# ROS Noetic Assignment 1— DC Motor Simulator and Proportional Controller

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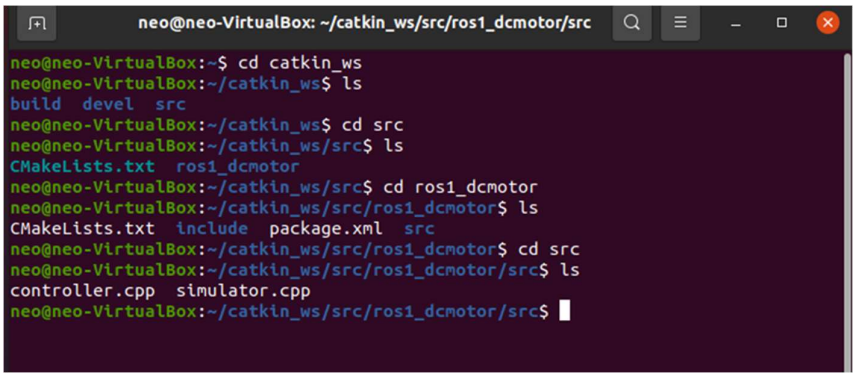
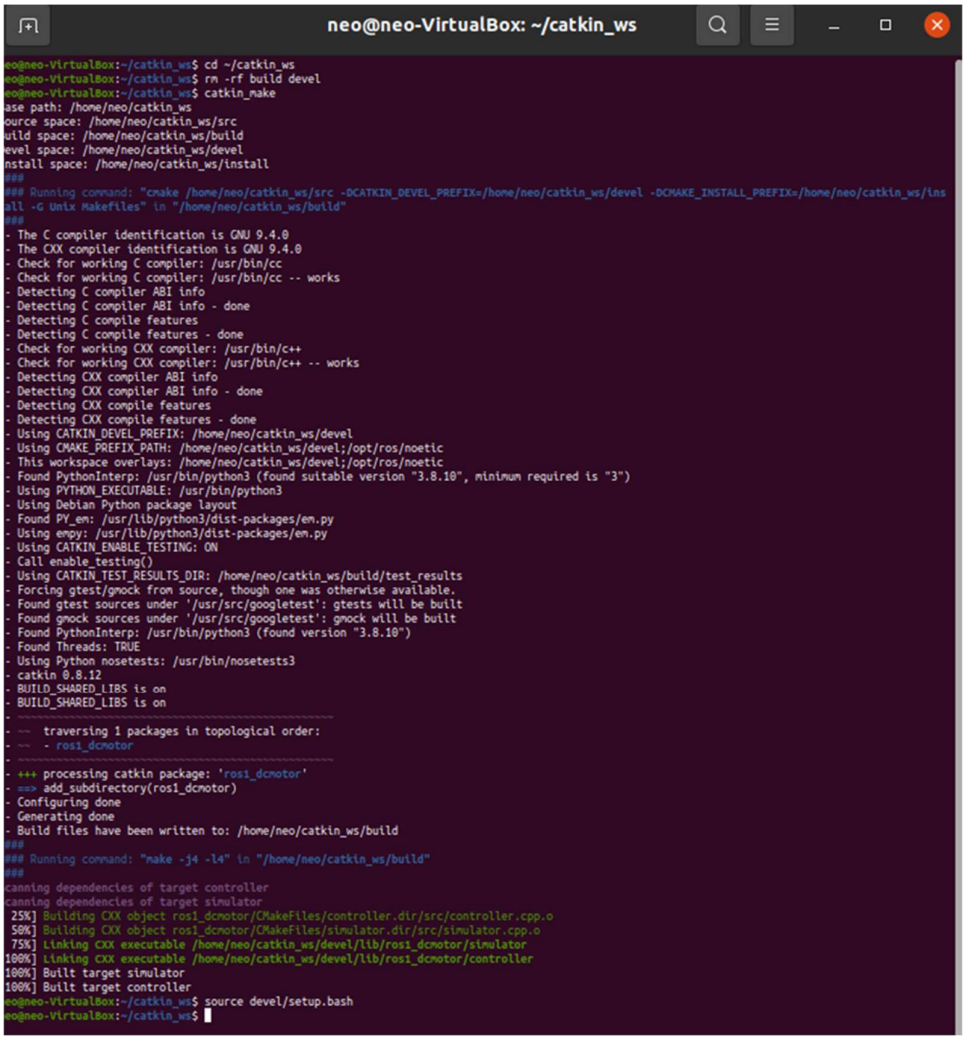
**FILES HIERARCHY:**




