MISR UNIVERSITY FOR SCIENCE AND TECHNOLOGY
COLLEGE OF ENGINEERING
MECHATRONICS DEPARTMENT

MTE 405 SENSORS AND MEASUREMENTS

LAB 5 – SPRING 2020

Lab 5

Goals Of The Lab

Simulation of Encoder

Simulation of Servo Motor

Encoder Channels

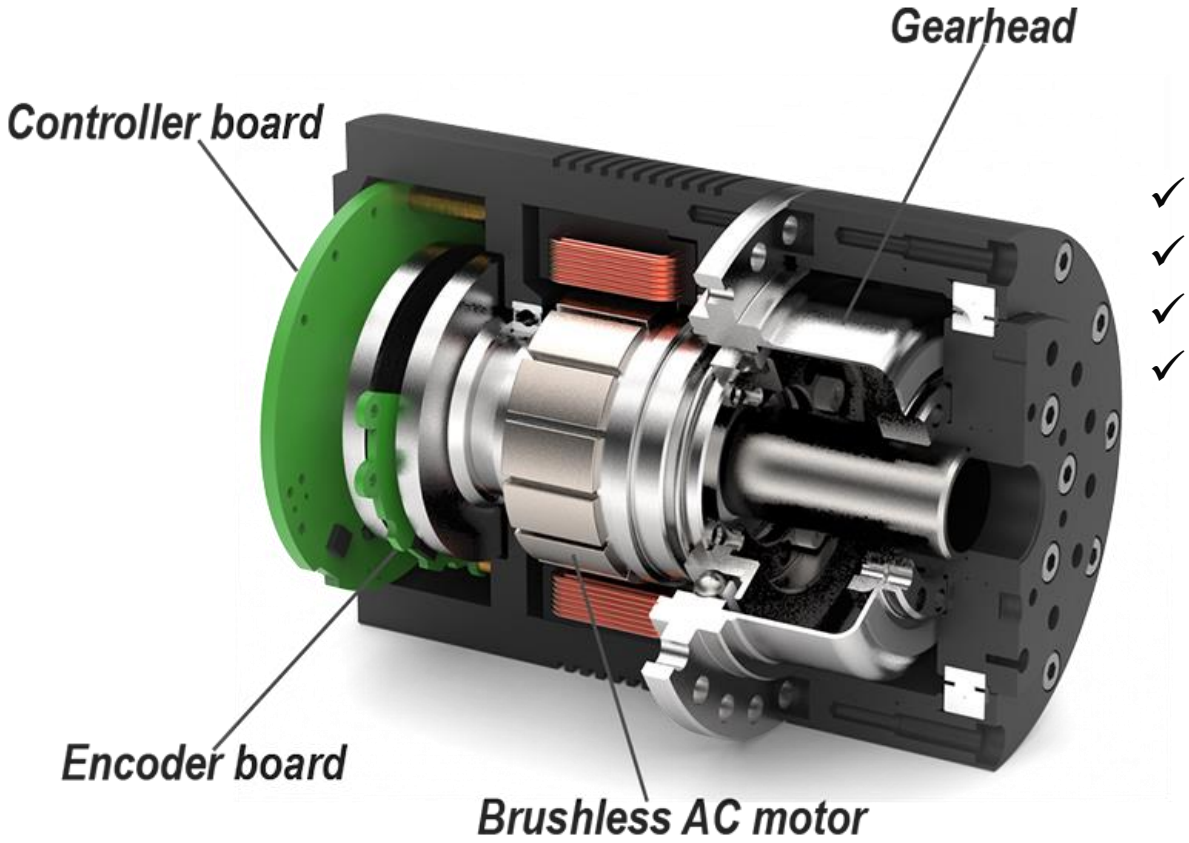
Combine Encoder Counts

Lab 5

Exercise 1

Simulation of Servo Motor

Servo Motor

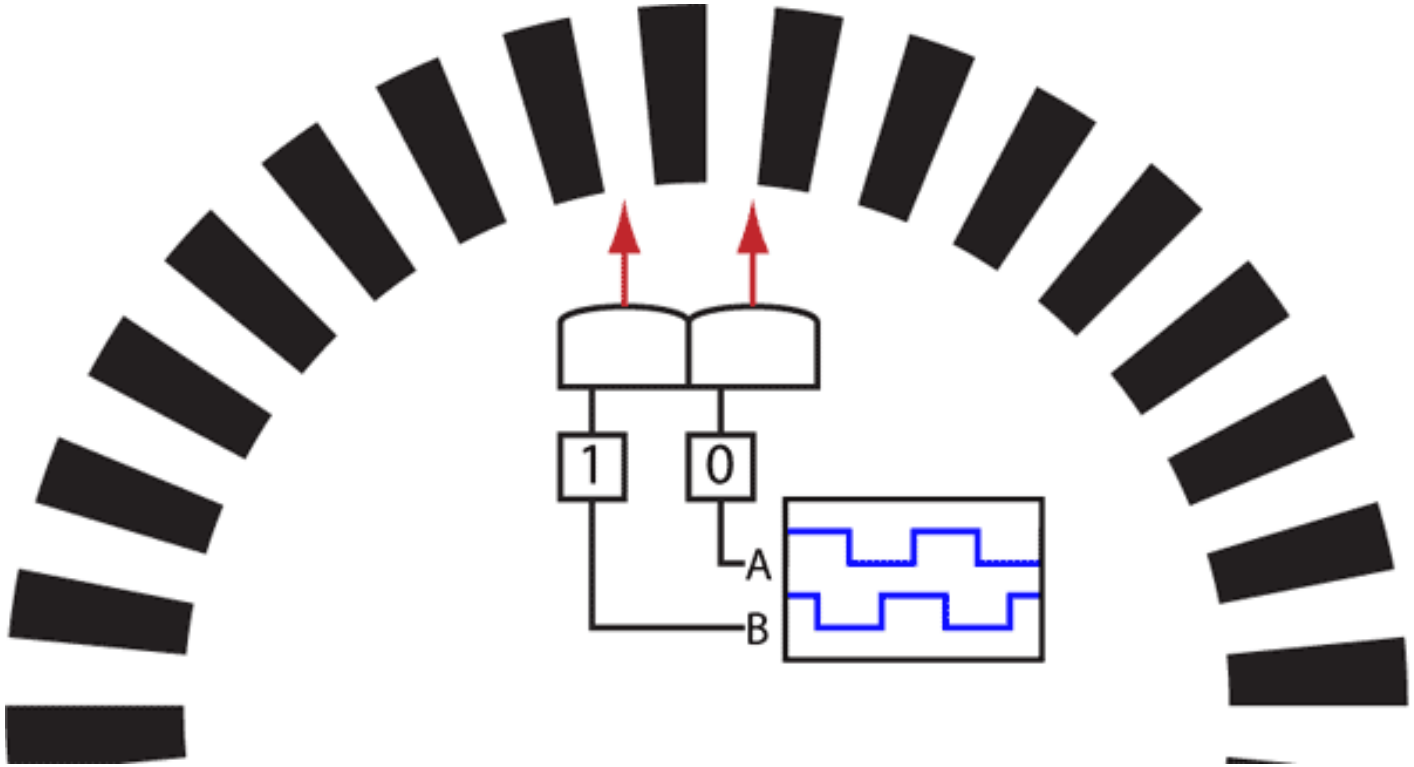


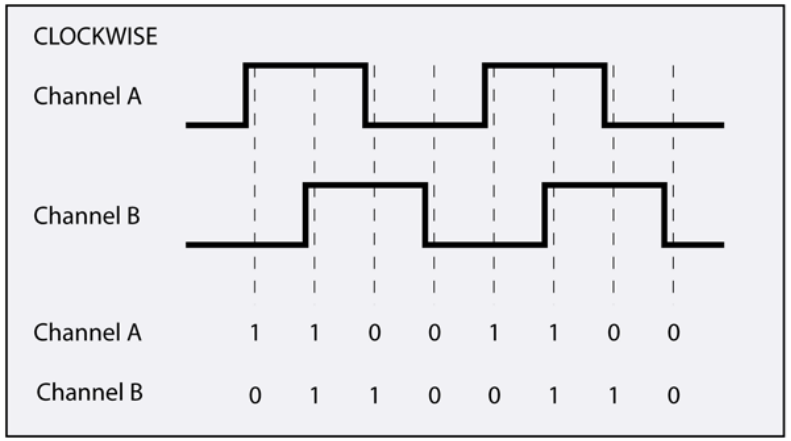
