# ADAPTIVE DRIVING ASSISTANCE SYSTEM

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## INTRODUCTION

An adaptive Driving Assistance system is a group of electronic technologies that assist drivers in driving functions. Through a safe human -machine interface, it increases car and road safety. It uses automated technology, such as sensors and cameras, to detect nearby obstacles, and respond accordingly. Compared with traditional transportation, Adaptive Driving Assistance System is superior in ensuring passenger safety and improving driving control.

### Objectives

> The technology employs a variety of sensors in conjunction with machine learning to aid drivers in avoiding errors in judgement.

> Single driver support system that provides braking and steering assistance.

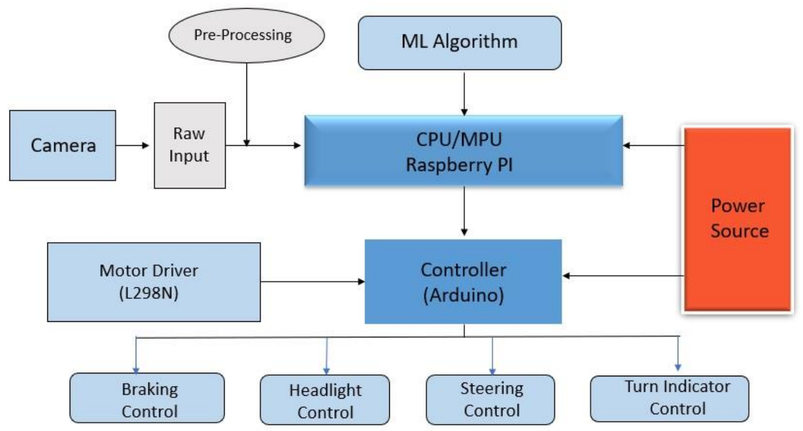
> The vehicle will come to a halt if an obstruction is detected.

> Headlights will be controlled based on the amount of outdoor light available, for better visibility for the driver.

> The turn indicators will be turned on, before changing lanes.

> It will be making decisions based on traffic signal status detection.

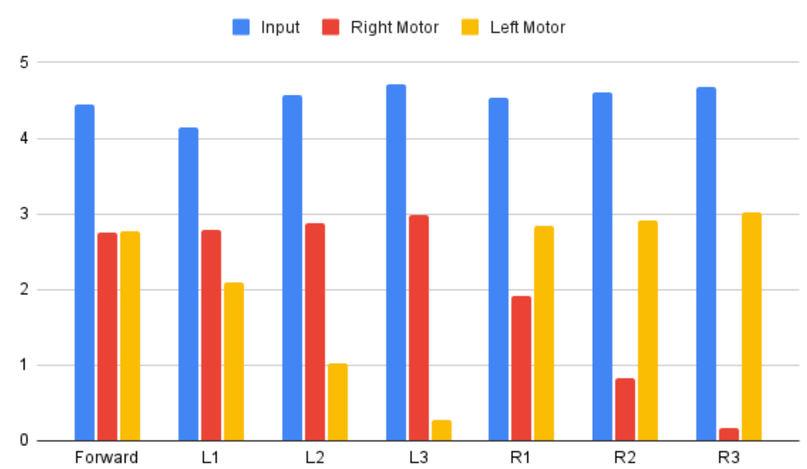
## BLOCK DIAGRAM




## DESCRIPTION

A 5V DC supply is used to power the entire prototype. A camera which is used as image sensor, sends in a raw live video feed which is initially processed to provide a video as clear as possible to the Raspberry Pi for better extraction of data. An algorithm to detect objects like a car, a stop sign or even a traffic signal, is integrated with the Pi for training purposes. This data is further implied for triggering the Arduino which executes all the controlling commands, provided by the Raspberry Pi from the results which were attained earlier. The motor driver, connected with the Arduino functions to provide steering and braking controls with respect to the input received from the Arduino, which responds back to the Pi.