**COMPILATION:**




**NODES TO BE IMPLEMENTED:**

simulator.cpp

- Subscribes to topic: /motor_voltage
- Publishes to topic: /motor_speed
- Current and Speed calculated according to motor dynamics equations.
- speed in rad/s is converted to rpm and then published

controller.cpp

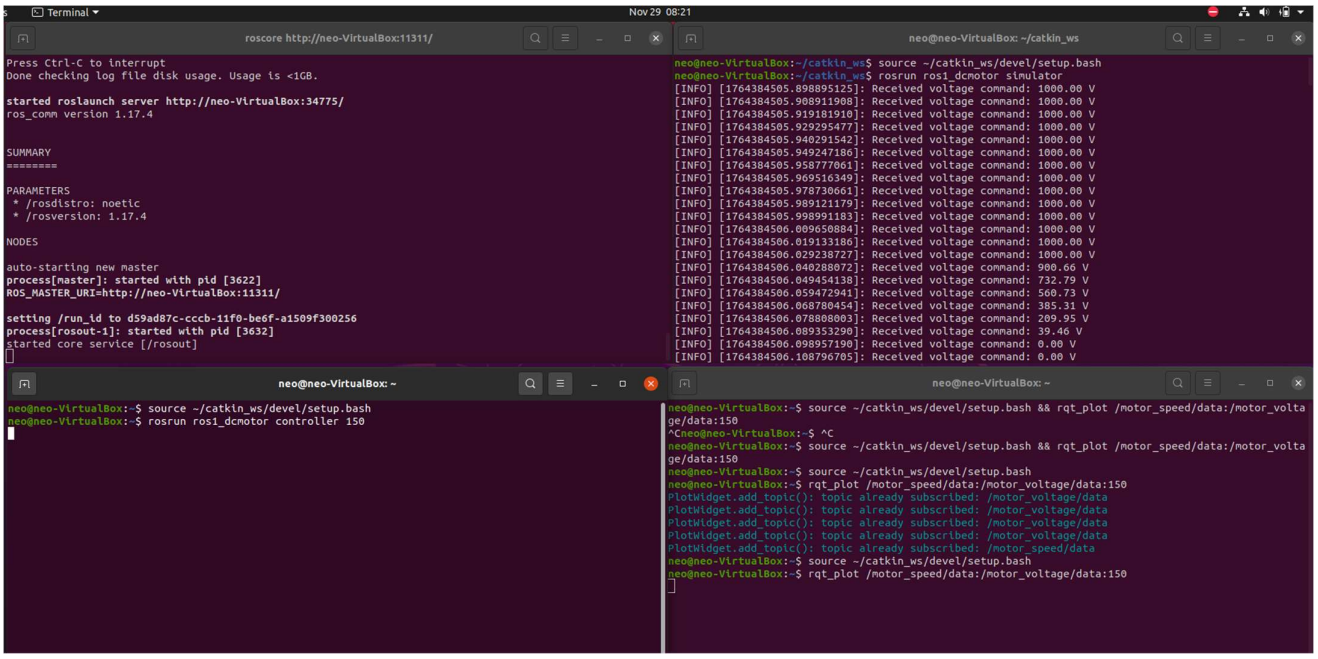
- Subscribes to topic: /motor_speed
- Publishes to topic: /motor_voltage
- The desired speed is supplied via command line argument.
- The actual speed in rpm is received as msg from the subscribed topic and difference between desired and actual speed is calculated and the proportional error voltage computed, and is published to the topic motor_voltage.

