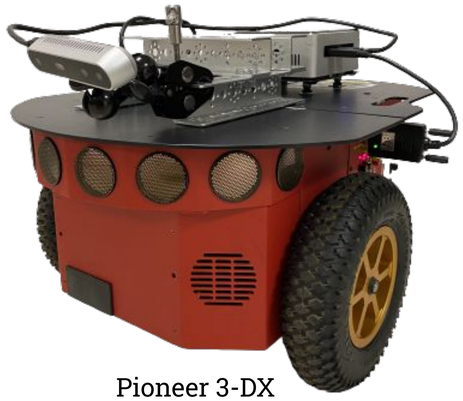
RUTGERS

WINLAB | Wireless Information Network Laboratory

Self-Driving Vehicle

Sandeep Alankar, Anthony Siu, Zhuohuan Li, Adas Bankauskas, Malav Majudar, Abia Mallick, Lohith Bodipati, Aayush Agnihotri



Pioneer 3-DX

Overview

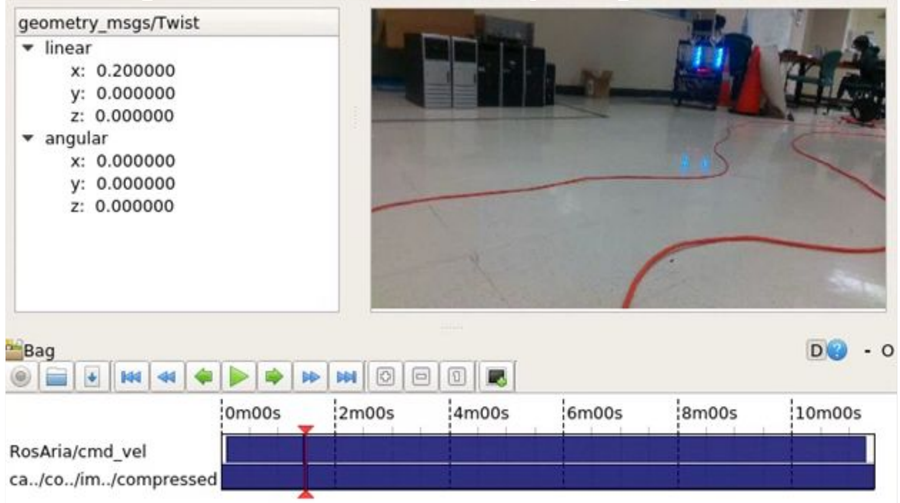
The ability for a robot to automatically and adaptatively travel to its destination has been a common interest among automobile companies for decades. By using simulated models as a basis for physical hardware, we can train miniature mobile robots with machine learning algorithms and neural networks to then easily scale them to larger sizes, creating a remote self-driving car testing platform.

Objectives

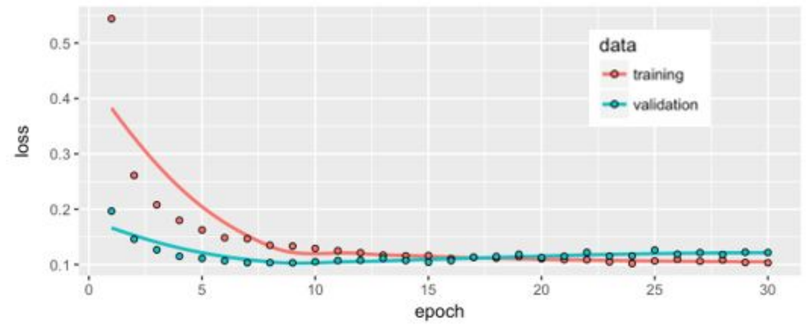
- ❏ Build a fully functional self-driving vehicle
- ❏ Incorporate ROS control into simulated model in Gazebo
- ❏ Write AI/machine learning algorithms and build neural network to train vehicle to be autonomous
- ❏ Use Gazebo to map out simulations
- ❏ Build a physical model at WINLAB and test its autonomy in a real environment

