

This is the Part 3 of ROS task. In this task we have to precisely control the velocity of the motors using a PID controller.

**DISCLAIMER:** The speed measurement system (IR Sensors) was not working properly even though I have tried a lot to tune it but the speed measurement was not working correctly. Therefore, I finally created a Simulink Model of the PID controller in Matlab. Nevertheless I have written an Arduino code and a node in ros which will work fine if the speed measurement is good or an encoder is used instead of IR sensor.

To do this task I have created the following:

1. Arduino code: The code first takes the values from the joystick and maps a reference motor speed, then the actual speed measured by the sensor is sent to the node, Finally the control signal computed by node is received and sent to the motors.
  2. Motor Driver: L293D Motor driver is soldered in a PCB Board along with different wires, ( enA, enB, in1, in2, in3, in 4, Vcc, Gnd , Vin). Then the driver is connected to the arduino via breadboard.
  3. Subscriber Node: The program `pid_controller_ros.py` takes the reference and actual motor speed, computes the error/difference and finally sends the desired control signal to the Arduino.
- ❖ Command for terminal: First of all, the `joy_sub_motor_pub.py` program should be saved in the catkin file the run the following code:

- `roscore`
- `source/devel/setup.bash`
- `roslaunch rosserial_python serial_node.py /dev/ttyACM0`
- `source/devel/setup.bash`
- `roslaunch joy_subs pid_controller_ros.py`

I have uploaded the following:

- I. Arduino code: `PID_controller_ros.ino`
- II. ROS Node: `pid_controller_ros.py`
- III. Video demonstration
- IV. Picture of the Graph showing the Motor speed after PID control.
- V. Node Graph: `rqt_graph.png`
- VI. Pictures of the Physical Model