- ✓ **Motor** : DC or AC
- ✓ **Quadrature Encoder** : 2-channels (*90^{o} phase shift*)
- ✓ **Gearbox** : Speed reducer (*Torque booster*)
- ✓ **Controller Board** : For motor and encoder conditioning. Some with :
  - on-board *PID controller* and speed, temperature and current *feedback (smart motors)*.

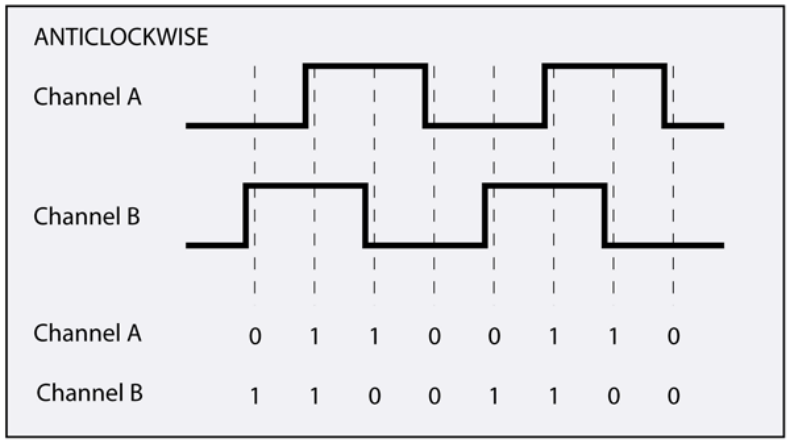
  Examples :
  HerkuleX Smart Servo
  XYZrobot Smart Servo A1-16
  Dynamixel Smart Servo

