

# Self-Driving Car Engineer Nano degree

## Project: Finding Lane Lines on the Road

### Write-up Report

The major goal of this project is to find the lane lines on the road. The following steps were followed to achieve the goal:

- Convert color image to grayscale for further processing it
- Apply Gaussian blur to remove noise
- Apply Canny edge detection to find the edges
- Apply region of interest to focus on the necessary area of image
- Apply Hough transform to find out lines from the edges detected
- Apply average to slope and drawing a solid line on the image
- Plot the lines on top of image
- Finally applying the pipeline to test video and tuning the parameters.

### Function to draw lines

In order to draw a single line on the left and right lanes, I created the function. This function works as follows:

1. Identify the left lane and right lane lines and separate them by their slope
2. Collect all x and y values of lines on both left and right side
3. Find the average of the coordinate points
4. Find the new slope and intercept using the average
5. With those values calculate the x value by setting in the ymax value(image height) and ymin value (ROI)
6. Draw a line with the x and y values to get the lanes

### Potential shortcomings with current pipeline

This pipeline works well for the first two test videos but fails to identify the lane lines on the third video. So little bit more tweaking is required to achieve that. The pipeline might fail in low contrast situations if any shadow falls on the road. It may not work well if the roads are curvy as well. It might be difficult to find the lanes during night with this pipeline

### Possible improvements to the pipeline

This pipeline needs a few improvements to be robust. One is by improving the code to detect curved lines. The parameters should be tweaked a little bit so that the code is robust even when there is a shadow on the road. For this a code that can calibrate the parameters by itself would be very useful.