Multiple Robots

Exercise 1: master-slave robots

Similarly to having multiple computers in the same ROS network, you can have multiple robots. In this exercise, you need two TurtleBots. So, you must **group with another team**. One TurtleBot will act as the master, while the other TurtleBot will act as the slave. The slave will follow the orientation of the master.

NOTE: When deploying multiple robots on the same ROS network, you must be able to distinguish them. To do so, we will use namespaces, via `ROS_NAMESPACE`.

1. On the master TurtleBot, run `export ROS_NAMESPACE=master`
2. On the slave TurtleBot, run `export ROS_NAMESPACE=slave`
3. Get the heading of the master TurtleBot from the `master/imu` topic on your laptop.
4. Command the angular velocity to the slave TurtleBot to match the heading of the master TurtleBot.

   NOTE: To calculate the desired angular velocity, you need a heading controller. You can implement a simple proportional controller:

   $$\omega = K(\theta_{\text{master}} - \theta_{\text{slave}}),$$

   where ω is the slave's commanded angular velocity, θ_{master} is the heading of the master Turtlebot, θ_{slave} is the heading of the slave Turtlebot, and K is the gain.
5. Define K as `rosparam` (https://mathworks.com/help/ros/ref/rosparam.html) and tune it live by using the `rosparam set` command.

RECOMMENDATION: For this exercise, create a new MATLAB script.