

Project Kratos

Electronics QSTP

Week 3 : Robotic Operating System (ROS)

Assignment Part B:

The questions of this part of the assignment are designed to make you familiar with the concepts of publishers, subscribers and custom messages. Attempt any 3 out of the 4 questions. Bonus points if you solve all 4.

Questions:

Q1) Write a node that publishes the string 'Hello World!' on a topic /new at a rate of 15 messages per second. Also write a subscriber node which will subscribe to /new and print the messages on terminal.


Q2) There are 2 signals : S1 and S2. S1 publishes 'green' on topic /s1 for 10 seconds and then publishes 'red'. On the other hand, S2 publishes 'red' on /s2 while S1 is 'green' and 'green' while S2 is 'red'. Write a node which will publish 'red' and 'green' on topic /s1, each for a duration of ten seconds. Write one more node which will subscribe to topic /s1 and publish 'red' or 'green' on /s2 according to the above mentioned condition.

Q3) A mars rover needs to publish various information on a topic so that it can be monitored.

For this we need a single custom message in which every information can be contained. Create a custom message to publish the following things in one single message:

- a) Velocity of the rover (linear + Angular)
(Hint: Use Twist message in geometry_msgs)
- b) Distance travelled
- c) Coordinates of rover (Hint: Use Pose message in geometry_msgs)
- d) Battery power level
- e) Time of travel

Use the appropriate predefined messages in std_msgs, nav_msgs, geometry_msgs packages to create a custom message which will contain this info.



Q4) You have to publish a clock system on a topic `/clock`. You have to do it the following way : There will be 3 topics `/hour`, `/minute`, `/second`. A count from 0 - 60 will be published on `/second` at a rate of 1 message per second. After it crosses 60, the count on `/minute` topic will increment. Similarly, count on the topic `/hour` should increment after the count `/minute` topic crosses 60. Also publish the complete time on the topic `/clock`. Write nodes with appropriate publishers and subscribers to create this system. (Hint: Use the `Int32` message in `std_msgs` package for publishing counts, and `String` message to publish the final time)

Submission details :

Create a package named 'electronics' and store all the codes for nodes in a separate folder called 'scripts' inside the package. Inside this folder make a separate folder for each question and store the codes in respective folders. For Q3) the message definition needs to be stored inside a directory named 'msg' with a .msg extension inside the package. Make a README file which explains which code represents which question and other details. Zip the package (not the workspace) and upload it to the classroom. Ensure that there are no build errors.

Deadline:

The deadline for this assignment is **1st June, 11:59pm**

Note 1: Submit the assignments before the due date. Any delay has to be notified with reasons. Punctuality is an essential part of the Kratos Team.

Note 2: Most of you would be doing these things for the first time, so you are bound to get struck at some point and may get overwhelmed by the course content. We don't expect you to solve everything in the first try. You have sufficient time. We highly encourage you to ask any doubt, however small or dumb you think it is. That is the only way by which you grow. Your job here is to learn and our job is to help you.

Note 3: Any feedback regarding the course structure or the assignments, is very valuable. We are also students, just like you and we have a lot of scope for improvement.