Lab 5

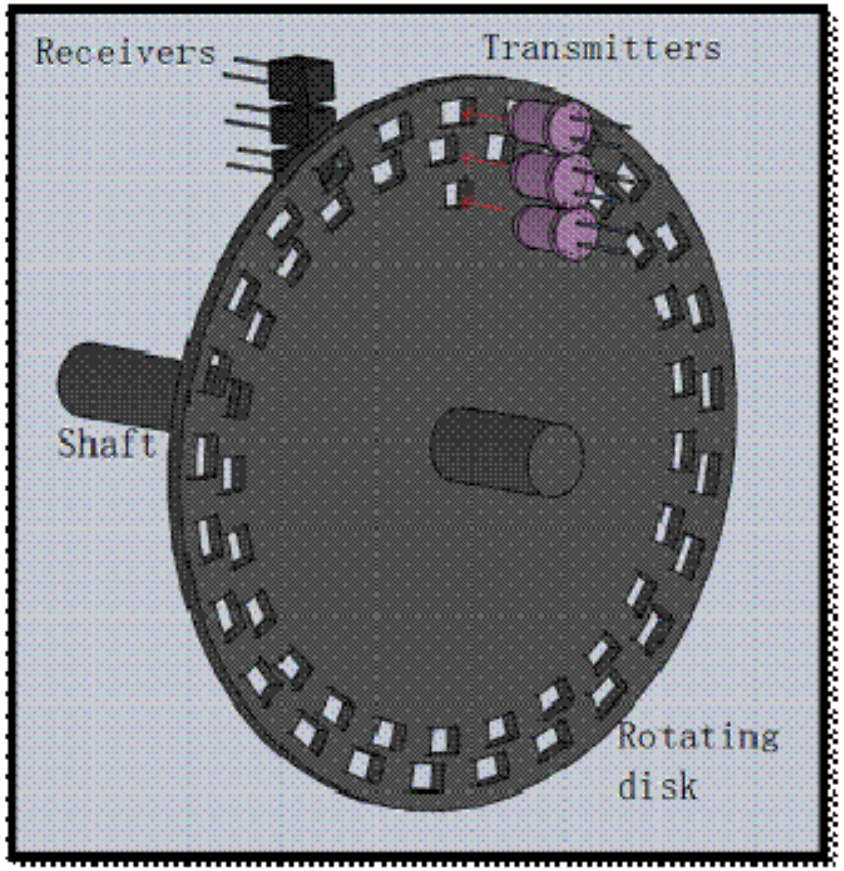
Quadrature Encoder

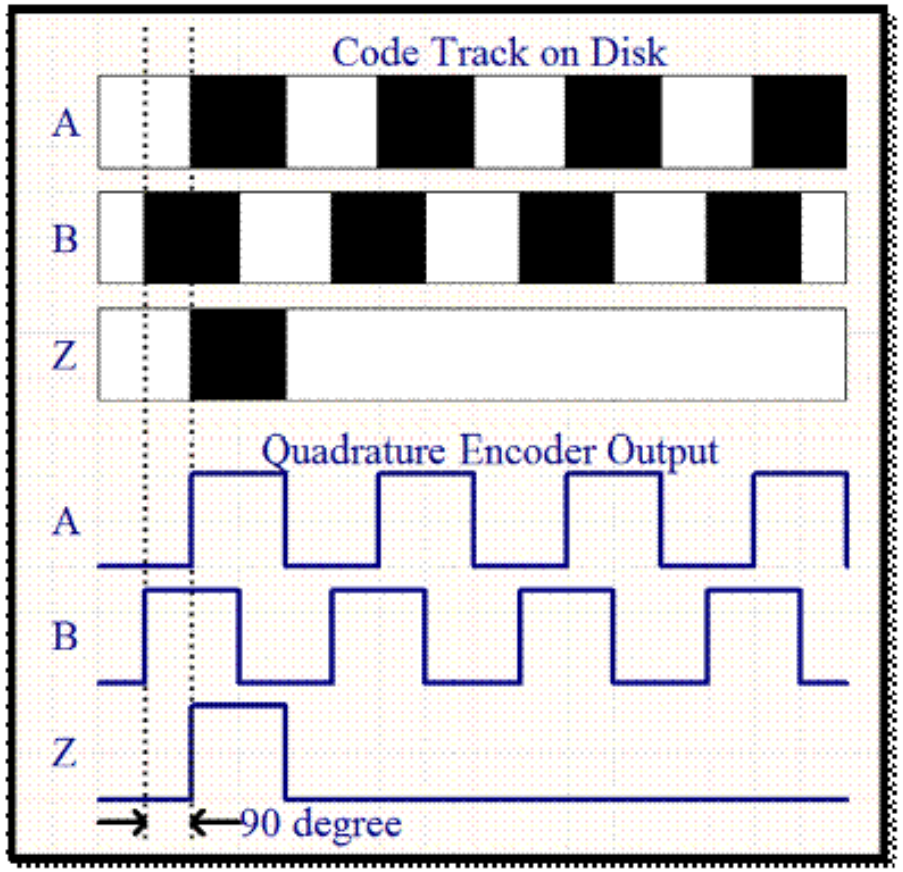






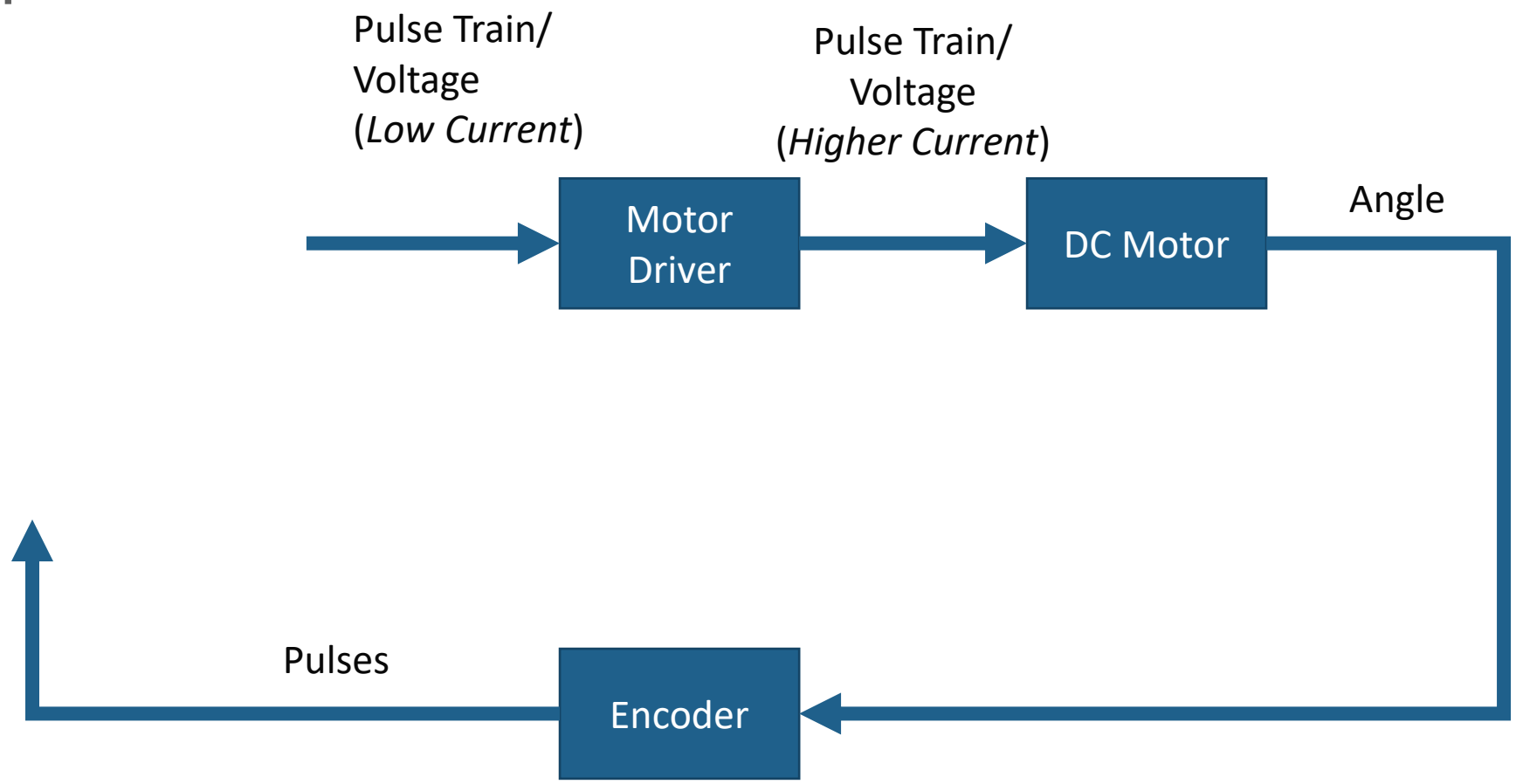
Quadrature Encoder





