

# Smart Car Crash Detection and Emergency Response System

## Team Members

W.A.D.T.J Wijethunga

D.M.M.M Dasanayake

N.P.T.H Nishshanka

## Project Summary

This project aims to develop a third-party car crash detection system that can be installed in any vehicle. The system uses multiple sensors and an AI model to accurately detect collisions and send the crash location to emergency contacts or services in real time. By offering a cost-effective and easy-to-install solution, this system enhances road safety by ensuring faster emergency response times and potentially saving lives.

## Introduction

- Car accidents are a leading cause of injury and death worldwide, and the time it takes for emergency responders to reach the scene is critical. Existing crash detection systems are often built into high-end vehicles, making them inaccessible to many drivers. Furthermore, these systems may not always provide accurate or timely information.

Our solution is a third-party system that can be installed in any vehicle, regardless of make or model. By leveraging advanced sensors and AI, it provides a reliable, affordable, and scalable crash detection solution that improves safety by ensuring that emergency responders receive the vehicle's location promptly.

## Objectives

Primary Objective:

Develop an automated crash detection system that accurately identifies car crashes and sends location alerts to emergency contacts via mobile application.

Secondary Objectives:

- Ensure high accuracy and minimize false positives using multiple sensors and AI.
- Create a cost-effective system that can be easily installed in any vehicle.

## System Overview and Approach

System Components:

- Accelerometer and Gyroscope (MPU6050): Detects sudden changes in motion, signaling a possible crash.
- Barometric Pressure Sensor (SCP1000)
- ESP32 Microcontroller: Manages data from the sensors, runs the AI model,

and sends alerts.

- GPS Module: Provides the vehicle's location at the time of the crash.
- Microphone: Detects loud crash sounds for further verification.
- AI Model: Analyzes sensor data to detect crash events accurately.

### **How It Works:**

- The system continuously monitors motion through the accelerometer, gyroscope, Barometric Pressure Sensor, and microphone. When the sensors detect a potential crash, the AI model verifies the data and, if a crash is confirmed, the system captures the vehicle's location using the GPS module. The crash location is then sent to pre-set emergency contacts and our crash assistant mobile application.

### **Key Benefits**

High Accuracy: Utilizes multiple sensors and an AI model to accurately detect crashes, reducing false alerts.

Automatic Alerts: Sends real-time location updates to emergency contacts, ensuring faster help.

Affordable and Scalable: The system is cost-effective and can be easily installed in any car, making it accessible for all drivers.

## **Project Plann**

### **Phase 1: Component Selection and Research**

- Select the appropriate sensors and finalize the system design.

### **Phase 2: System Assembly and Software Development**

- Integrate the hardware components and develop the software for crash detection and alerting.
- Custom mobile application development.

### **Phase 3: Testing and Calibration**

- Test the system for accuracy and fine-tune the algorithms to minimize false alarms.

### **Phase 4: Field Testing**

- Conduct real-world tests to validate the system's performance in various driving conditions.

## **Conclusion**

Our project provides an innovative, affordable solution to the critical issue of delayed emergency response after car accidents. As a third-party system that can be installed in any vehicle, it offers a simple yet effective way to enhance safety on the road. By leveraging advanced sensor technology and AI, we are creating a system that not only detects crashes with high accuracy but also ensures faster emergency assistance through real-time location alerts.