Week 3 Assignment

In this assignment you will be implementing a simple controller in the context of ROS. This will be a relatively short assignment.

1. PID Controller for Turtlebot

You will need to write two ROS nodes. One which publishes a path and another which automates the turtlebot along the path.

The path publishing node should publish a path as a single point using the `/geomtery_msgs/Point` message type (link for more info) over the topic `/path` For this exercise we are keeping the path as only a single goal point that the turtlebot needs to travel to.

The second node should subscribe to `/path` and implement a PID controller for turtlebot to move to the goal point received in the message. To do this it should compute the correct velocity and publish it to `/cmd_vel` topic. On receiving the goal point, the turtlebot should first rotate to face towards the goal point. They should travel in a straight line to the goal.

The PID controller should have two components, one for controlling the linear velocity of the robot and another for the angular velocity. The rotational controller will be used to rotate the robot to the required angle by computing the correct angular velocity. This angular velocity will be published through the `vel.angular.z` component of `/cmd_vel`. Once it is facing the goal, the linear controller should compute the required linear velocity and publish it on the `vel.linear.x` component of `/cmd_vel.`

2. Bonus

For bonus marks you can extend the above system to use a path of multiple paths. This would mean you need to use the `/nav_msgs/Path` message type (link for more info) to publish a list of multiple points. You would also need to design the controller node to be able to traverse multiple points. The robot would traverse the path one point at a time using the same behaviour as given above.

3. Submission

To submit the results of this task you will need to use `rosbag.` Rosbags are files which used to record a stream of messages on any topic. Follow this tutorial to learn how to record and play rosbag files. The bag file recorded should contain the messages published on the topics `/path` and `/cmd_vel.` Record a bag file showing turtlebot traversing the complete path.

Alongside this you should push your code to the repo created in the first assignment. For this you can copy and paste the code directory into the directory with your git repo and then use the `git` command.