PROJECT KRATOS

QSTP 2021 Course Handout

Autonomous Subsystem

Description:

The Autonomous subsystem helps the rover plan its path and traverse through various terrains whilst avoiding different obstacles on its way. This is done with the help of ROS, a meta-operating system.

We are divided into two verticals:

- Path Planning
- Object Detection

This QSTP is aimed to build the foundations and give an insight into the kind of tasks we undertake.

Weekly Plan:

Week	Content	Tasks
1	Basic tutorials on ROS (Robot Operating System), basic architecture, concept of nodes, publisher, subscriber, services and actions *Resources:* Morgan Quigley and Wyatt Newman for ROS using python/C++, ROS wiki	Create a simple Calculator Service that can perform basic addition, subtraction, multiplication and division
2	Understanding gazebo, writing scripts to simulate various tasks using ROS. Basics of OpenCV *Resources:* Morgan Quigley and Wyat Newman for ROS, official OpenCV documentation	Design a line following bot according to color
3	Introduction to Neural Networks. Overview of the Convolutional Neural Network Architecture. Using how to use a machine learning architecture like pytorch. *Resources*: 3blue1brown video playlist, CS 231n notes and videos, Official pytorch tutorials, Kaggle courses for Data Science	Writing a neural network (preferably CNN) using machine learning frameworks like pytorch and training it on MNIST dataset.
4	Advanced CNN – concept of YOLO (You Only Look Once), Single shot detectors, Transfer Learning. *Resources*: CS 231n notes and videos	Applying transfer learning to load a pretrained vgg model and training it on CIFAR 10 Dataset on pytorch.