this system extends beyond vehicle safety, fostering a paradigm shift towards a more secure and responsive transportation ecosystem.

Existing System

- ❖ The existing system for the Smart Airbag Deployment System with Instant Emergency Alert and Hospital Integration comprises several crucial components working in concert to ensure optimal performance and safety. Among these components are the battery, voltage regulator, relay, power supply unit (PSU), and controller, each playing a pivotal role in the system's functionality. The battery serves as the primary power source, providing electrical energy to the system when the vehicle's engine is not running or during a collision event. Coupled with a voltage regulator, the battery ensures a stable power supply to the system's various subsystems, preventing voltage fluctuations that could compromise performance. Additionally, the relay acts as a switch, controlling the flow of electricity to key components such as the airbag deployment mechanism and emergency alert system. The power supply unit further regulates and distributes power to different modules within the system, ensuring consistent operation across diverse conditions. Lastly, the controller serves as the central processing unit, orchestrating the functions of the entire system, from analyzing sensor data to triggering emergency alerts and coordinating hospital integration. Together, these components form the backbone of the existing system, providing the reliability and functionality necessary to enhance automotive safety in today's dynamic driving environments.

Literature Survey

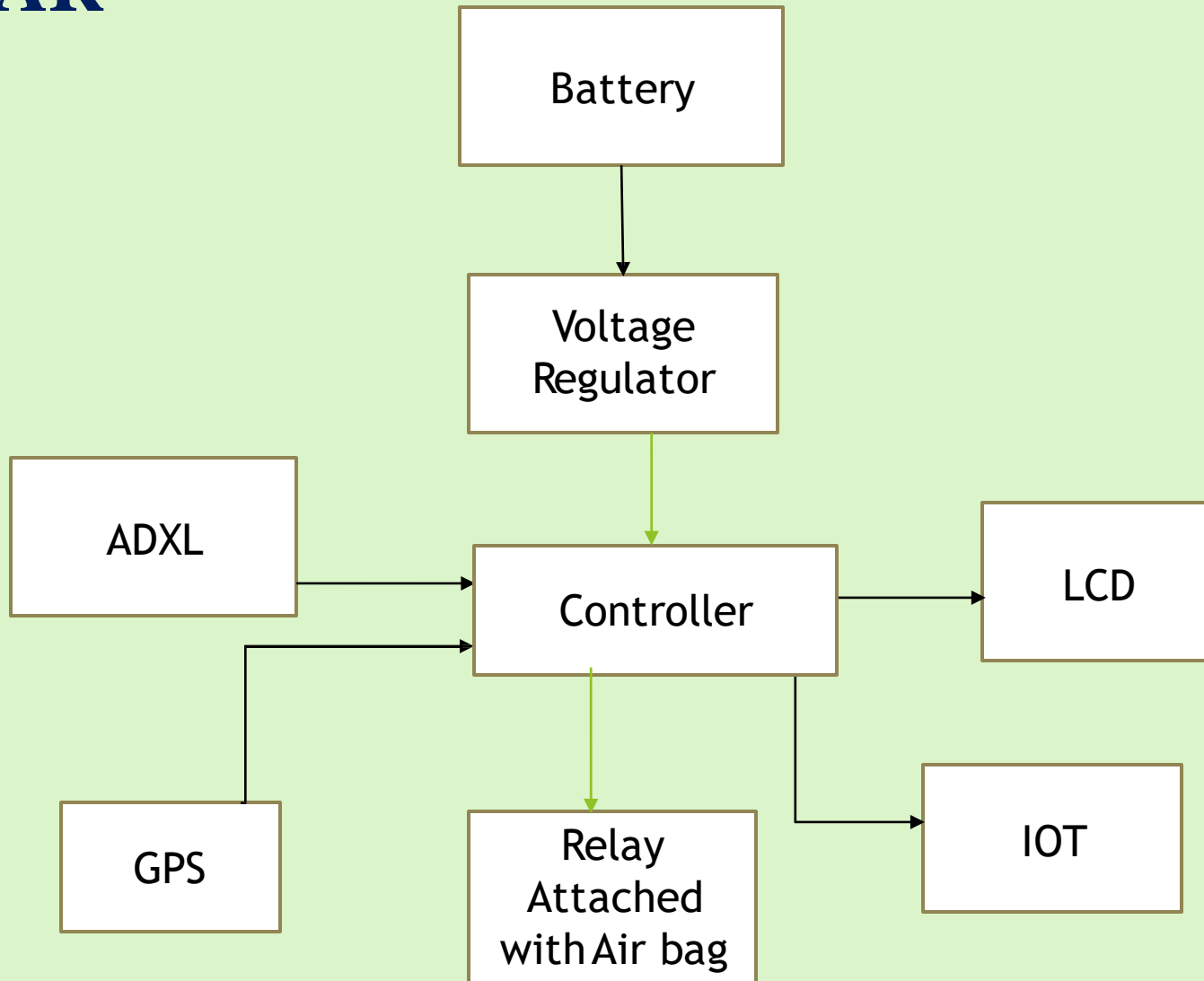
S.No	Authors	Reference Papers	Drawbacks
1	Akash Bhakat; Neetigya Chahar;V Vijayasherly	Vehicle Accident Detection & Alert System using IoT and Artificial Intelligence	False Alarms: The Vehicle Accident Detection & Alert System utilizing IoT and Artificial Intelligence may be prone to false alarms, potentially causing unnecessary panic or response efforts for non-accidental incidents.
2	L. Ramalingam; Umamagewaran Jambulingam; S. Muthumarilaksh mi; N. Malathi	IoT-Based Car Safety System With Airbag Notification for Emergency Assistance	Sensor Reliability Concerns: The IoT-Based Car Safety System's efficacy is contingent on sensor accuracy, introducing a potential drawback as sensor malfunctions or inaccuracies could result in false airbag notifications, leading to unnecessary emergency responses.

