ROBOT WITH ROS AND SIMULINK
Testing algorithms on Simulink

Introduction

Pioneer 3DX robot is a small mobile robot to develop autonomous solutions. Connect robot with ROS on linux based system using the RosAria library which was developed by the manufacturer. The robot is running on the principle of differential drive system. It has 16 SONAR sensors, 8 in the front and 8 in the back. They all are mounted in such a way that they are getting data from all possible angles to reduce the blind zone for the robot. MATLAB/SIMULINK are the tools in which making algorithms for the system is easy compared to doing it on any other platforms. Install the linux based environment on your host computer using the VMWare virtual machine. It is a software which allows you to use different operating systems on a host computer without dividing your main hard drive. To install linux on VMWare follow ...... this. You can download VMWare and install AriaLibrary using ..... Follow ..... steps to install the ROS environment on the virtual machine.

Connection with ROS

1. Turn on the robot and connect with your host machine using a USB cable.
2. One window will open on the virtual machine interface. Click on to connect it with the virtual machine.

3. Give permission to that specific USB port:

    a. Check if it is connected to the machine using:

        `ls -l /dev| grep ttyUSB`

        $$ Remember the port number $$

    Then, `sudo chmod -R 777 /dev/ttyUSB$(port_number)`

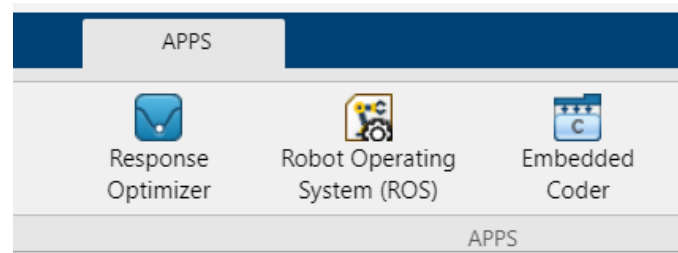4. Start ROS master using:

    `roscore`

5. Start Aria Client to use the robot:

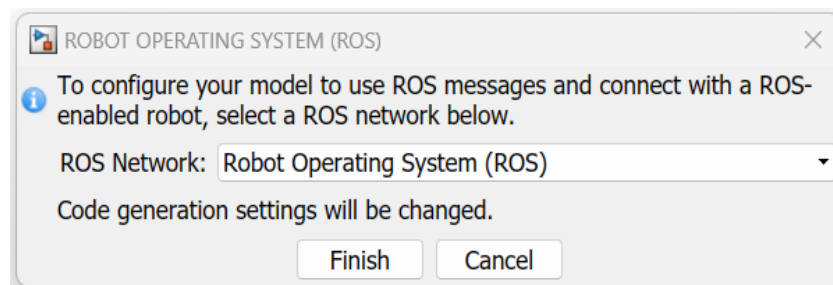   `roslaunch rosaria_client rosaria_client_launch.launch`

6. You will hear a beep sound from the robot.
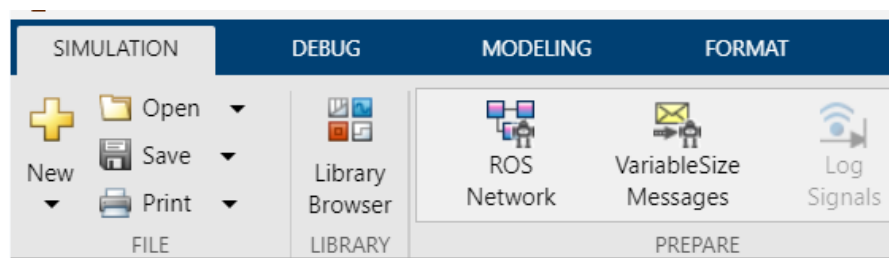
Bridge ROS and Simulink

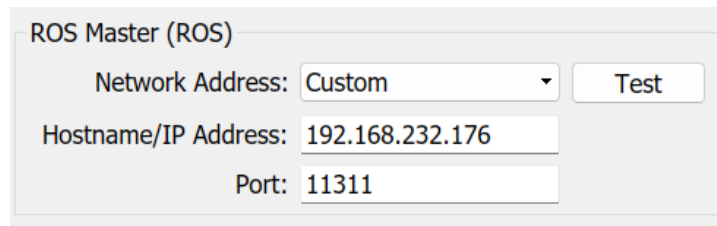1. Open simulink model, go to the app section of the top and select ROS.

