CS321 - Assignment 4

Problem Statement:

Part A:

Use an ADC to convert an analog input voltage to digital value and then display it on the LED display of the kit. Control the speed a stepper motor through this analog voltage. Higher the voltage higher should be the speed of the motor. What happens when the voltage is at the highest? (<u>CAUTION</u>: Do NOT provide an analog input voltage greater than 4.75V)

Part B:

Mount a pointer on the shaft and a calibrated paper dial across the shaft of the stepper motor. The pointer should point to the voltage (on the dial) corresponding to that input to the ADC.

Bonus:

(i) In what way(s) can you measure the actual speed (rpm) of the motor? Implement it, if you can.

(ii) What is the maximum rpm you can achieve with this motor?

(iii) What happens if you do not provide a delay in the program controlling the motor? Explain the phenomenon.

(iv) What is the minimum possible resolution (angle) of the motor shaft?

(v) Imagine a case if the shaft of the stepper motor had to be rotated in a manner cycling through steps (a) through (e) given below:

(a) Rotate clockwise with speed X1 for 1 sec.

(b) Rotate clockwise with speed X2 for 2 sec.

(c) Rotate clockwise with speed X3 for 3 sec.

(d) Rotate clockwise with speed X4 for 4 sec.

(e) Stop for a second.

(NB: X1<X2<X3<X4)

What kind of an analog voltage pattern would you expect to provide to give as input? Provide a Voltage vs time graph.

If the shaft of the motor were to be made to rotate anticlockwise in steps (c) and (d) what would be the nature of this voltage? Explain.

Deadline:
September 3rd 2018, 9:00am (for both part (a) and part (b))
Evaluation will be during the lab hours on September 3rd 2018 (Monday)