S.No	Authors	Reference Papers	Drawbacks
3	Rinika Paul; K. Deepa; M. Nithya	Implementation of Airbags and IoT-based Safety and Alert Systems in Two-wheelers	Cost Implications: The implementation of airbags and IoT-based safety systems in two-wheelers may pose a drawback in terms of increased production costs, potentially limiting affordability and widespread adoption, especially in price-sensitive markets.
4	Aini Hussain M A Hannan Azah Mohamed Hilmi Sanusi	Decision Algorithm for Smart Airbag Deployment Safety Issues	Algorithmic Uncertainties: The Decision Algorithm for Smart Airbag Deployment may encounter drawbacks associated with algorithmic uncertainties, potentially leading to suboptimal airbag deployment decisions in complex and dynamic real-world accident scenarios

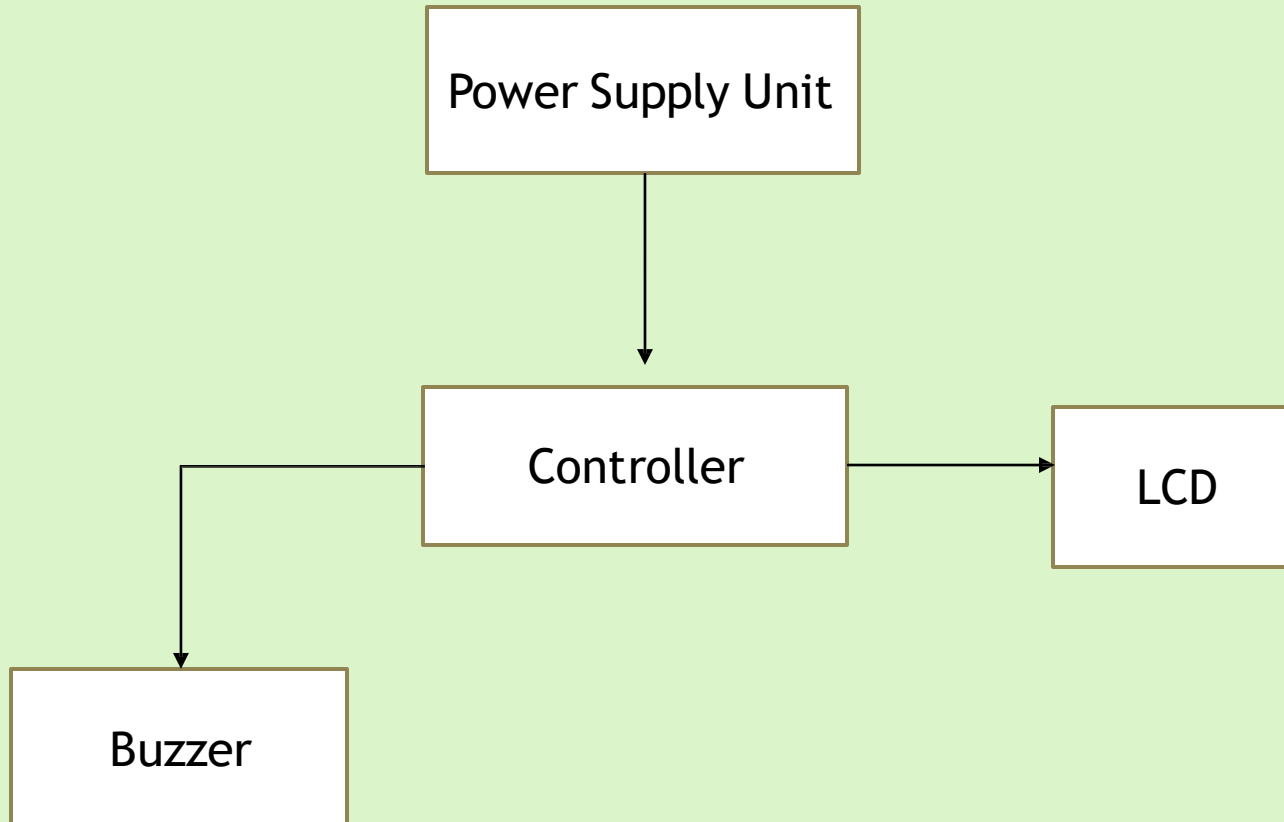
Proposed System

- ❖ The proposed Smart Airbag Deployment System integrates a comprehensive set of components to ensure enhanced automotive safety. The power supply unit, supported by a reliable battery and voltage regulator, delivers a stable power source to the system. The controller, equipped with advanced processing capabilities, interfaces seamlessly with components such as the LCD, buzzer, ADXL accelerometer, and GPS module. The ADXL accelerometer precisely detects crash events, triggering the deployment of airbags through a relay mechanism. Additionally, the GPS module enables accurate location tracking, facilitating swift emergency response. The IoT connectivity ensures real-time communication, allowing the system to instantly transmit emergency alerts to relevant authorities. This sophisticated integration not only optimizes airbag deployment but also establishes immediate communication with hospitals for coordinated medical assistance, exemplifying a holistic approach to automotive safety.

Proposed Block Diagram IN CAR



IN HOSPITAL



Advantages

- ❖ Rapid Emergency Response
- ❖ Real-time Health Monitoring
- ❖ Accurate Crash Detection
- ❖ Enhanced Location Tracking
- ❖ Holistic Automotive Safety
- ❖ Optimized Post-Collision Communication

