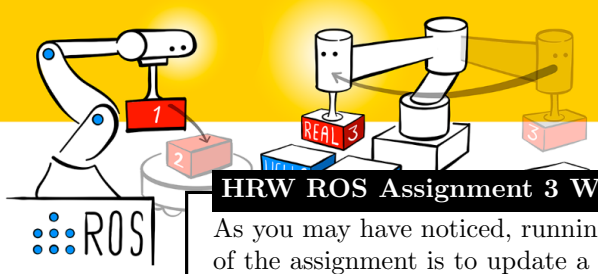


HRW ROS Assignment 3 Week 1 Part 1

As you may have noticed, running all the nodes one by one can be very tiring, so the goal of this part of the assignment is to update a launch file in the `hrwros_week1/launch` folder to be able to run the two previous assignments together to obtain the same result as you obtained at the end of assignment 2 launching only one file.
You can work towards this goal in the following steps:

1. Complete the missing sections of the `hrwros_week1_assignments1_2.launch` file, which you can find in the `hrwros_week1/launch` folder, with the correct names of the nodes and files to start the ROS nodes of assignments 1 and 2.
2. Open a new terminal and run the command:

   ```
   $ roslaunch hrwros_week1 hrwros_week1_assignments1_2.launch
   ```

3. Start a new terminal and run the command rosnode list you should see all the nodes running!

To complete this part of the assignment, upload a screenshot of the `hrwros_week1_assignments1_2.launch` file, with all the correctly filled-in parts

HRW ROS Assignment 3 Week 1 Part 2

The goal of this part of the assignment is to learn how to use arguments and parameters to launch files. Use of arguments to launch files allows us to change values within launch files by specifying them along with the launch command. Uses of parameters allows us to configure some of the functionalities of our ROS nodes. In this part, you will learn how to use these two features of launch files. To achieve this goal, you can follow the steps below:

1. Go back to the terminal where you started the ROS nodes for the first two assignments. Press Ctrl+C to terminate that specific launch.

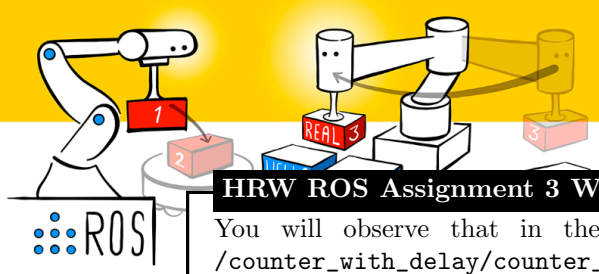
2. Run the command:

   ```
   > roslaunch hrwros_week1 hrwros_week1_servers.launch counter_delay_parameter:=2
   ```

   Notice the ":=" (colon equals) after the `counter_delay_parameter`. That is how we can pass an argument value to a launch file, provided we have defined the same argument within the `<arg>` tag in the launch file. In the `hrwros_week1_servers.launch`, this is done in line 4. Do not worry about the error thats prompts when executing this, we will fix it in the last part.

3. After running this command, you can see a lot of text output from the command and within that text output, you will see a section called SUMMARY which has two subsections namely PARAMETERS and NODES. Take a screenshot that shows the SUMMARY and the contents of the two subsections and upload it here.

Continued on the next page



HRW ROS Assignment 3 Week 1 Part 3

You will observe that in the parameters subsection there is a parameter which is called `/counter_with_delay/counter_delay: 2.0`. The value of this parameter is what you passed as the argument to the launch file. And if you look on line 13 in `hrwros_week1_servers.launch`, the parameter `counter_delay` (defined by the `<param>` tag) takes the value of the argument you just passed. The result is the value you see for this parameter in the parameter subsection. Also, defining a parameter inside the ¡node¿ tags of a launch file, makes this parameter a private parameter. Hence, the parameter in the parameter list is also prefixed with the node name, that is `/counter_with_delay`. Parameters to a node can be accessed inside a node using the `rospy.get_param()` function. Use the ROS wiki to learn how to use this function. Just google, "rospy get param" on the google search bar. After this, follow the steps below to modify the delay of the counter.

1. Go back to the terminal where you started roslaunch for the previous part and hit Ctrl+C.
2. Update the section in `counter_with_delay_as.py` file to check for and read the private node parameter "`counter_delay`" using the `rospy.has_param()` and `rospy.get_param()` functions. You will have to un-comment lines 37 to 41 in `counter_with_delay_as.py` and figure out what goes in the place of `<write your code here>` using the ROS wiki for `rospy.has_param` and `rospy.get_param` functions.
3. Go back to the terminal where you pressed Ctrl+C and run the command

   ```
   $ roslaunch hrwros_week1 hrwros_week1_servers.launch counter_delay_parameter:=2.0
   ```

4. Start a new terminal and run the command:

   ```
   $ rqt_plot /counter_with_delay/feedback/feedback/counts_elapsed
   ```

   This will start a plot window.
5. Now, in another terminal, run the action client ROS node, `counter_with_delay_ac.py` with the command:

   ```
   $ rosrun hrwros_week1 counter_with_delay_ac.py
   ```

6. Wait for the action client to display the message that the counting was successful. Run the command in point 5 again, and then go to the plot window. First click on the pause button on the plot window in the right top corner. Then click on the Pan/Zoom button of this window in the panel just above the plot, and use the right mouse click to zoom out of the default view until you see a "saw-tooth or right angled triangle" waveform. Upload a screenshot of this window here.

This completes HRW ROS Assignment 3 Week 1