



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 5, May 2024

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

 9940 572 462

 6381 907 438

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# Pro-Gurad Crash Detection System in Car

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**ABSTRACT:** The "ProGuard" introduces an advanced crash detection system aimed at improving road safety and emergency response efficiency. By leveraging cutting-edge sensor technology, real-time communication capabilities, and intelligent data storage solutions, ProGuard offers a comprehensive solution to the challenges posed by vehicular accidents. Upon detecting an accident, ProGuard immediately notifies nearby police stations and hospitals, ensuring rapid deployment of emergency services. The system also informs the vehicle's second prior owner and stores detailed accident data within the vehicle, facilitating efficient insurance claims processing and post-accident analysis. The report outlines ProGuard's design, including the integration of Arduino microcontrollers and ultrasonic sensors, and discusses its functional and non-functional requirements. ProGuard's proactive approach not only promises to minimize the severity of accidents and reduce response times but also aims to streamline the insurance process, ultimately enhancing road safety and societal well-being. The literature survey, system requirements, design architecture, and implementation details are thoroughly examined, underscoring ProGuard's potential to revolutionize automotive safety technology.

**KEYWORDS:** Crash, Crash detection, Twilio, authorized users, ultrasonic sensors

## I. INTRODUCTION

In modern society, vehicular accidents pose a significant threat to public safety, often resulting in injuries, property damage, and even loss of life. Despite advancements in automotive safety features, the ability to swiftly detect accidents and coordinate emergency response efforts remains a critical challenge. Additionally, the documentation of accident details for insurance claims and post-accident analysis often lacks efficiency and accuracy. To address these challenges, the "Proguard" Project introduces a groundbreaking crash detection system designed to enhance road safety, expedite

Emergency response coordination, and streamline the insurance claims process. Proguard represents a fusion of cutting-edge sensor technology, real-time communication capabilities, and intelligent data storage solutions integrated seamlessly within vehicles.

Upon the occurrence of a vehicular accident, proguard springs into action, automatically detecting the incident and initiating a cascade of vital actions. Instantaneously, proguard dispatches essential information, including the car model, precise accident location, intensity, impacted parts, and timestamp, to nearby police stations and hospitals, ensuring swift emergency response deployment. Furthermore, proguard extends its communication reach to include the vehicle's second prior owner, notifying them of the accident and providing pertinent details. Beyond its immediate response capabilities, proguard revolutionizes accident data management by storing

comprehensive accident details within the vehicle itself. This stored data encompasses crucial information such as the car model, time of accident occurrence, intensity of the collision, and precise location of the incident. This data repository serves as a valuable resource for insurance claims processing, facilitating prompt and accurate assessments of liability. The implementation of ProGuard heralds a new era in automotive safety technology, promising to mitigate the severity of accidents, reduce response times, and simplify post-accident documentation and analysis. By enhancing the efficiency of emergency response coordination and insurance claims processing, ProGuard not only saves lives but also minimizes the societal and economic impact of vehicular accidents.

## II. RELATED WORK

### A. Existing System

The current landscape of crash detection and response systems predominantly relies on manual intervention and passive reporting mechanisms. In the absence of dedicated crash detection technology, the detection and response to vehicular accidents are often reliant on eyewitness reports or manual emergency calls. Emergency response efforts are typically initiated following reports from witnesses or involved parties, leading to potential delays in deploying assistance to accident scenes. Moreover, the documentation of accident details for insurance claims and post-accident analysis is marred by inefficiencies and inaccuracies. Insurance claims processing often involves time-consuming procedures, relying heavily on subjective accounts and fragmented documentation. Lack of standardized data collection and storage mechanisms within vehicles further complicates the process, hindering accurate assessment of liability and delaying claim settlements.

### B. Proposed System

The proposed "ProGuard" system represents a paradigm shift in crash detection and response technology by integrating cutting-edge sensors, real-time communication, and intelligent data storage to revolutionize vehicular accident management. Upon detecting a crash, ProGuard autonomously initiates critical actions, transmitting vital information—such as car model, accident location, intensity, impacted parts, and timestamp—to nearby police stations and hospitals for rapid emergency response. It also notifies the vehicle's second prior owner with pertinent details. Additionally, ProGuard stores comprehensive accident data within the vehicle, facilitating expedited insurance claims processing. This proactive approach enhances road safety, speeds up emergency responses, and streamlines documentation, significantly improving accident management efficiency.

## III. IMPLEMENTATION

### A. MODULE: COMMUNICATION MODULE

Communication Module: The Communication Module within ProGuard enables seamless real-time communication with the nearest police station, hospital, and second prior owner through advanced wireless protocols. In the event of a crash, this module swiftly transmits crucial information—including accident location, severity, and vehicle details—to facilitate rapid emergency response deployment. Additionally, it ensures that the second prior owner is promptly notified with pertinent accident details, enhancing communication and situational awareness.