Result



FIGURE 1.1 TRANSMITTER
OUTPUT IN CAR

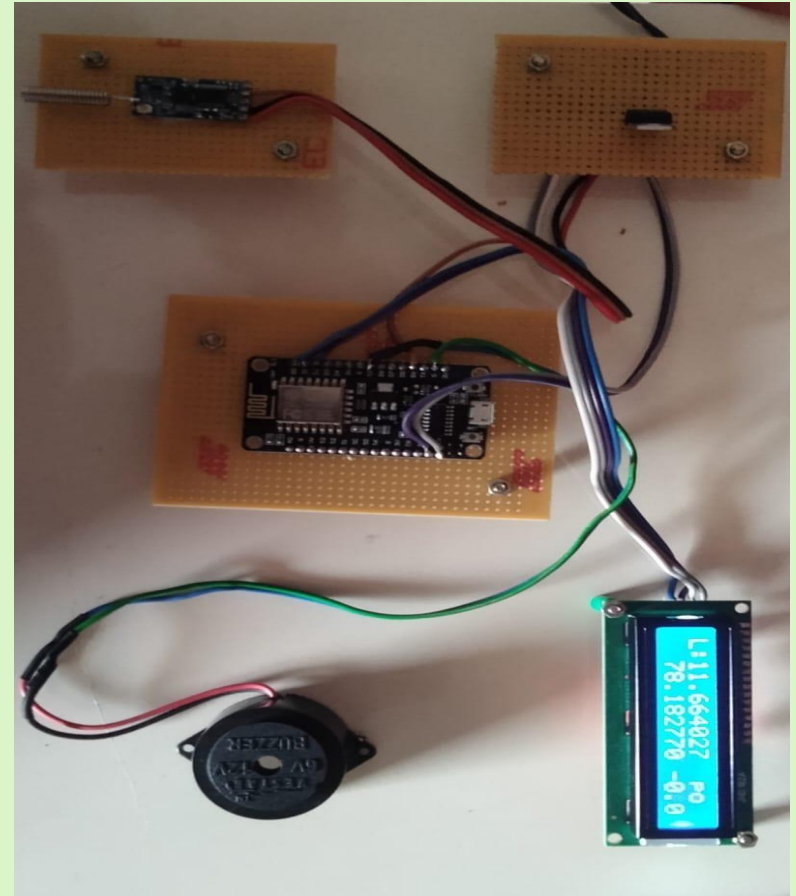


FIGURE 1.1 RECEIVER OUTPUT
IN HOSPITAL

Conclusion

- ❖ In conclusion, the integration of a Smart Airbag Deployment System with Instant Emergency Alert and Hospital Integration represents a transformative advancement in automotive safety technology. By leveraging state-of-the-art sensors and communication systems, this innovative solution not only improves the precision and effectiveness of airbag deployment but also ensures rapid response in critical situations. The ability to instantly alert emergency services and seamlessly integrate with hospital networks promises to significantly reduce the time between an accident and medical intervention, potentially saving countless lives and minimizing the severity of injuries.

Future Enhancement

- ❖ Complexity
- ❖ Power Consumption
- ❖ Regulatory Compliance
- ❖ Maintenance and Updates

Reference

1. V. Vibin, P Sivraj and V Vanitha, "Implementation of In-Vehicle and V2V Communication with Basic Safety Message Format", International Conference on Inventive Research in Computing Applications (ICIRCA), 2018.
2. Gorade Nishigandh et al., "Air Bag System in Two-Wheeler Vehicle System", National Conference on Recent Innovations in Engineering and Technology, 2019.
3. Arnav Chaudhari et al., "Smart Accident Detection And Alert System", IEEE India Council International Subsections Conference, 2021.
4. D. N. Kumar, "Collision Prevention in Cross Road Scenario in Vehicular Networks", 6th IEEE CONECCT, 2021.
5. Rahul George, Srikumar Vaidyanathan, Amandeep Singh Rajput and K. Deepa, "LiFi for Vehicle to Vehicle Communication – A Review", INTERNATIONAL CONFERENCE ON RECENT TRENDS IN ADVANCED COMPUTING, 2020.

List of Publications

1. M.Jayalesh, Dr.Sankar Ganesh.S, G.Ganesan, B.Gurumoorthy, March 2024 “Iot based smart airbag deployment system with instant emergency alert and hospital integration for enhanced automotive safety in International Journal of New Innovations in Engineering and Technology Vol.24, Issue 1, pp.1170-1173, ISSN:2319-63191.indexing-Google scholar, UGC Approved list.