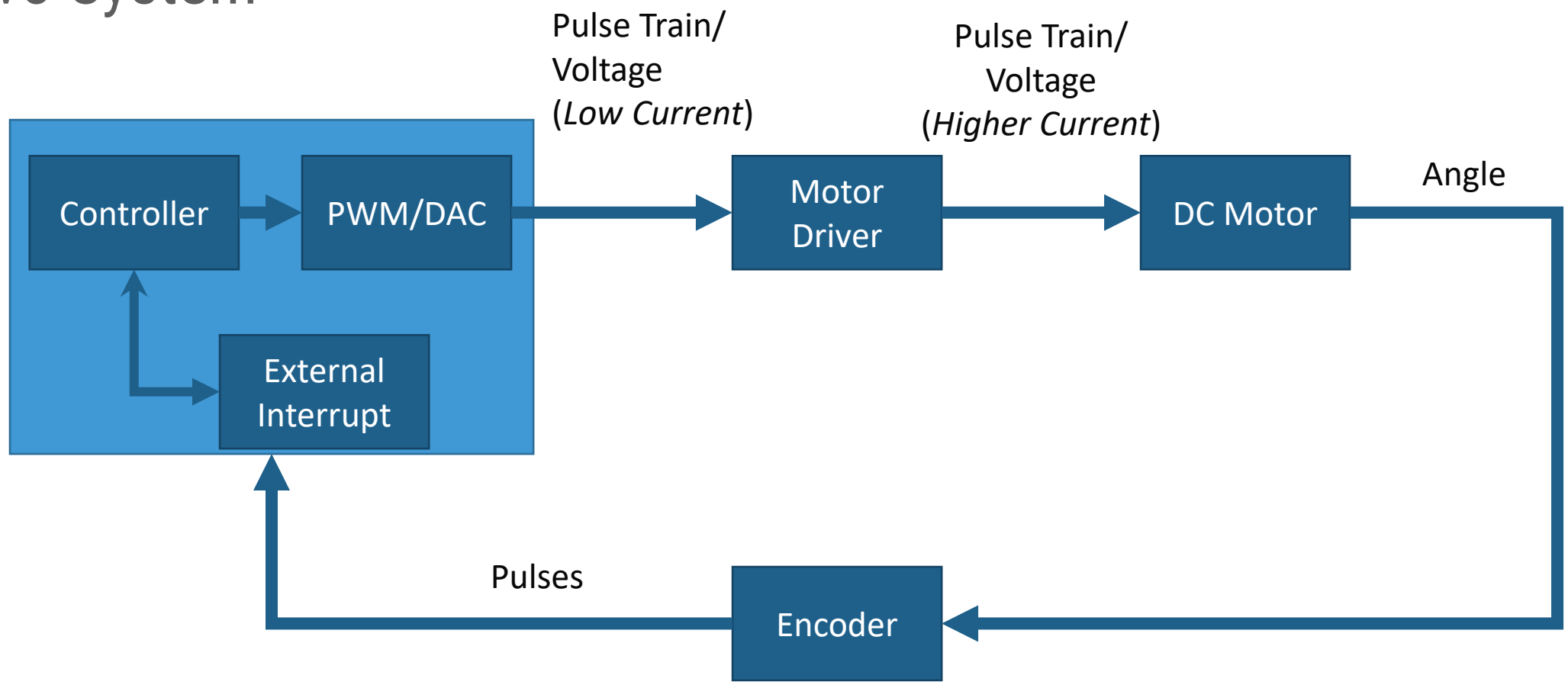
Lab 5

Servo System



Angle = Measurable Speed = Calculated

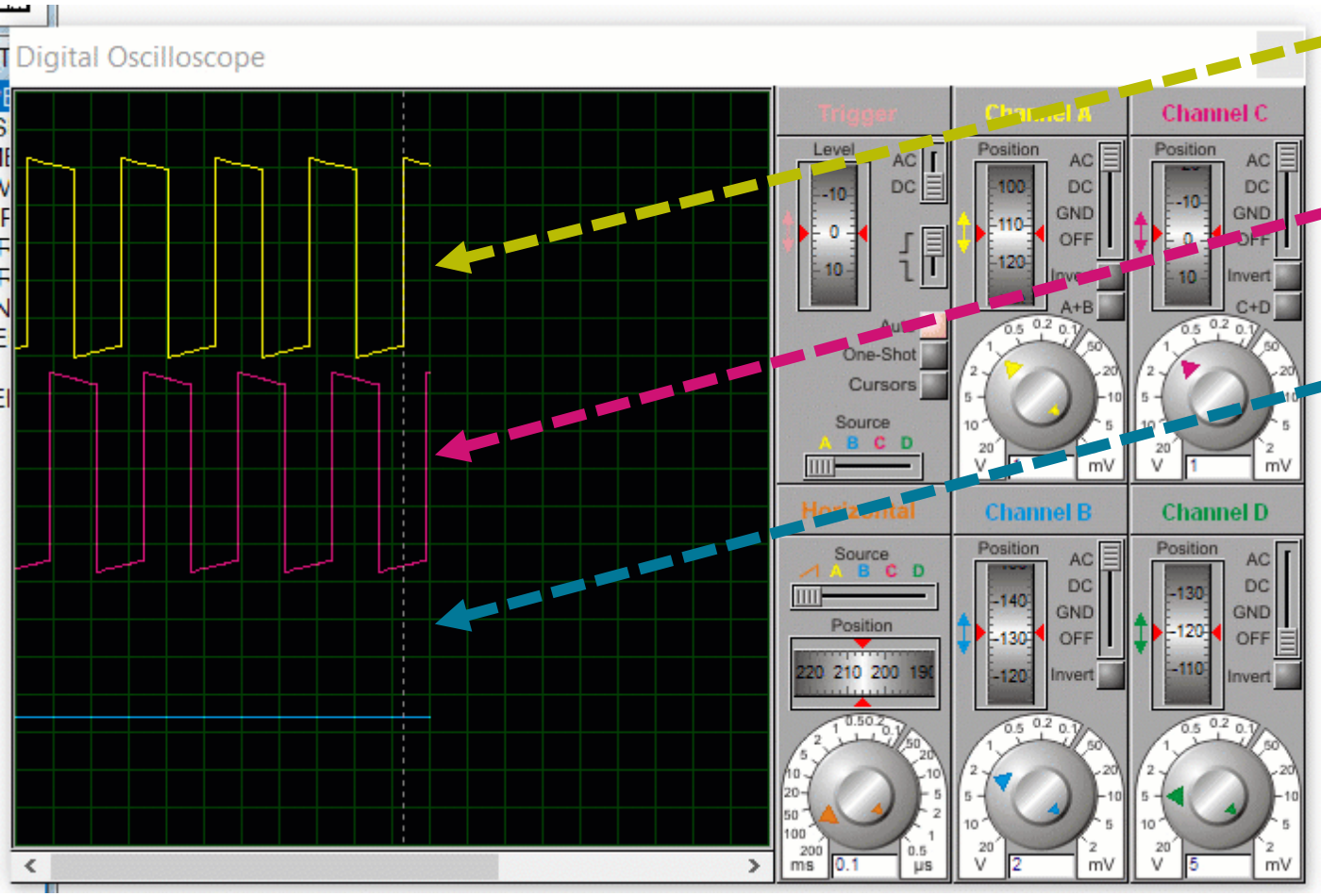
Servo System

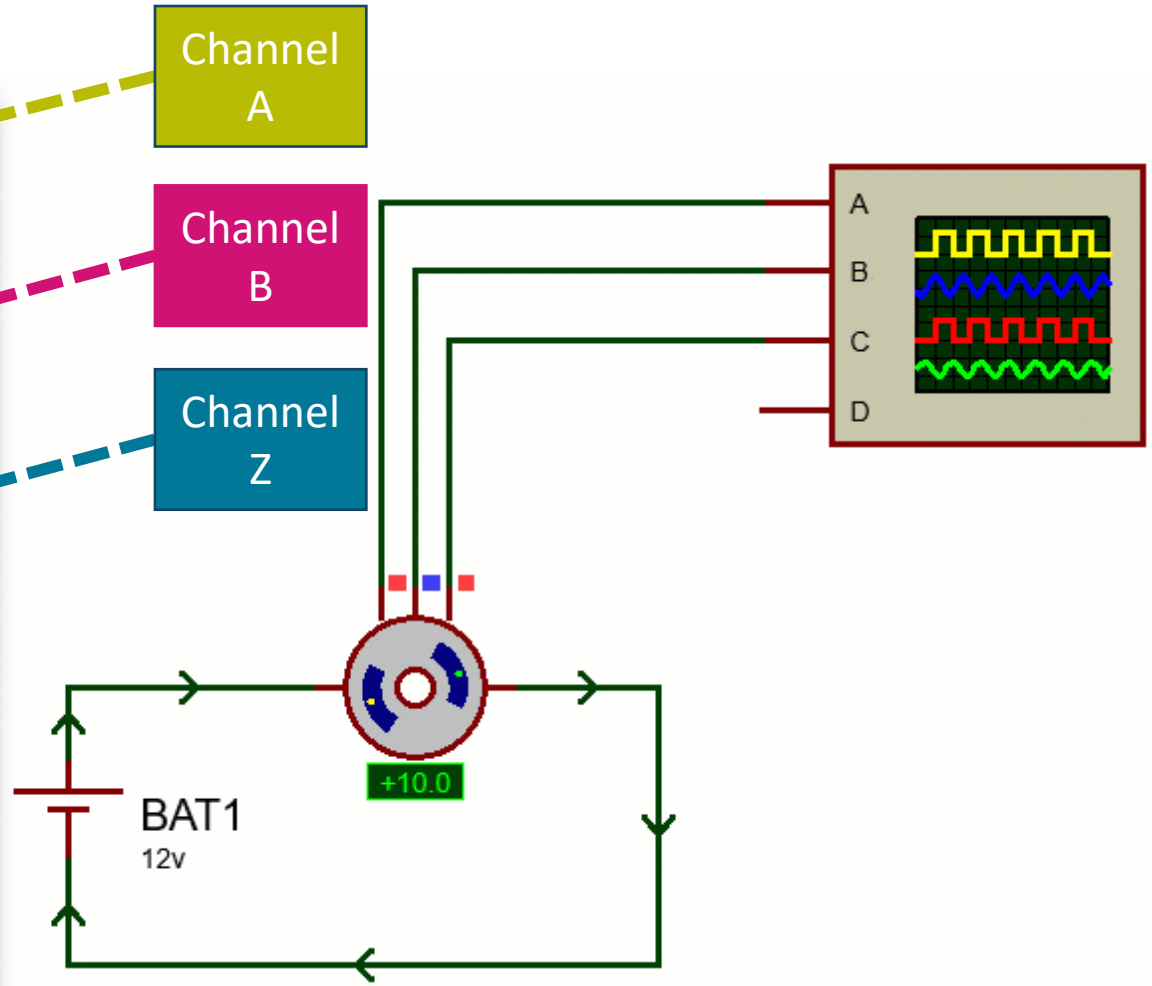


