Verification of End to End Learning Concept for Mobile Robotics Platform

Vivian Nguyen, Dr. Kevin McFall

Southern Polytechnic College of Engineering and Engineering Technology

End to End Machine Learning Concept

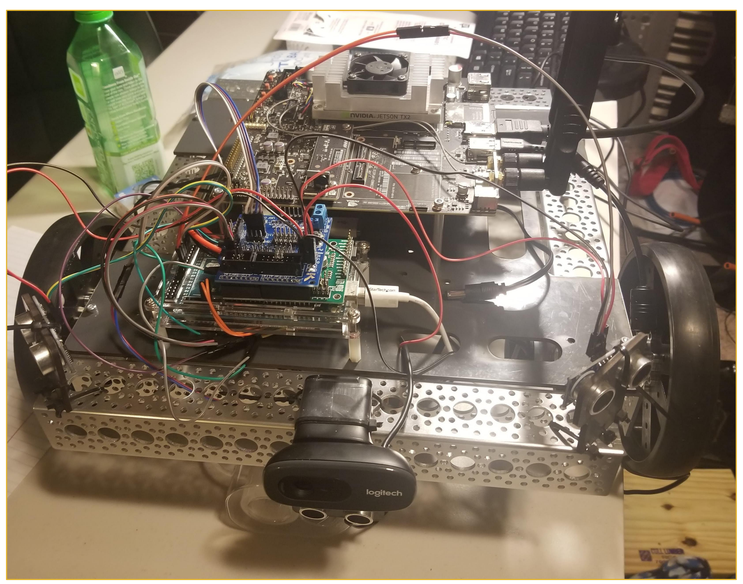
- The research is based on the NVIDIA DAVE-2 Self Driving Car: using a Convolutional Neural Network (CNN) to map raw pixels from a single front-facing camera directly to steering commands.
- The goal of this system is to train a smaller robot to drive without explicit definition of any environment variables: lanes, edges, wall, obstacles, velocity, acceleration, direction.
- Currently, this is being achieved by exploring the usage of PyTorch and Transfer Learning: using another well-trained CNN and training with collected data to drive autonomously.
- Training Data is collected via camera input and associating velocity with motor encoder values from a quadrature motor with a 320x240 resolution image stored in a CSV file.

Robotics Platform

- NVIDIA Jetson TX2 Development Board
- NVIDIA JET Robotics Teaching Kit
- Arduino Mega 2560
- Webcam
- DX5E/AR610 Transmitter/Receiver

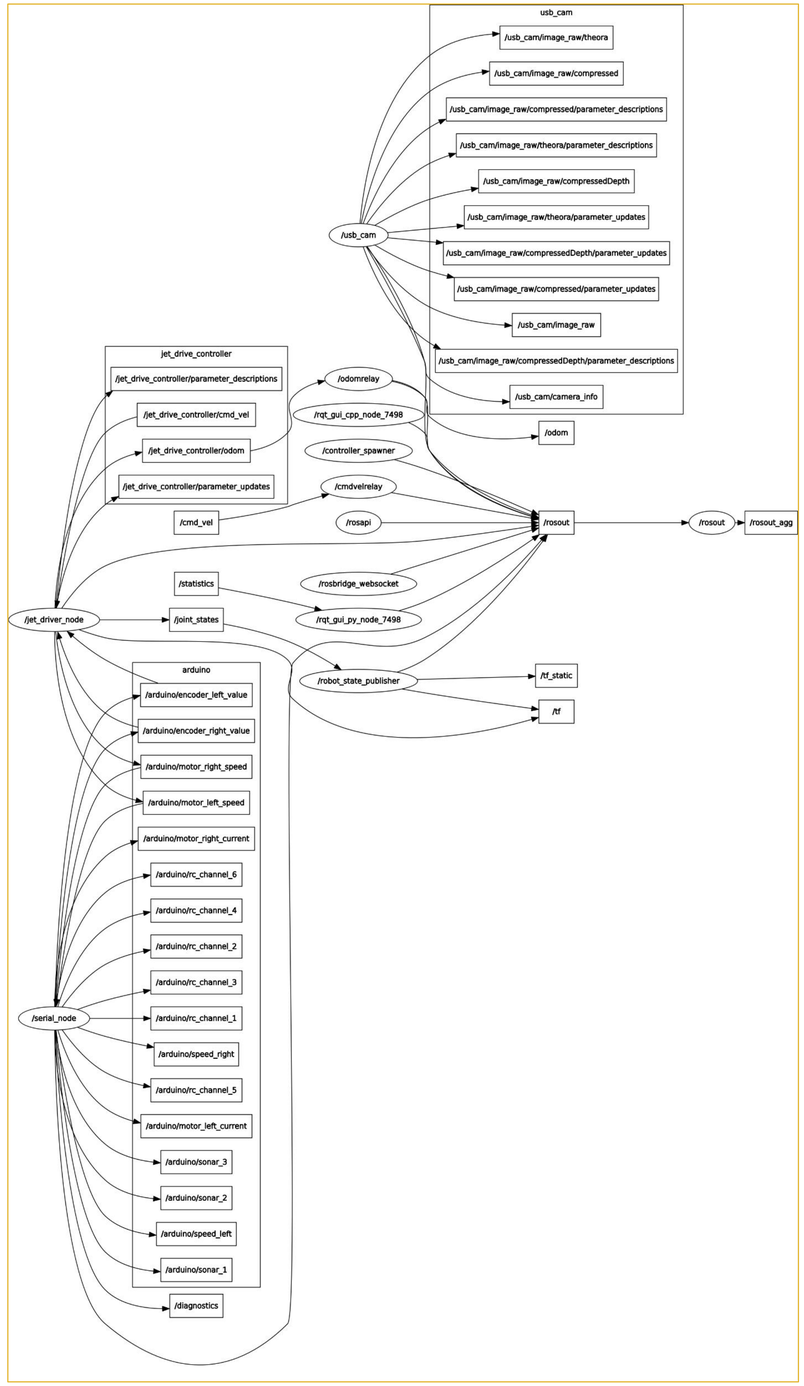
Ongoing Results

- Majority of the work done has been data collection and robot troubleshooting: differential drive calibration, RC transmitter ROS node communication.
- Current Dataset: ~70,000 unique datapoints at ~1GB compressed images



The Autonomous Robot Platform

9 Datapoints with Associated Labeled Values



Current ROS Node Flowchart