ME 639: Introduction to Robotics : Assignment-1

Sem 1, AY 2025
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Tasks:

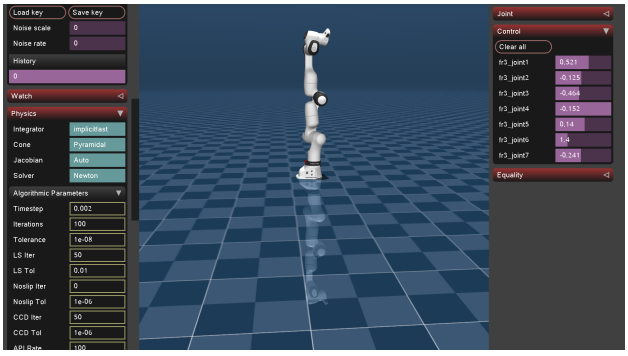
1.Environment Validation:

Description: Installed Ubuntu 22.04, ROS2 Humble Hawksbill, Mujoco and had set up Ros2 workspace.

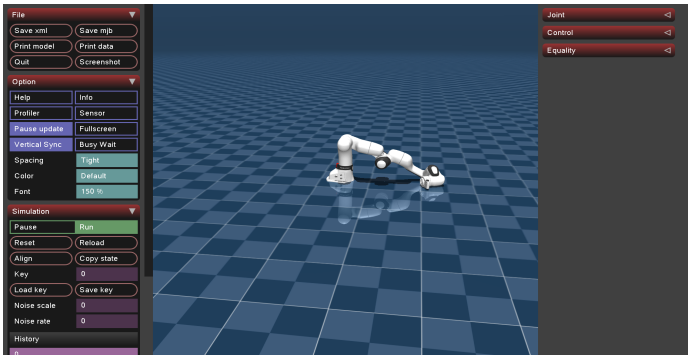
Challenges: Faced few issues while loading Ubuntu, sorted it out with the help of chatgpt. **Couldn't load Mujoco_ros** even after multiple attempts and different approaches.

2.Serial Chain Manipulator:

With gravity:

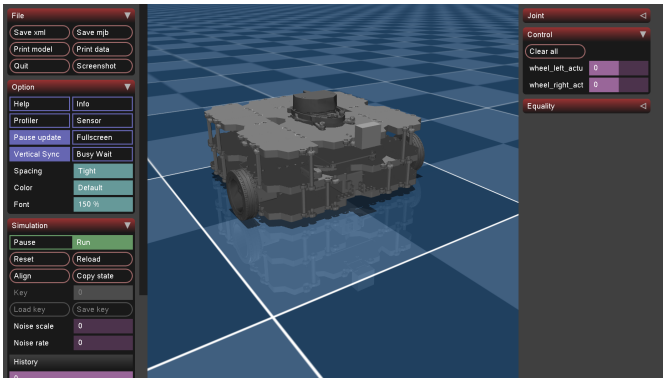


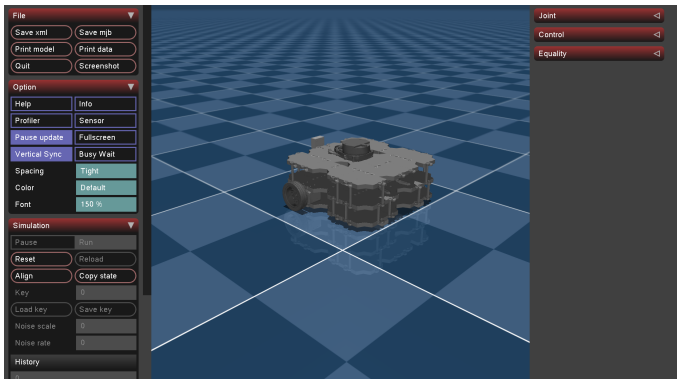
With high value of gravity:g=-250



Description: Simulated Franka Research 3 serial chain manipulator using Mujoco and vs-code. Took the help of C**hatgpt** for loading code. It contains 7 actuator positions(joints) which are rotary joints. And able to move the joints using control options on the right. Couldn't find much difference in operation without gravity(by disabling gravity icon). Tried increasing the value of gravity to -250. Most of the actuators fell to the ground and couldn't operate it as we wanted.

3.Wheeled Mobile Robot:





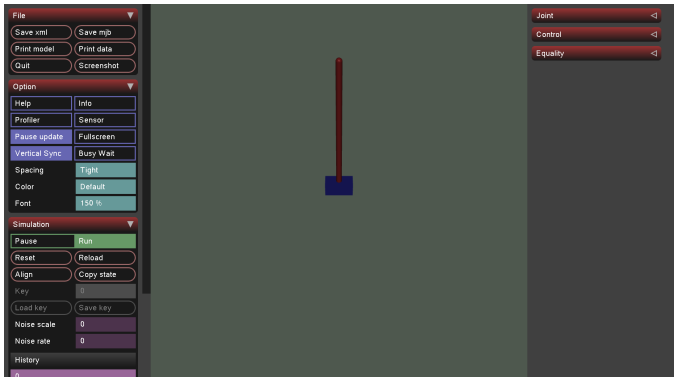
Description: Simulated Turtlebot3 waffle pi using Mujoco and vs-code. It contains 2 actuators: at left and right wheels. And able to drive the Turtlebot using control options on the right. Drove the turtle bot, understood that straight motion is obtained when two equal actuations are given. The turtlebot3 gets lifted into the space when gravity is disabled.

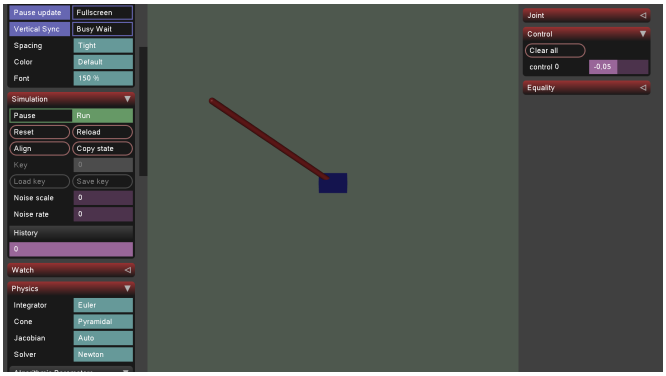
Challenges: Unable to simulate the application of forces on the Turtlebot even after including the codes in python and in the XML file.

4.Quadruped Robot:

Description: Simulated Unitree Go 2 EDU quadruped using Mujoco and vs-code . It has 12 actuators. Actuators can be controlled by the control option on the top right. Where we can set our actuations and simulate the quadruped robot.

5.Inverted Pendulum:





Description: Simulated inverted pendulum in Mujoco via vs-code. Took chatgpt’s help for the XML code of inverted pendulum. The inverted pendulum can be controlled by the control option on the right and observed the simulation. Included a small change in the initial conditions of the inverted pendulum. Had set one of the intial conditions to be 30 degrees and checked the operation.