Angle = Measurable Speed = Calculated

Lab 5

Simulation of Servo Motor





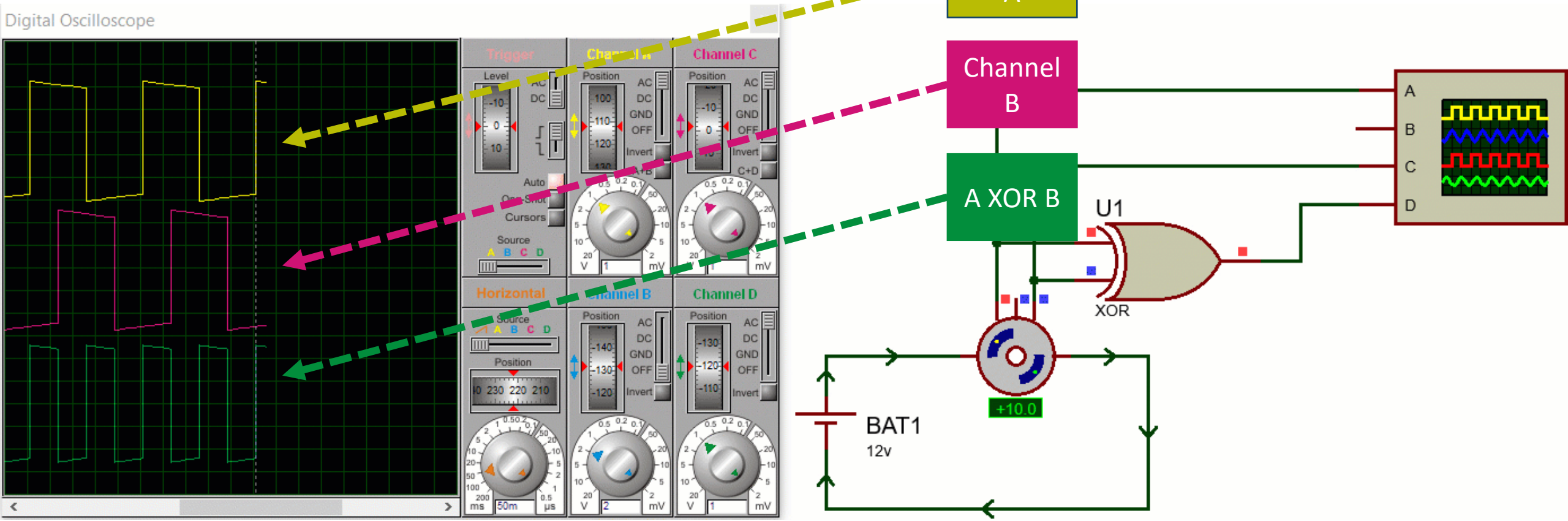
Lab 5

Exercise 2

Combining Encoder Count

Lab 5