2. Select robotic operating system 1 (ROS1).

3. Go to the simulation section, select the ROS network and write down the IP address of the ROS master machine.
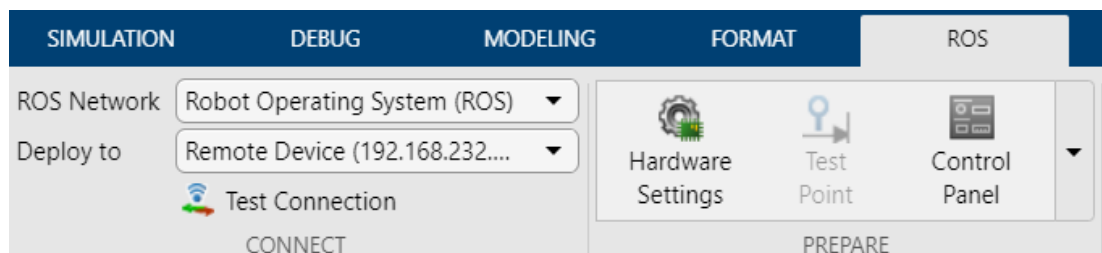
4. Test it using test, if it reached master then press OK.

5. Go in the ROS section
6. Select deploy to then manage remote device
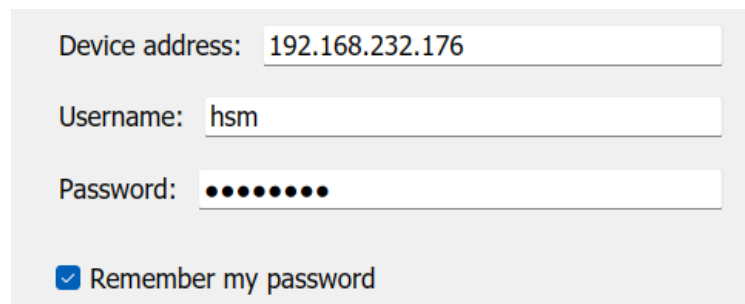
7. Write down the IP address of the ROS master machine, and the master machine's username and password.
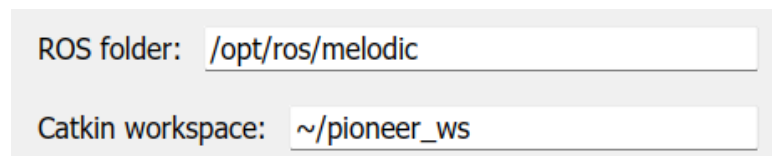
8. Look for the ROS folder section if you are using different ROS versions and catkin workspace if you are using different workspace.
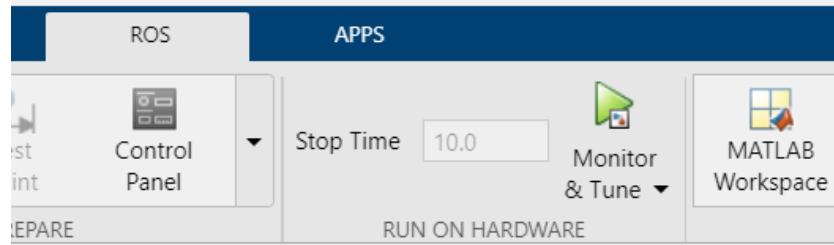
9. Press OK.

10. Now run this model pressing monitor & tune.

It will create a separate folder on the specified catkin workspace on step 8 and will start the simulink model on the ROS interface to test the algorithms and visualize the sensor and pose topics.