### B. The Data Storage Module:

The Data Storage Module within the ProGuard system serves as a centralized repository for storing detailed accident information directly within the vehicle's memory. It captures essential data such as the vehicle model, time of accident occurrence, intensity of impact, and precise location of the incident. This comprehensive storage capability ensures that crucial details are securely retained, enabling efficient post-accident analysis and insurance claims processing. By seamlessly integrating data storage within the vehicle, ProGuard enhances both the accuracy and accessibility of accident documentation, contributing to improved road safety and streamlined management of vehicular incidents.

### C. GSM MODULE:

GSM Module: The GSM module enables an Arduino board to establish internet connectivity, facilitating voice calls, SMS messaging, and data transmission. With this module, Arduino projects gain the capability to communicate over cellular networks, expanding their reach and functionality. Users can implement applications such as remote monitoring, control systems, and mobile alerts seamlessly, leveraging the GSM module's versatile communication capabilities. This integration empowers Arduino-based projects with real-time communication abilities, enabling a wide range of innovative solutions across various domains.

#### IV. EXPERIMENTAL RESULTS



Fig 8.1.1 Front view of the car



Fig 8.2.1 Back view of the car

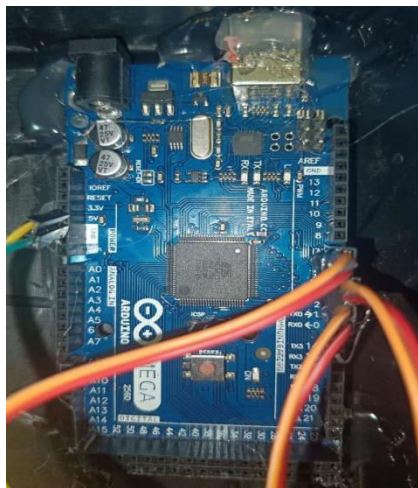


Fig 8.3.1 The connections of arduino board

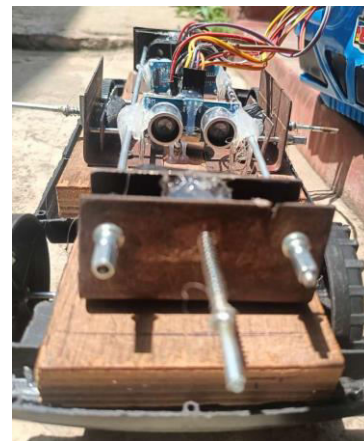
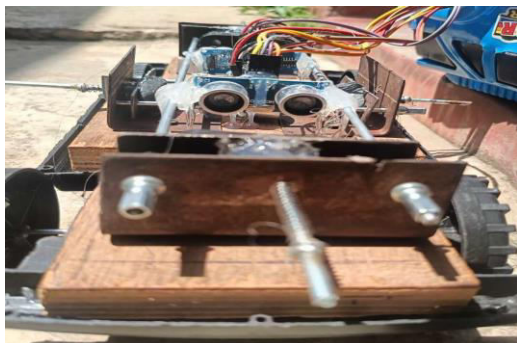


Fig 8.5.1 Internal view of front sensor



```
Sent from your Twilio trial account -  
Location: [12.9719, 77.5937], Sensor:  
back, Impact Level: high, Timestamp:  
2024-05-06 03:37:34 ,model:  
Volkswagen Polo 2019 [KA17MA0999]
```

Fig 8.5.1 Internal view of front sensor sms sent after car accident

#### IV. CONCLUSION

The "ProGuard" crash detection system represents a pioneering advancement in road safety technology, integrating cutting-edge sensor technology, real-time communication, and intelligent data storage within vehicles to address critical challenges in accident detection, emergency response coordination, and insurance claims processing. With its proactive crash detection mechanism and swift notification system, ProGuard ensures timely deployment of emergency response teams, potentially reducing the severity of injuries and property damage. Moreover, its comprehensive data storage capabilities streamline insurance claims processing, expediting assessments of liability and claim settlements. By enhancing road safety, reducing response times, and simplifying post-accident documentation and analysis, ProGuard contributes significantly to society's well-being, heralding a new era in automotive safety technology with promises of safer roads and more efficient accident management processes.

#### REFERENCES

##### Books:

1. "Building Wireless Sensor Networks" by Robert Faludi
2. "Internet of Things: Principles and Paradigms" by Rajkumar Buyya, Amir Vahid Dastjerdi, and Mehdi Sookhak.
3. "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy
4. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville.

##### Links:

- <https://machinelearningmastery.com/machine-learning-in-python-step-by-step/>
- <https://www.coursera.org/learn/machine-learning-with-python>
- [https://www.w3schools.com/python/python\\_ml\\_getting\\_started.asp](https://www.w3schools.com/python/python_ml_getting_started.asp)
- <https://www.edx.org/course/machine-learning-with-python-a-practical-introduct>
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