IOT Based Smart Airbag Deployment System with Instant Emergency Alert and Hospital Integration for Enhanced Automotive Safety

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Abstract:*In pursuit of advanced automotive safety measures, this paper presents a new IoTbased Smart Airbag Deployment System (SADS) concept that aims to revolutionize the automotive safety system. The system involves the use of IoT technology to provide emergency alerts in the event of an accident and enable emergency services to respond quickly. Additionally, SADS integrates with hospital systems to help provide timely medical assistance to injured passengers. SADS uses real-time data analytics and machine learning algorithms to reduce the risk of injury by ensuring airbag deployment is optimized based on the severity and nature of the crash. A comprehensive introduction to vehicle safety not only improves occupant protection, but also helps reduce emergency response times and improve post-accident medical care. Through verification and simulation studies, the effectiveness and reliability of the proposed system demonstrate its ability to reduce the incidence of traffic accidents and improve the understanding of safety in driving.*

Keywords :*IoT, Accident prediction, Gps and Airbag sensor.*



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AVS Engineering College, Salem

has presented a paper titled

IoT Based Smart Airbag Development System with Instant Emergency Alert and Hospital Integration for Enhanced Automotive Safety
in

8th International Conference on Engineering Technology and Science (ICETS' 24)

at Muthayammal College of Engineering, Rasipuram, Namakkal Dt., Tamil Nadu

on 20th March 2024



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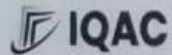
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