RUTGERS

WINLAB | Wireless Information Network Laboratory

ACE

Autonomous Car Emulator

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Introduction

The goal of this project is to create a scaled model intersection with working autonomous cars and camera data to help make more informed driving decisions.
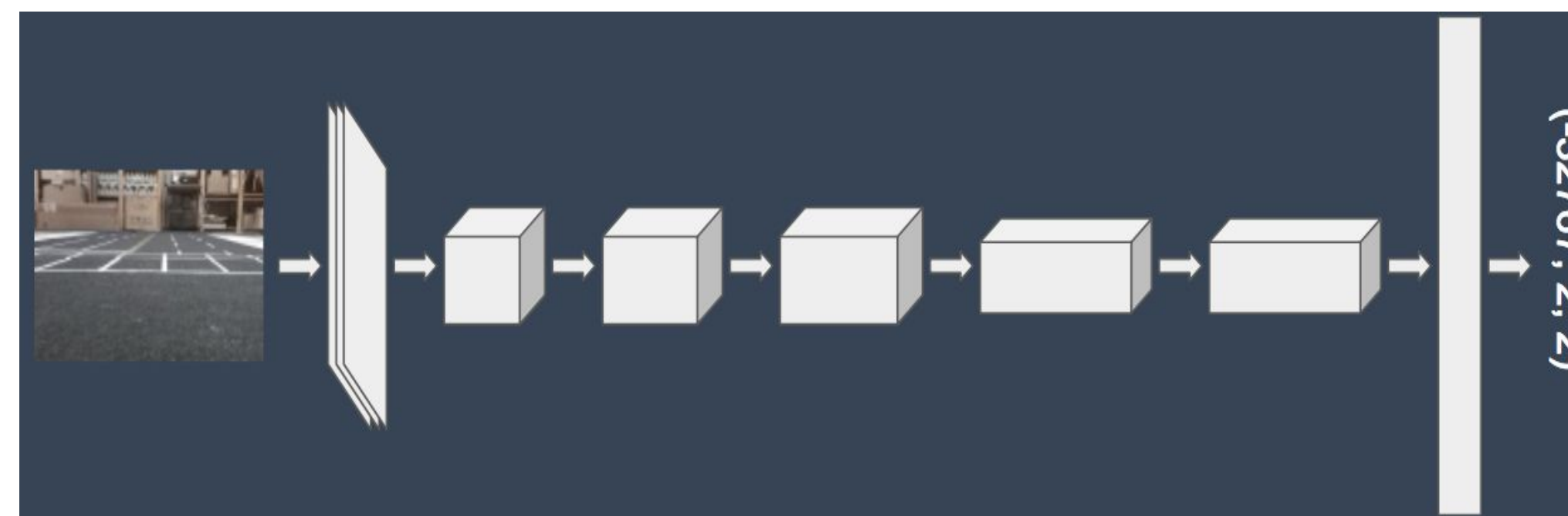
Autonomous Cars
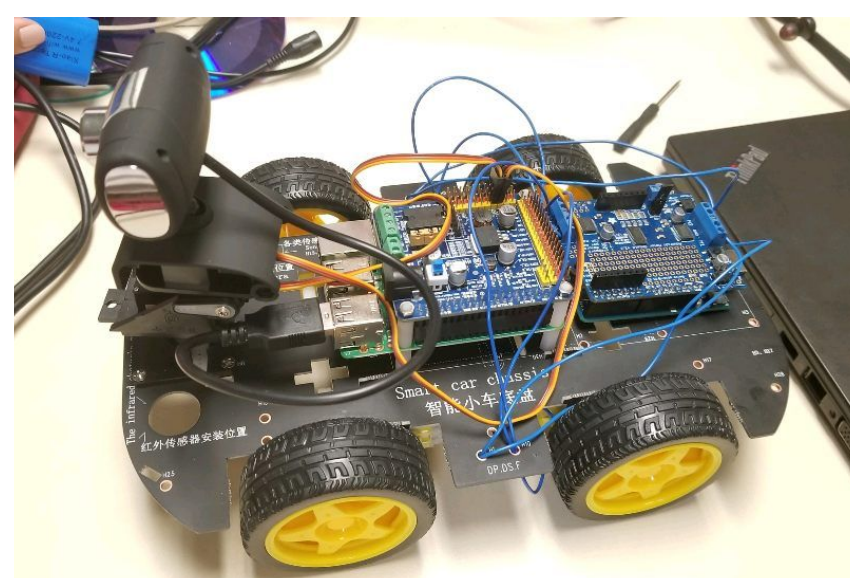
The car is based on Raspbian Stretch.
We managed to control the car using a joystick to collect data.