Experimentation

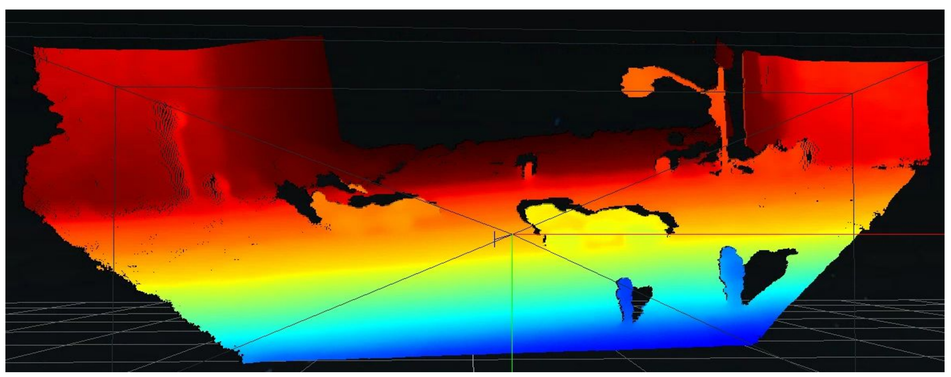
Training Pioneer 3-DX with rqt_bag:



Results:

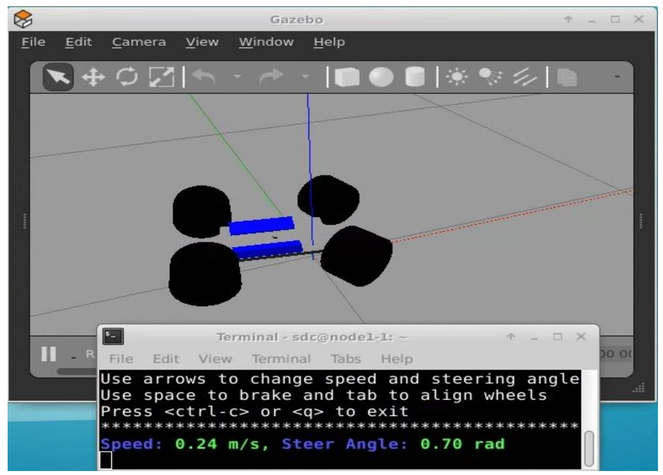


Depth Camera View of Model City Intersection:

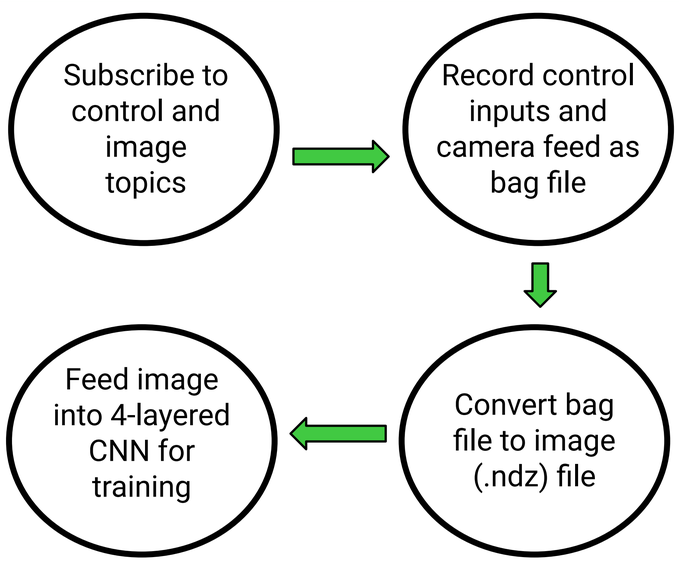


Gazebo

- ❏ Simulation software compatible with ROS used to create virtual environments
- ❏ Built virtual self-driving model before in-person meeting was possible
- ❏ Testing Ackermann steering in virtual environment
- ❏ Controlled digital model with keyop.py script



Training Flowchart



Website QR Code

Future Plans

- ❏ Use depth sensor of the RealSense camera to provide additional training data
- ❏ Reduce the number of clients necessary to communicate between the user and the robot
- ❏ Allow for remote subscription to camera without sacrificing robot control security
- ❏ Configure RosAria onto smaller mobile robots and test self-driving behavior alongside Pioneer 3-DX in city intersection

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