

# Autonomous Rover with Deep Learning

Presenter Qiwe Yang

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# Project Objectives

- Integrating ROS (Robotics Operating System) and Unity Engine

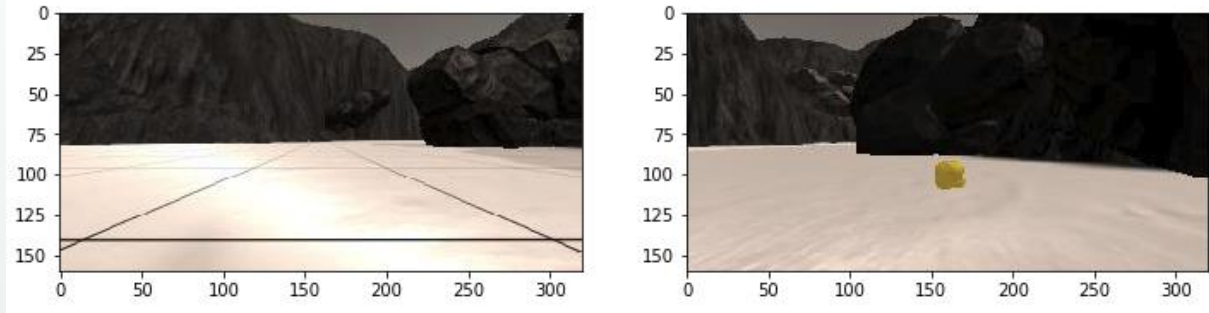


ROS is a mainstream industrial framework to develop Robots. It is designed to simplify the development of Robotics. It supports C++ and Python.

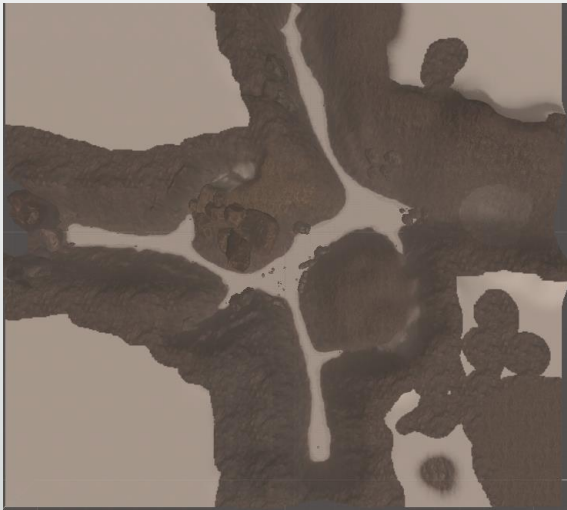
Unity Engine is designed to develop video games, and it is easy to use for simulation environment. It supports C#.

# Project Objectives

- Computer Vision: help the robot know the objects and movable terrains



- Path Planning: help the robot know where it is, the area searched and to be explored



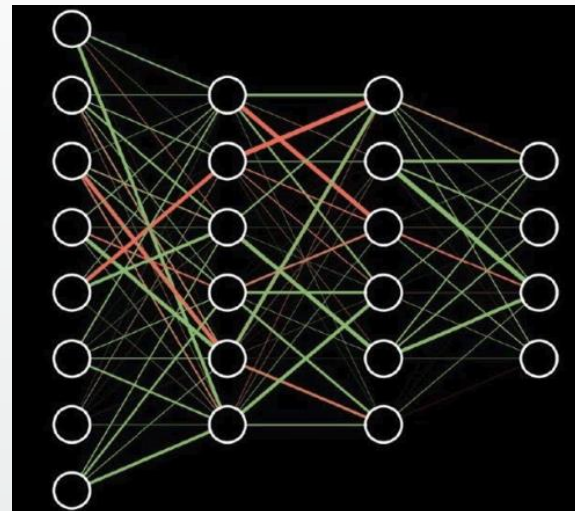
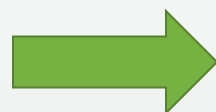
# Project Objectives

