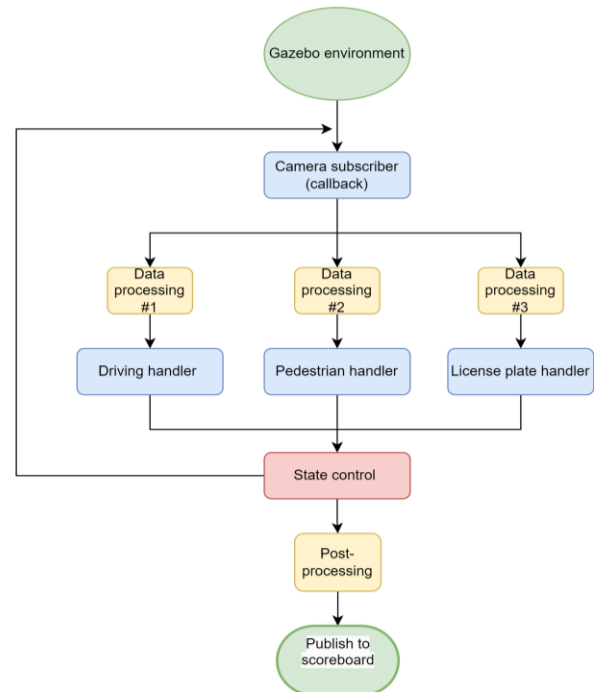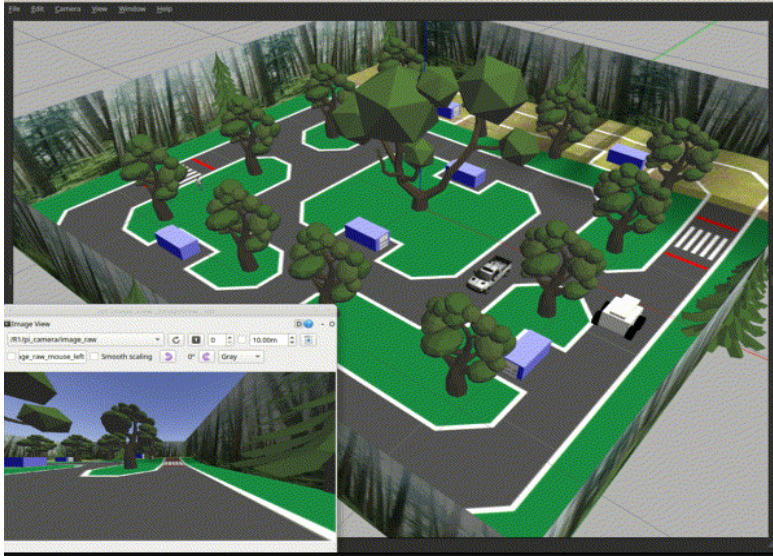# Self-Driving Car Simulation

Tools and skills: TensorFlow, OpenCV, Python, ROS, Linux, Data analysis, Git

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Links: Video Demo, Design Report, GitHub Repo, Course Info

Goal:

Programmed a self-driving robot in a Gazebo simulation capable of vehicle and pedestrian detection, obeying traffic rules, and successfully reading license plates.

Outcome:

Placed 1nd out of 16 teams and obtained the maximum possible points.

Key features:

Self-driving

- Image preprocessing using OpenCV and HSV filtering to remove any unnecessary information for input

- Built and trained a convolutional neural network (CNN) using TensorFlow, outputting linear and angular velocities
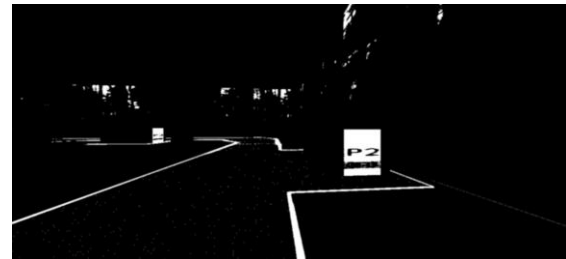
License plate reading

- Utilized homography and perspective transforms to ensure a consistent view of the individual characters for input

- Built and trained CNNs to determine parking ID, alphabets, and numbers individually
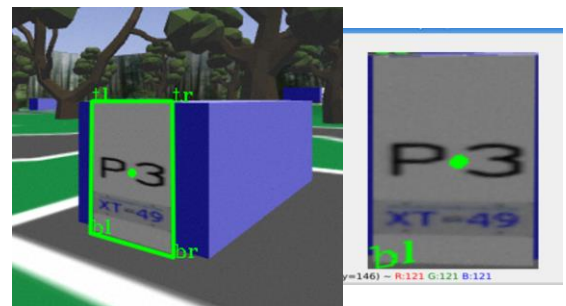
Data collection

- Trained, cleansed, and labeled 20000+ input images by employing a strong data collection method, resulting in high prediction accuracy of the neural networks
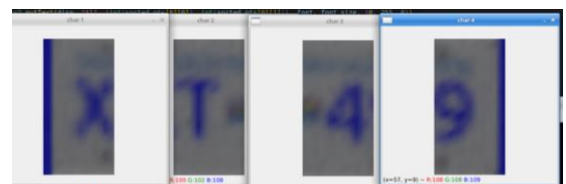
Pedestrian detection

- Utilized several computer vision techniques for crosswalk detection and determining the pedestrian's position

HSV filtered camera view for self-driving

Homography (left) and perspective transform (right) on a license plate

Preprocessed license plate characters