**EXECUTION OF THE NODES AND OBSERVATION:**

1. The ROS MASTER was made to run with command roscore.
2. The **simulator.cpp node** was then made to run in another terminal - it listens to the motor_voltage node for voltage commands and publishes the motor speed value to motor_speed topic.
3. The **controller.cpp node** is then made to run in another terminal - with command line argument 150 rpm - desired_speed.
4. The controller.cpp node listens to the motor_Speed terminal to which the simulator publishes - takes that msg stores it in actual_speed- calculates error voltage with proportional gain Kp.
5. This voltage is published in the motor_voltage topic and the corrective action in motor speed takes place.

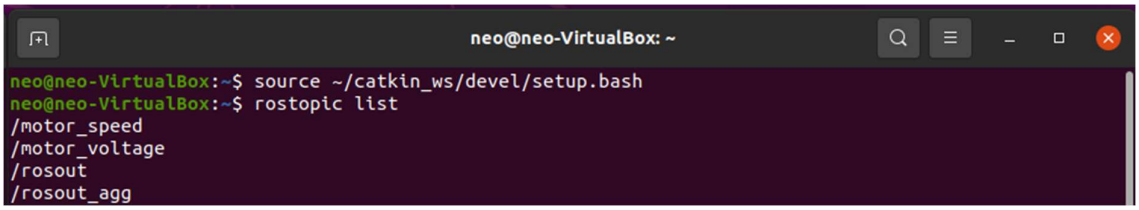
**EXECUTION STEPS :**

- Starting the ros master
- Running the SIMULATOR node
- Running the CONTROLLER node with command line argument desired_speed =150 rpm

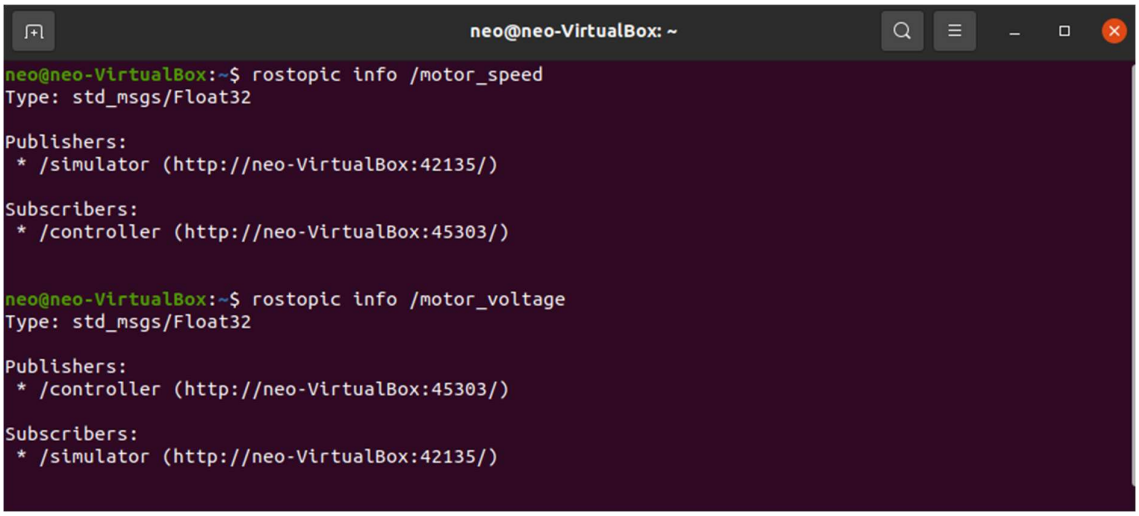


- ROS INFO in Simulator window displaying voltage value received as msg in motor_voltage topic
- ROS TOPIC data of /motor_speed topic