- Train the robot in deep learning

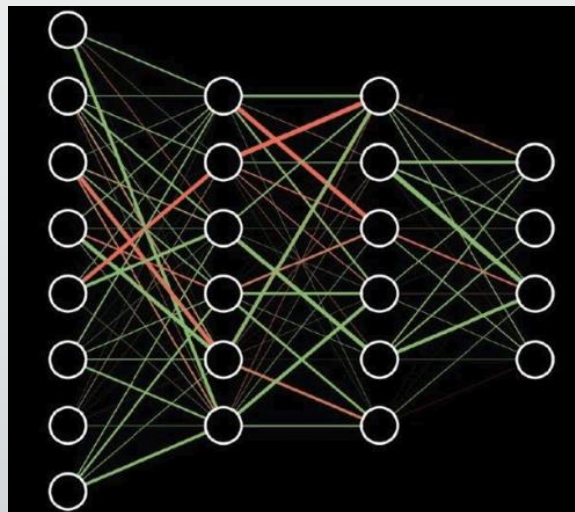
## Training



Needs 3000 images to train the model successfully



## Prediction



Path	SteerAngle	Throttle	Brake	Speed	X_Position	Y_Position	Pitch	Yaw	Roll
\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_29_59_260.jpg	0	0	1	0	99.9999	85.58897	0.000235487	36.07043	2.97647E-07
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\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_29_59_441.jpg	2.353278	0	0	0	99.9999	85.58897	0.0002348866	36.27711	4.698126E-07
\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_29_59_487.jpg	2.353278	0	0	0	99.9999	85.58897	0.0002353959	36.56429	1.733153E-06
\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_29_59_534.jpg	2.353278	0	0	0	99.9999	85.58897	0.0002350594	36.99504	3.68951E-06
\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_29_59_584.jpg	2.353278	0	0	0	99.9999	85.58897	0.0002363006	37.28323	3.399717E-06
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\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_29_59_679.jpg	0	0	0	0	99.9999	85.58897	0.0002356373	37.68153	4.456956E-06
\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_29_59_727.jpg	0	0	0	0	99.9999	85.58897	0.0002359336	37.68153	3.576558E-06
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\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_29_59_964.jpg	-8.353922	0	0	0	99.9999	85.58897	0.0002359961	35.31875	-7.535161E-06
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\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_30_00_158.jpg	-7.446123	0.191538	0	0	99.67054	85.59	0.02574506	31.90124	0.016308081
\\user\yan\Desktop\RoboHD\roversim\beta\roversimaller_test_dataset\MGObocan_2017_04_16_11_30_00_206.jpg	-4.507141	0.3384871	0	0	99.67072	85.59034	0.03286897	31.94446	0.002218349

Steering angle, can be other control inputs, such as brake or throttle (prepared)



