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Real-Time Systems

3-LAB motor position control

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Lab 3 motor position control

The main objective is to control the position of a EMG30 dc motor.
The motor should move in steps from +90º to -90º each second.
Motor is powered by an arduino motor shield rev3 (or a keyes L298 red board)
Motor positioning is obtained based on a quadrature encoder (360 pulses/revolution)
To control the motor position, a Proportional-Integral-Derivative (PID) controller is recommended

Connect the motor as follows:

- Hall sensor B (purple) to pin 19
- Hall sensor A (blue) to pin 2
- GND to hall sensors (green) to GND
- Power to hall sensors (brown) to 5V
- Motor power 12Vdc (red) to motor shield A+
- Motor ground (black) to motor shield A-
- For old (red) boards based on L298 driver: connect ENA to pin 3, IN1 to pin 11 and IN2 to pin 12

Send code to the raco

Lab 3 motor position control

Step 1: test PWM output value on pin 3 to change motor speed

Step 2: test motor direction based on pin 12 to change rotating direction (old red boards require complementary value on pin 11)

Step 3: get motor position from the encoder

Step 4: plot data

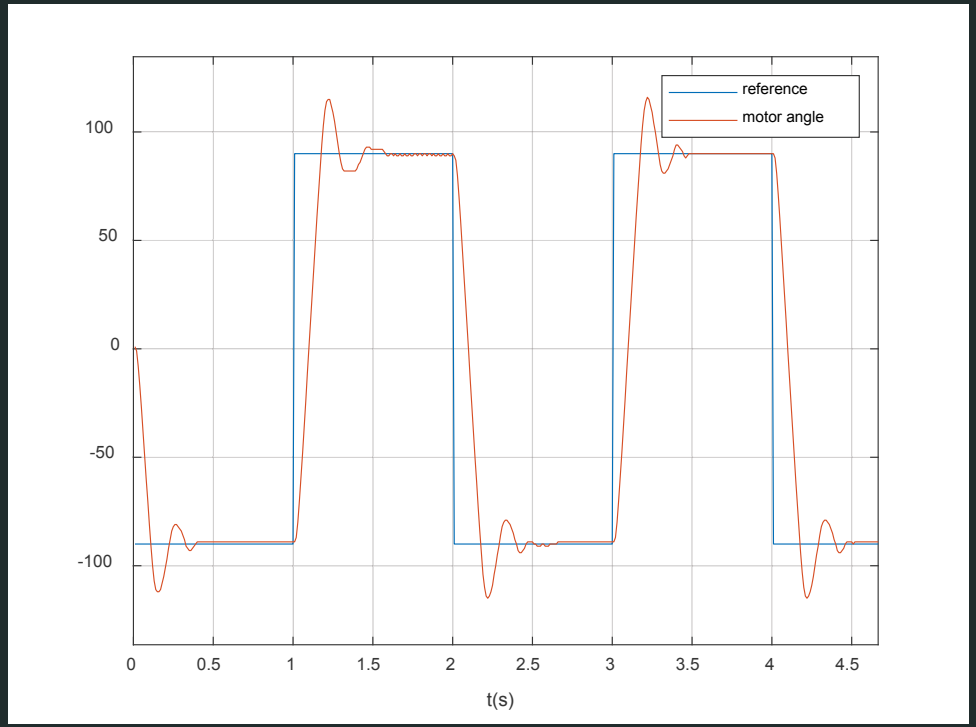
Step 5: create a variable reference changing from

+90º to -90º each second

Step 6: close the loop with a PID feedback controller

in order to make the output motor position to follow

the reference value. This loop should execute each 10 ms.



Step 7: fine tuning of the controller gains to make the system behave fast and smooth