SRD (Autonomous car)

Introduction:

Autonomous vehicles are automobiles that can move without any intervention by detecting the road, traffic flow and surrounding objects with the help of the control system they have. These vehicles can detect objects around them by using technologies and techniques such as RADAR, GPS, Odometry, Computer Vision. The autopilot drive of autonomous vehicles starts briefly with the ultrasonic sensors on its wheels, detecting the positions of vehicles that are braking or parked, and data from a wide range of sensors(Cameras , GPS etc..) are analysed with a central computer system and events such as steering control, braking and acceleration are performed.

Purpose:

We are aiming to add emergency vehicle priority awareness feature to autonomous cars. In our project, we plan to use Artificial Intelligence, Machine Learning, Image Processing methods and test the results in simulation environment. The Autonomous Vehicle Drive Simulator that we will use need to provide us to simulate sensors such as GPS, radar and gives potential sensor outputs.

Our system will include:

* Lane detecting and following
* Object recognition and auto brake
* Virtual drive assistant
* Route Planning
* Obstacle's avoidance

Product perspective:

**Self-Driving:** Classification systems that monitor traffic signs, use cameras, monitor other systems, use radar and laser sensors.

**GPS:** Space-based satellite navigation system that provides time and location information anywhere.

**Digital Maps:** The process in which data collection is compiled and formatted in a virtual image.

**Lane Assist:** Tracks the position of the vehicle in the lane.

**Product Functions:**

**Lane Lines Detection:** The system detects highway lane lines. Distinguishes dashed lines and straight lines. Provides warning in case of loss of lanes. Image analysis techniques are used to define lines.

**Tracking Environment:** Tracks objects around the vehicle using the scanner and algorithms. Sensors monitor the position of objects as they move within the scanning range. So, the system behaves according to objects.

**Detection of Traffic Signs:** Using image processing techniques and various algorithms, studies are done to classify traffic signs. Recognize traffic signs. The vehicle behaves according to the colours of the traffic lights.

**Vehicle Detection and Tracking:** The system performs vehicle detection and tracking events. It adjusts the speed and position according to the behavior of the vehicles around it during highway driving. Sudden braking performs events such as lane change. Keeps track distance always constant with a vehicle in front.

**Apply Braking:** When a pedestrian step in front of the vehicle and a collision is possible, sudden braking has been performed. When the obstacles, pedestrians, and vehicles on the road are lifted, the vehicle accelerates to regain its speed.

### Assumptions

* The main assumption in this project is that the system works well when there are no environmental factors. (Bad weather, holes, slope, etc.)
* Lane markings are assumed to be distinct.
* In our system, it is assumed that all traffic signs and the presence of all objects around the vehicle can be clearly and seen.
* If the vehicle is running, it is assumed that the system is always on and scanned.

# Requirement Specification

This section includes requirements to build our software system and description of its behavior.

User Interface:

The interface will be created with flutter or java to connect the app to the car whether by Bluetooth or Wi-Fi , and to see the objects detections and tracking in Realtime , plus to that the path stimulations , the two devices will be connected to the server(backend) exchanging the data (in JSON fromat).