Combining Encoder Count



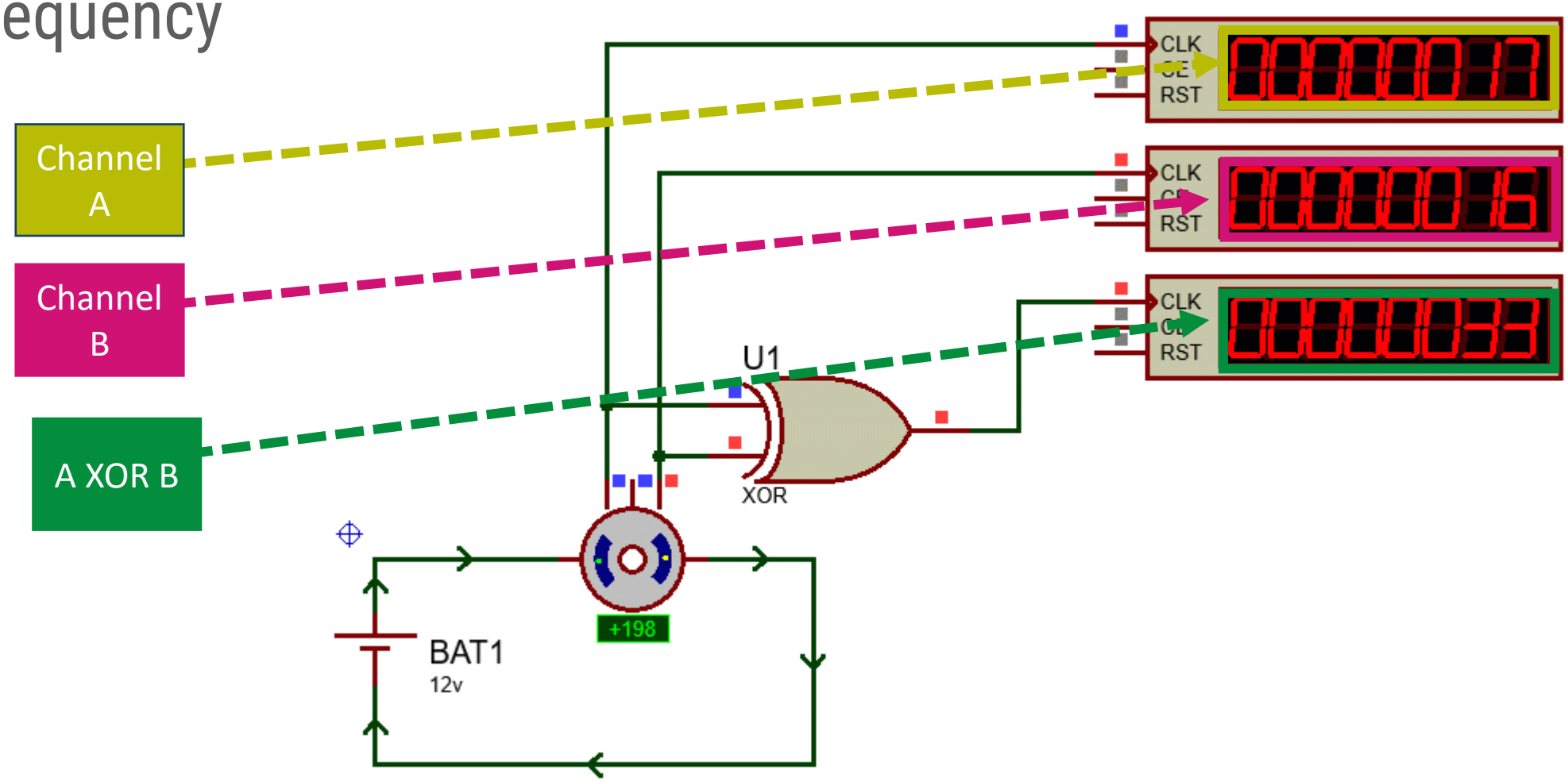
Lab 5

Exercise 3

Encoder Frequency

Lab 5

Encoder Frequency

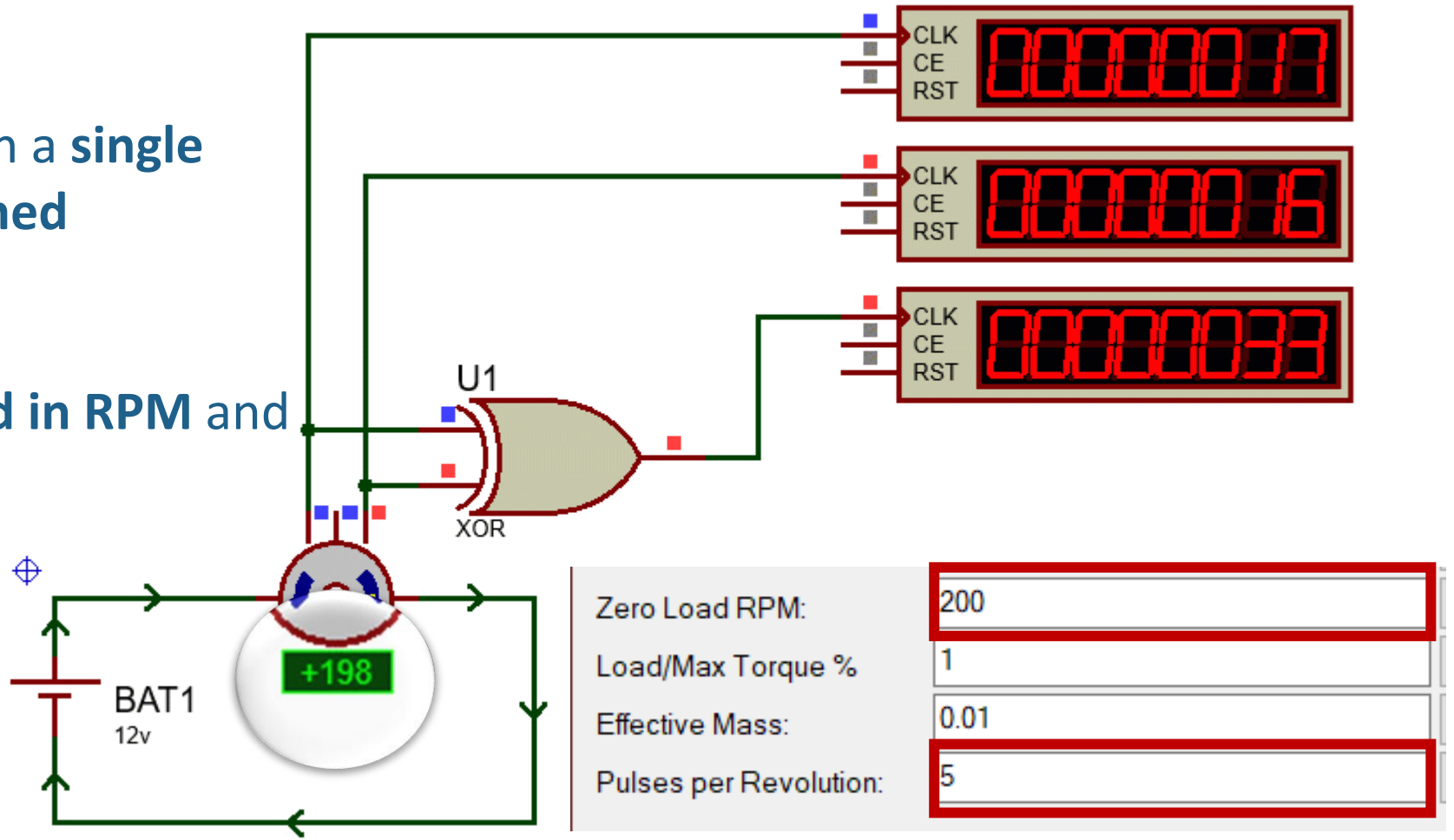


Assignment 4

The frequency shows **17 Hz** on a **single channel** and **33 Hz** on **Combined channels**.
How could this be explained?
(pay attention to **motor speed in RPM** and **pulses per revolution**)