Virtual Simulation

3D model of the intersection created using SketchUp and Unity
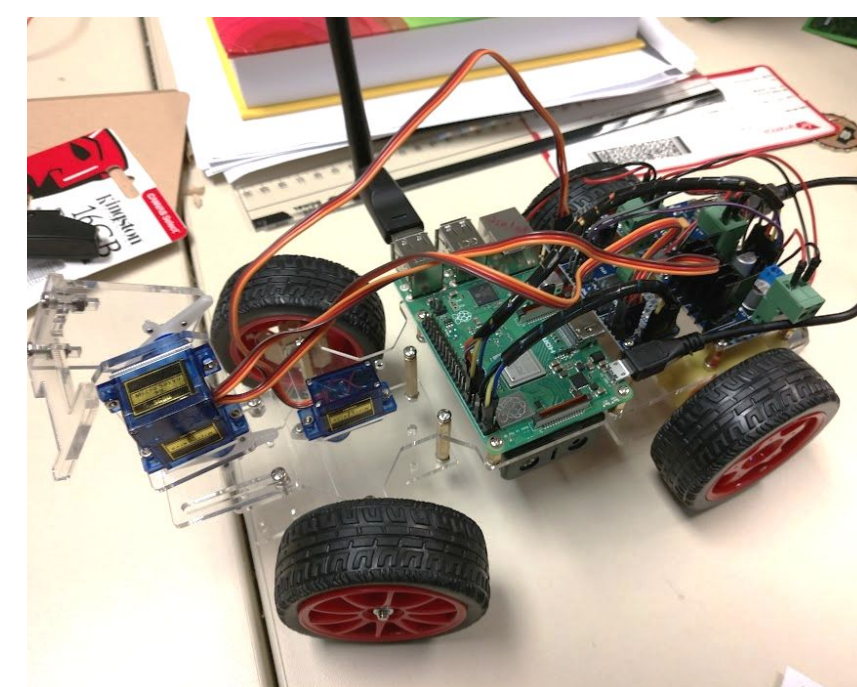

Neural Network

We used a five-layer convolutional neural network (CNN) to solve the self-driving problem.

The network took a image of the car's current view as input and output the steering and speed commands. The network is built and trained under petrochemical framework.