## Change in voltage VS Various turn modes

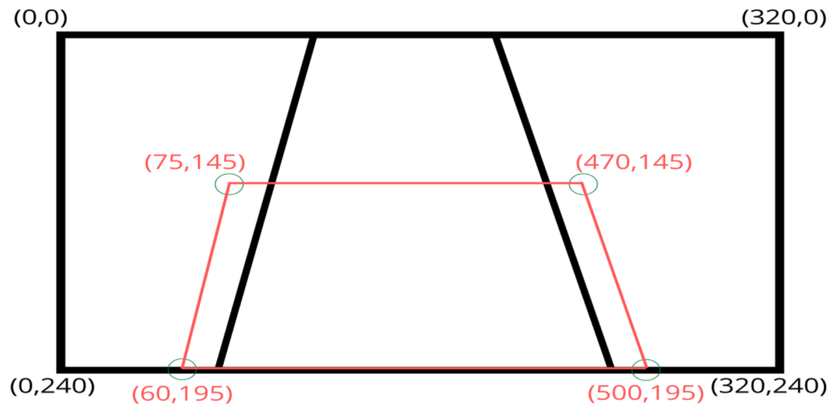



## REGION OF INTEREST

A region of interest is a sample within a data set identified for a particular purpose. The ROI defines the borders of an object under consideration.

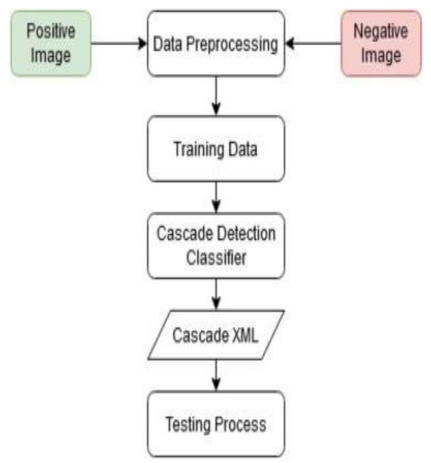
In our project, the ROI is set for the car to detect the upcoming lane and the surroundings for processing and decision-making for steering control and braking assistance.

## Design Sketch (ROI)

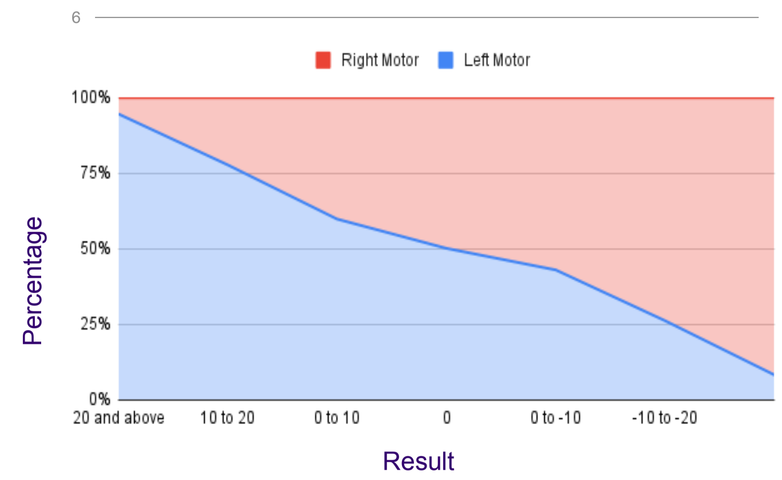



## CASCADE TRAINING

Computer vision is how computers automate tasks that mimic the human response with the visual information. Multiple Image features such as points, edges, or patterns are used to identify an object in an image. A cascade classifier uses these visual cues as features to determine if an object is in the image, such as a face. Cascading classifiers are trained with positive sample views of a particular object and arbitrary negative images of the same size. After the classifier is trained it can be applied to a region of an image and detect the object in question. To search for the object in the entire frame, the search window can be moved across the detection, and image and check every location for the classifier.




## Change in result VS Change in voltage




## CONCLUSION

Adaptive Driving Assistance System, is the term used to describe the growing number of safety functions designed to improve driver, passenger and pedestrian safety by reducing both the severity and overall number of motor vehicle accidents. By the means of developing this project, we are able to achieve major key features like braking control, headlight control using LDR, steering control using machine learning and automatic turn indicators. The prototype developed by us, is successfully able to manoeuvre on the track made, which demonstrates all the above stated features with an overall 70-75% accuracy.