- Prove your answer by Calculations
- Calculate the error

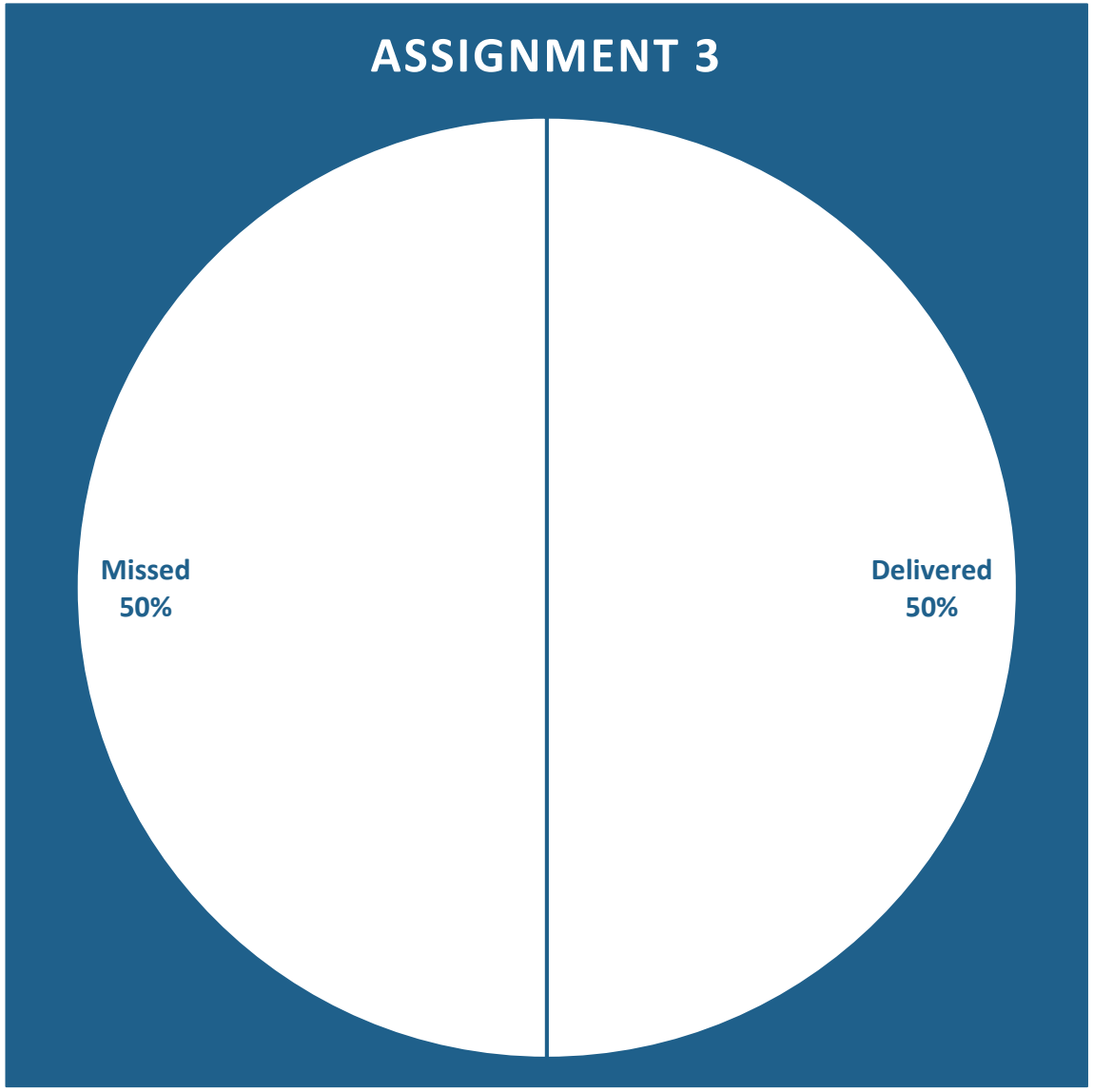
Due **Before** 24-04-2020

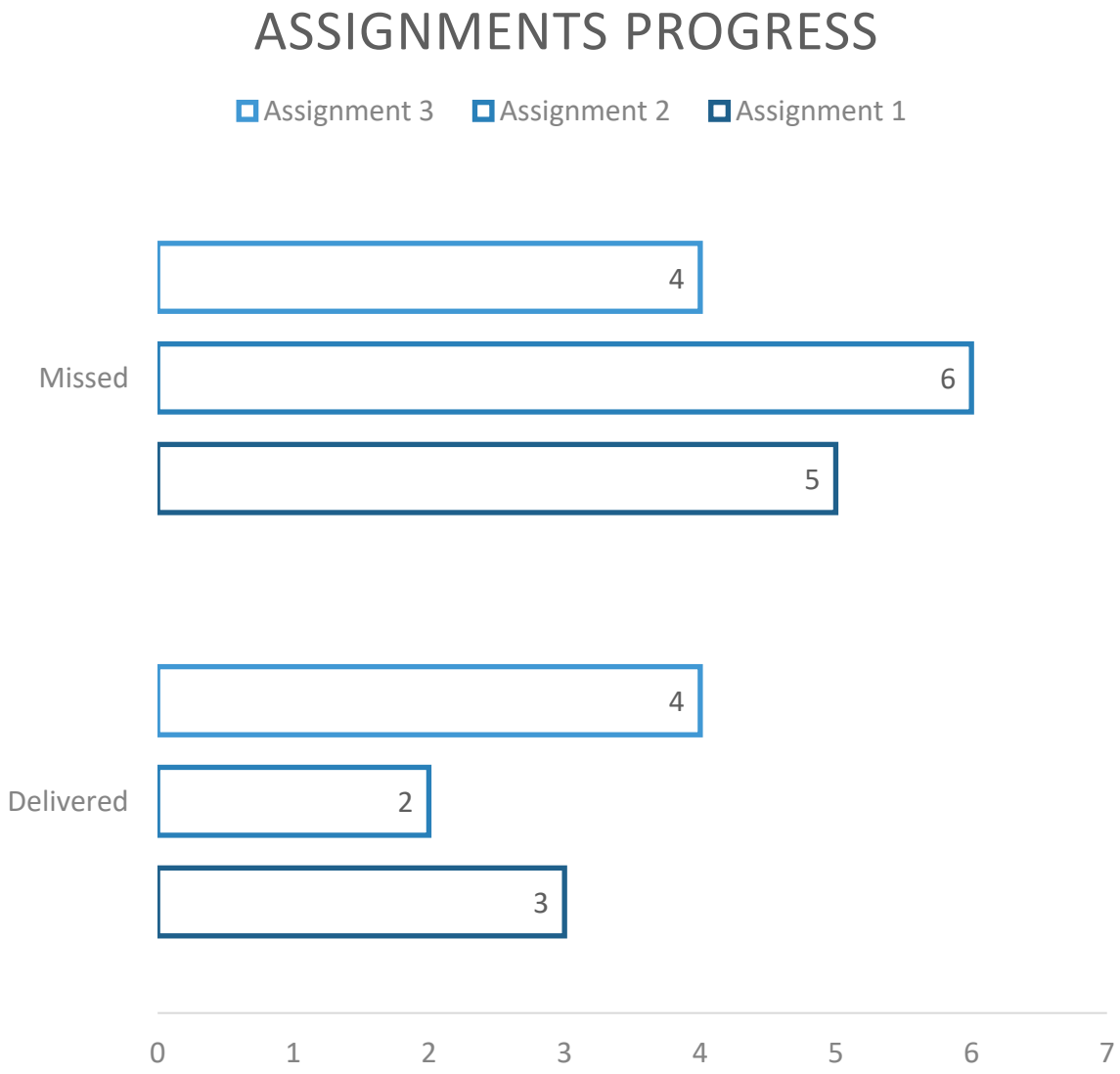


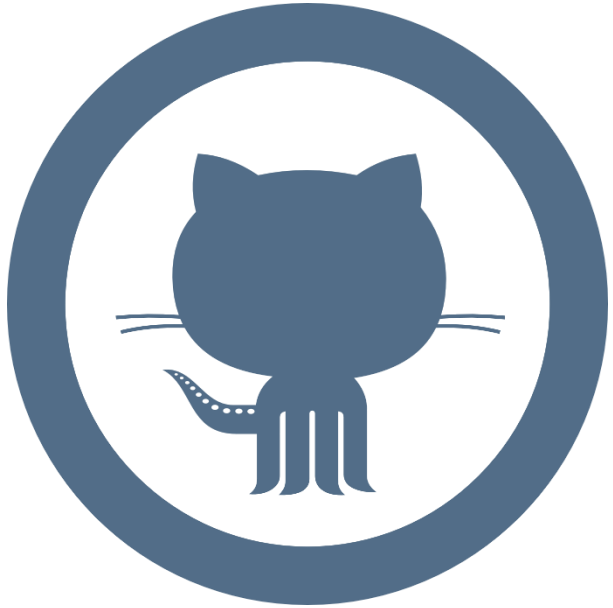
Self Study

- Arduino **External Interrupt**.
- Arduino **TimerOne** .

Practice on both to be ready for the next lab


ASSIGNMENT 3
Missed
50%
Delivered
50%


ASSIGNMENTS PROGRESS
Assignment 3
Assignment 2
Assignment 1
Missed
4
6
5
Delivered
4
2
3
0
1
2
3
4
5
6
7



Don’t forget to pull the lab update from.

http://github.com/wbadry/mte405

END OF Lab 5