Course Code	**MEE428 Real Time Control**		
Homework #3	**Reading Encdoer and Observing Data on MATLAB App**		
Related Learning Outcome:	**2**		
Group Number:			
Group Member ID	**Group Member Name**	**Group Member Surname**	**Group Member Signature**

Grading			
Q1 (20%)	Q2 (20%)	Q3 (30%)	Q4 (30%)

Due Date: 30.03.2024

Needed software

- MATLAB 2021a or newer
- Matlab Simulink Support Package for Arduino Hardware

Needed hardware

- Arduino UNO
- Potentiometer
- DC Motor with Encoder
- DC Motor Driver

1) By using "*Matlab Simulink Support Package for Arduino Hardware*", connect a potentiometer and a DC Motor driver to appropriate pins of Arduino UNO. Read analog input value of the potentiometer and set DC Motor voltage in accordance with 10-bit analog value of the potentiometer by calibrating to work system in bi-directional in real time with external mode. Count the encoder pulses by using external interrupt block in both directions (positive for CW and negative for CCW) with connecting two channels of encoder and determine the real time position of the DC Motor accordance with necessary transformation from pulses to angle in degrees. Show the 10-bit analog value, PWM percentage that is utilized to DC Motor terminals, encoder pulses and motor position in degrees on real time plots.

2) With the same model that is utilized in Question – 1, add "Serial Transmit" block to send motor position value via serial communication and deploy the model to Arduino UNO. Drive the DC motor offline by rotating the potentiometer knob and read the resultant serial communication line by using appropriate program (Arduino IDE is recommended).

3) Create a MATLAB App, which contains at least three buttons and one textbox. The UI elements should be functional with followings;
    - A button to start a connection between Arduino and the MATLAB App
    - A button to close the connection between Arduino and the MATLAB App
    - A button to start reading serial communication data that comes from Arduino
    - A textbox that shows the incoming data from Arduino

4) By using hardware with deployed model in Question – 2, utilize a MATLAB App, on which the motor position can be observed on the textbox placed for incoming data in real time. Apply the specified functionalities to UI elements.