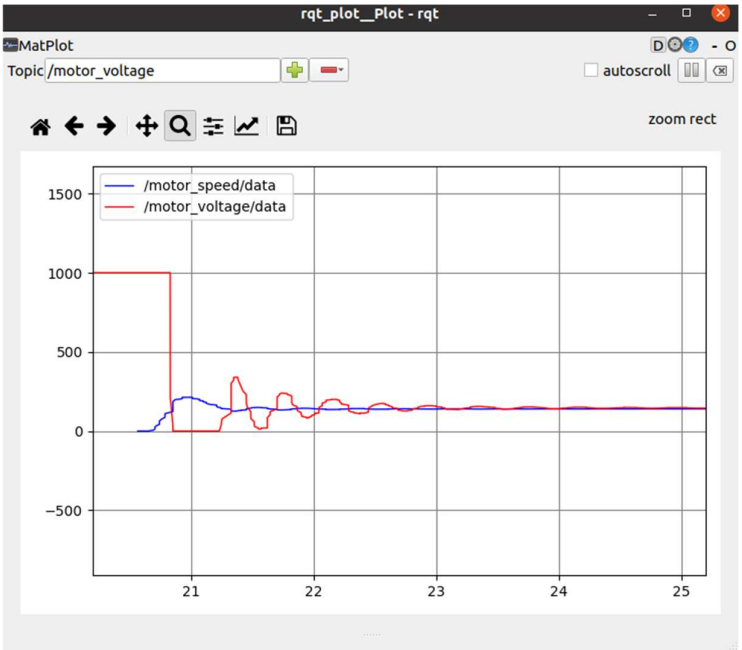
ROSTOPIC LIST:

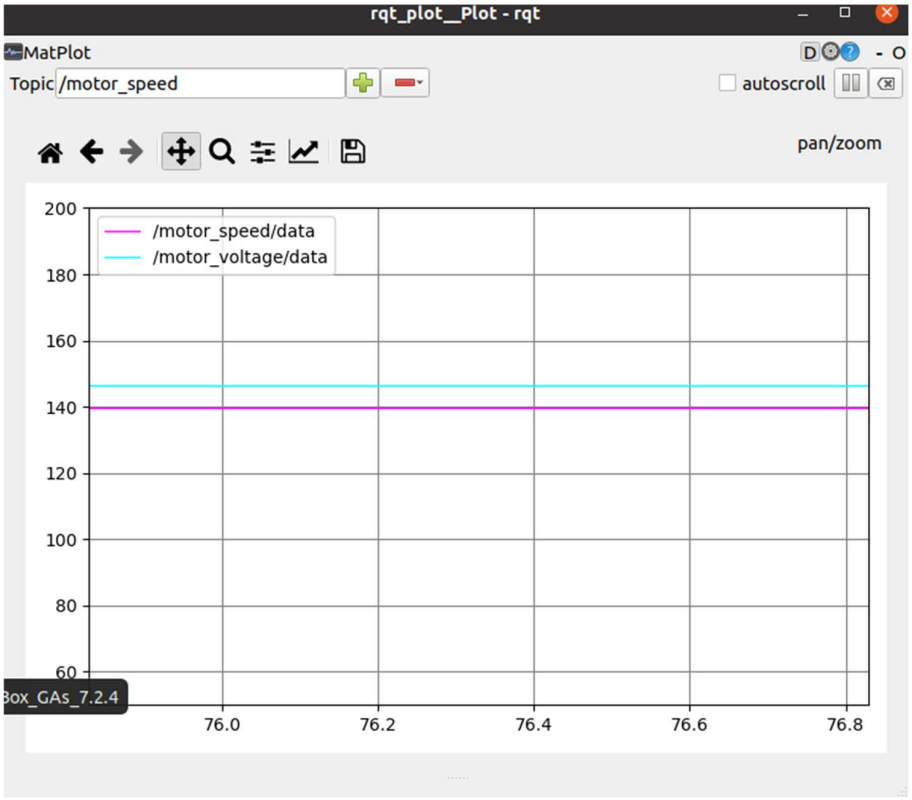



ROSTOPIC INFO:




RQT PLOT GRAPHS:




rqt_plot__Plot - rqt
MatPlot
Topic /motor_speed
autoscroll
pan/zoom
/motor_speed/data
/motor_voltage/data
200
180
160
140
120
100
80
60
76.0
76.2
76.4
76.6
76.8