Test Bed

Modeled after the 120th St and Amsterdam Ave intersection in New York, NY near the Columbia University campus.
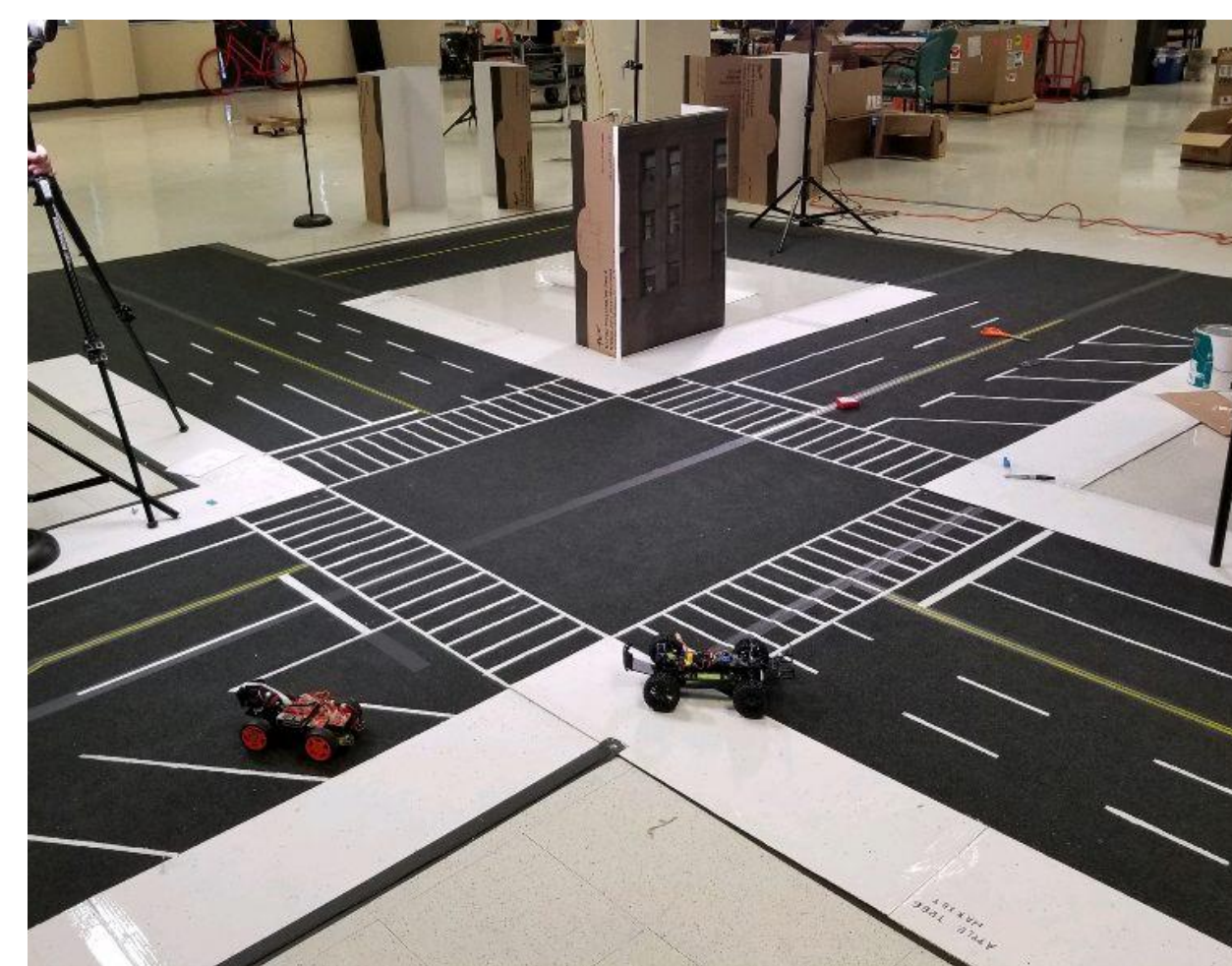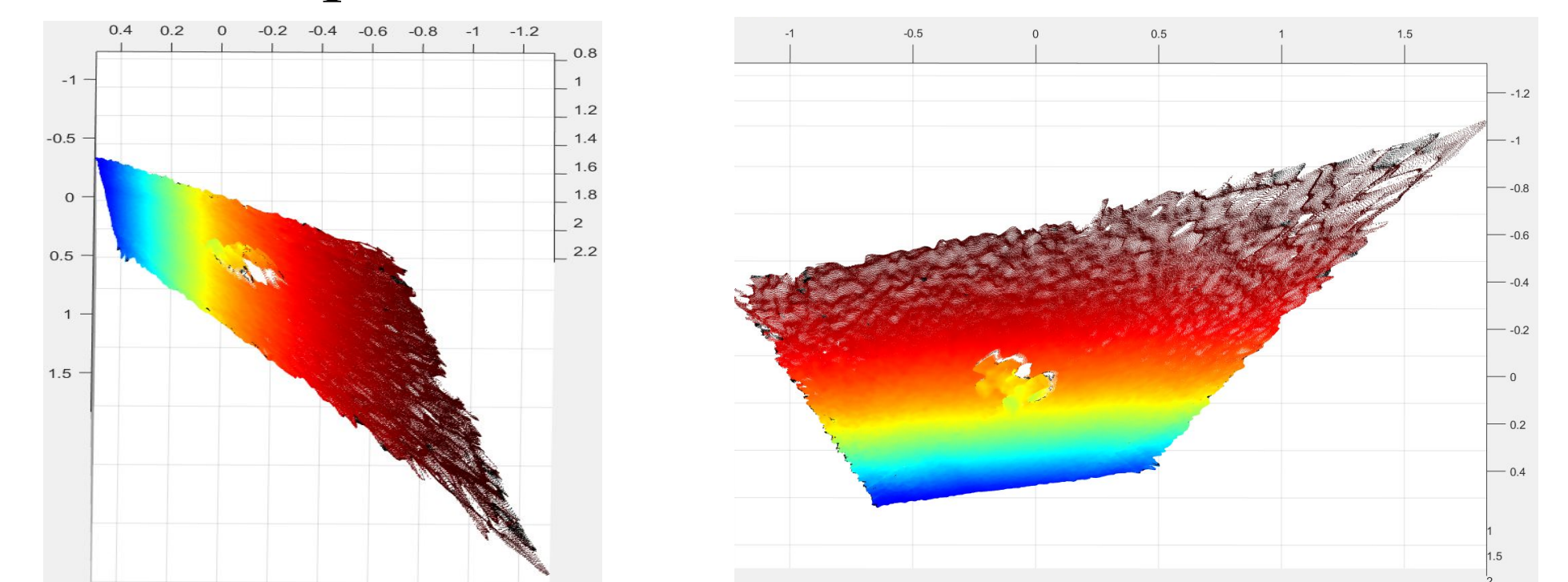

