

Project Proposal: Road Sign Detection System for Harsh Driving Analysis and Speed Compliance

1. Problem Statement:

Harsh driving, characterized by sudden acceleration, hard braking, and abrupt lane changes, poses a significant risk to road safety, highlighting the need for a robust system that can accurately detect and analyse such behaviours by combining multiple data sources, including vehicle speed and visual cues from the surrounding environment.

2. Proposed Solution:

The proposed solution is to develop a real-time system that integrates data from Inertial Measurement Units (IMU), Global Positioning Systems (GPS), and camera inputs to accurately detect and analyse instances of harsh driving. By combining vehicle dynamics data, such as speed and acceleration, with visual cues from the surrounding environment, the system will provide a comprehensive approach to identifying and evaluating rash driving behaviours, offering actionable insights to enhance road safety.

3. Objective:

The objective of this project is to design and develop a real-time system that integrates data from IMU, GPS, and camera inputs to accurately detect, analyse, and evaluate instances of harsh driving, with the goal of enhancing road safety through comprehensive monitoring and actionable insights.

4. Hardware Requirements:

The initial list of Hardware required for prototyping of the concept includes:

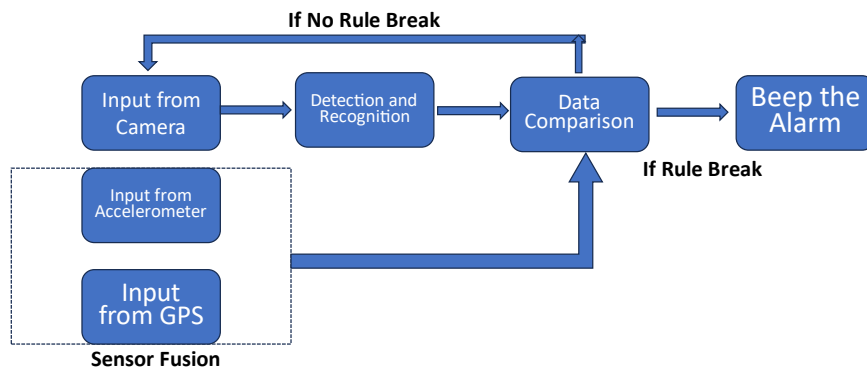
1. Microcontroller capable of executing multiple codes simultaneously
2. Camera to Capture surroundings
3. Secondary sensors such as Accelerometer and GPS for additional data.
4. Hardware accelerator to meet computation requirements.
5. Devices to show output of the system.
6. Power source.
7. Data storage device.
8. Cooling systems to reduce system temperature.

5. Software Requirements:

1. Open-source ML model to train on custom dataset.
2. Operating system able to run on microcontroller.

6. Project Flow:

Flow of the System



7. Budget Breakdown:

Sr. No	Component	Price
1	Raspberry Pi 4 Model B/ 5 (8GB Ram)	7780
2	5MP Raspberry Pi Camera	220
3	Heat Sink/ Cooling Fan	485
4	MPU6050 Accelerometer	250
5	Google Coral TPU	10600
6	Battery	3000
7	Raspberry Pi Micro SD Card 64GB/ 128GB	1100
8	Metal Case with Fan	990
9	GPS Neo8M Sensor	650
Total		25075

8. Expected Outcome:

The project defined according to its scope must give the following outcomes:

1. It should be able to classify Traffic signal into 3 categories namely Red, Yellow and Green.
2. It should be able to identify 'numbers' present in the speed limit sign.
3. The Buzzer must sound when the rules defined in the code are violated. For eg: For speed limit of 60, the speed of the vehicle must not be above 60 for that particular time period.

9. Conclusion:

The proposed system aims to address the critical issue of harsh driving by leveraging the integration of IMU, GPS, and camera inputs for real-time detection and analysis. By combining vehicle dynamics data with visual cues, the system provides a comprehensive solution to identify and evaluate rash driving behaviours, contributing to improved road safety and enabling proactive measures to mitigate risks associated with unsafe driving practices.

10. Group Details:

Sr. No	Name	Roll No
1	Saurabh Autade	BEN 04
2	Nishad Harsulkar	BEN 14
3	Sujal Koli	BEN 20