

### Lab Session: Running motor using microcontroller and interfacing of encoders

1. To run motor through microcontroller XEP 100, we will use PWM interface and program it to give certain duty cycle. An H bridge amplifier will be used to take PWM and direction input and drive the motor eventually. All the details are posted in slides and relevant documents on moodle. Use sample programs to get motor driven by PWM input with 10%, and 60% duty cycle. Use easyscope to see PWM signals and observe difference of running motor at different duty cycles.
2. To read the encoder pulses A and B and convert them into digital count a decoder chip HCTL 2021 is used. Study the input and outputs of the chip and identify the logic to read the encoder count eventually through digital i/o pins of XEP 100. A sample program is posted. Understand how it works and make connections accordingly. All the data sheets are posted on moodle along with a sample program. Understand and figure out how things are working. Use Easy scope to see signals in the oscilloscope at various points in the system.
3. Now we will setup program to identify Coulomb friction and Static friction in motor gear box assembly. Idea is to increase torque input to motor linearly and note, using encoder, at what point motor actually starts running and then decrease torque linearly to observe at what point motor stops. Torques corresponding to starting point and stopping points would be static friction and Coulomb friction respectively.
4. **Challenge:** Think how you can measure backlash in the system and discuss with TA or instructor before actually implementing your measurement idea.