**CENG483 HOMEWORK-3 13/11/2023**

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1. What are ROS Publisher and Subscriber? How to use them?

ROS (Robot Operating System) Publisher and Subscriber stand as important components that form the backbone of communication within robotic systems. The Publisher is for sending information from one ROS node to another, while on the receiving side, the Subscriber plays a crucial role by carefully monitoring a designated ROS topic, capturing incoming information that Publisher sends. This process provides an important communication link between nodes in ROS.

They are quite simple to use. As an example:

-Publishing of a ROS node (in terminal):

$ **rostopic pub** /topic1 my\_message\_type "data: 'Hello, World!”

-and for the other node (Subscriber) to listen:

$ **rostopic echo** /topic1

These must be entered in the ROS terminal (in separate terminals).

ROS also provides a variety of visual graphical interfaces and methods to view the status of nodes (such as “**rosnode list**” or **rqt\_graph**). With those, you can see the Publisher and Subscriber nodes easily and understand the concept faster.

**2-** What are the differences between ROS Service and Message structures?

ROS message and service structures are the foundations that enable communication and data sharing in robotic applications. Messages generally represent a one-way, continuous flow of data. They also have primitive data type support.

Services, on the other hand, represent two-way and concurrent interactions (such as request/response) between nodes. While messages are generally used in continuous data transport scenarios such as status updates, services are preferred for more specific operations.

**3-** What are ROS Node and Topic? How to use them?

The concept of ROS Node refers to the small units of ROS. Due to its structure, it can be thought of as "each one performs a different task". For example, if you want to create a system that works with ROS, it will usually consist of multiple nodes. Using different nodes for movement and different nodes for sensors is the most obvious example of this.

ROS Topic is another concept that is completely related to nodes. It is simply a mechanism that allows data to flow between nodes. Nodes can broadcast or listen to messages of a certain type within a topic. This mechanism is also clearly seen when explaining Publisher and Subscriber in the first question.

If you want to use ROS Node and ROS Topic:

- You can start running your node with a structure like:

"$ rosrun my\_package node1" in terminal.

- For ROS topics, the "rostopic" keyword is needed, as explained in the first question: rostopic pub **/my\_topic** my\_message\_type "data: 'Hello, World!”