Steering angle to command the rover



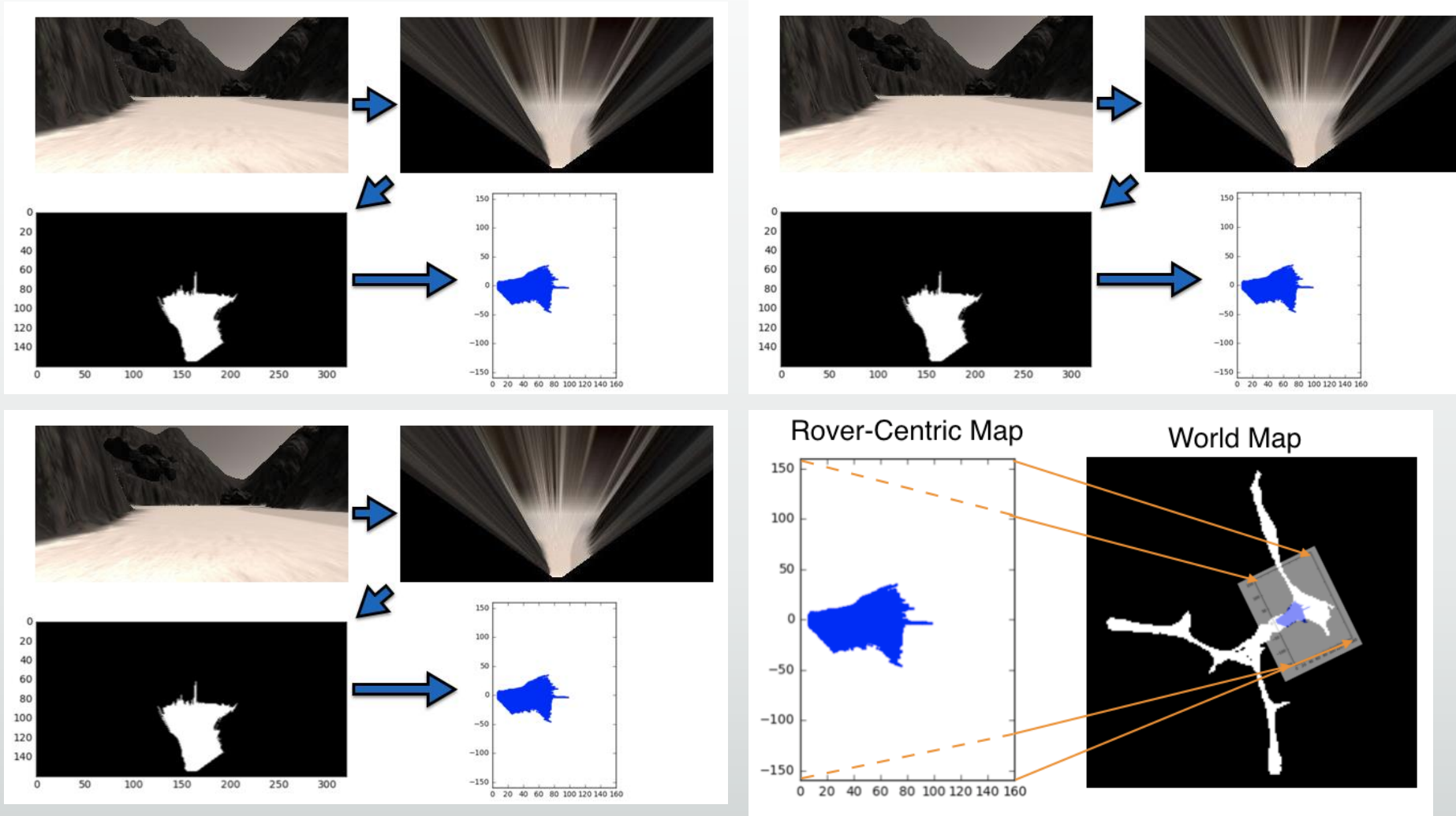
# Simulation Result Overview

<https://www.youtube.com/watch?v=BlcPZLJX2tw&feature=youtu.be>



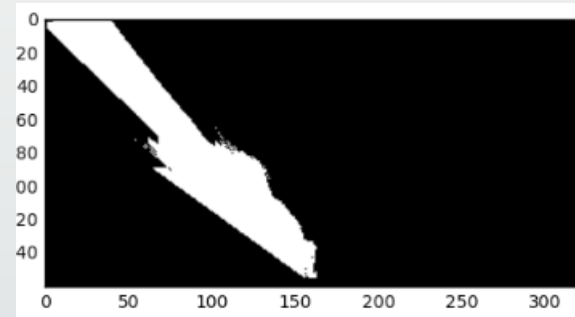
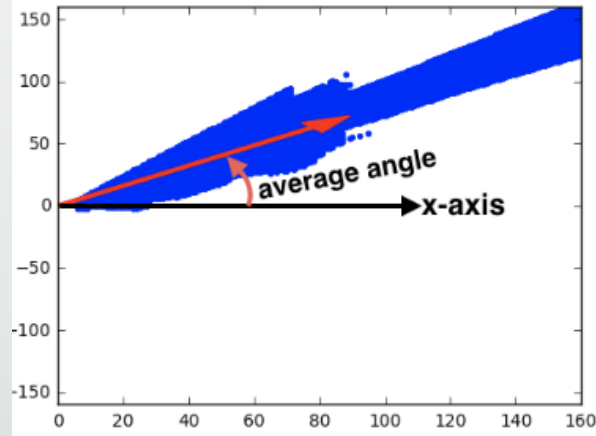
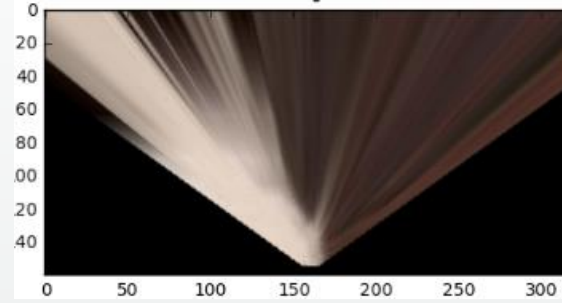
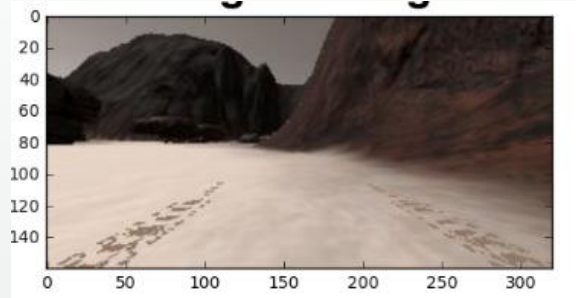
### 3. Key Implementation Details

Convert images from camera on the rover to the world map



### 3. Key Implementation Details

Where to go?





## 4. Future Works

1. Improve the decision making codes
2. Implementing the hardware
3. Taking more sensor data to help control the vehicle.