Scale Factor = 14.9

Depth Cameras

Intel RealSense D400 Depth cameras are placed around the intersection and they are connected to the ORBIT nodes.
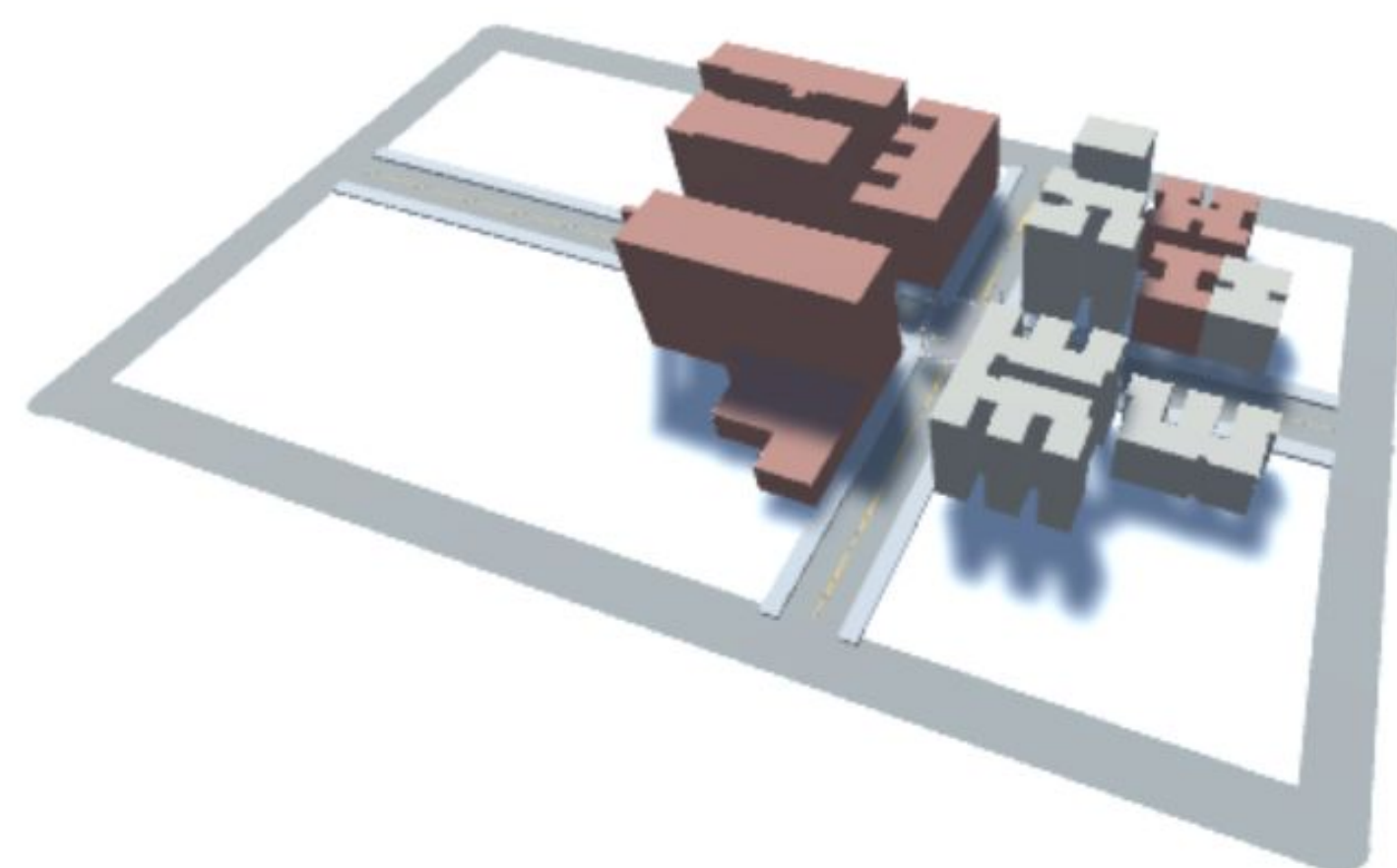

The cameras provide depth information which helps create a point cloud for the scene (above).

Combined point cloud feed from 2 cameras.

Future Work

- Fine tune the CNN to make the car drive more smoothly.
- Implement a wireless network to handle all the information reception and distribution.
- Unify interaction between Unity simulation and scaled model emulation
- Identify moving parts in the intersection and gather data (speed, acceleration, stopping distance) to pass on to the autonomous cars.

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