# Problem Statement

Without human steering behind the wheel, how AI-powered vehicle can maneuver the vehicle on the road for the benefits of:

1. Free up more time in traffic or commute
2. Improve road safety
3. Assist disabled person to reach destination

# Approach

To use a single lens camera to perform automated driving and possibly road sign detection.

# Intended experiments

* Remove top part of image to make model focus learning on path and lane
* Perform horizontal flipping (together with label values) to generate more training data.
* Process image with grayscale to make model more sensitive to path or lane line, and robust for low light conditions.
* Try segmentation model to detect lane, path, and objects.
* Use detected lane line to predict motor (left and right) values (Regression).
* Object avoidance while continue moving in lane.
* Use activation word or object detection to create interruptor function for next action (Rule based).
* Use detected lane line, detected objects, and current acceleration (state) to generate the next course of action (RL)

# Tuning and Optimization

Before making any changes, always check:

* Model loss and accuracy, any vanishing or exploding gradients problem.
* Evaluate model predicted against growth truth values
* Visualize feature extracted

Then carry out following tuning steps in sequence:

1. Collect more data. More data always help.
2. Try different edge detector. Lane / traffic line do not have complex edges
3. Try different architecture.
4. Hyperparameter tuning

# Deployment

Final model should deployable to any vision based robocar that have the following specification:

|  |  |
| --- | --- |
| **ROS** | jetbot\_ros |
| **CPU/GPU** | At least with benchmark of 30fps inference speed on MobileNet-v2 |
| **Camera** | 8MP 160° FoV |
| **Connectivity** | USB, Wifi, Lan, or Bluetooth to connect device for deployment |

Example: Jetbot, Jetracer