

ADC and PWM Interfacing

ERTS Lab, CSE Department

1 Lab Objective

1. Understand ADC and PWM in ATmega 2560
2. Get acquainted with using Joystick and Servo Motor
3. Interfacing of Joystick module, Servo Motor, USER_SW and GLCD

2 Pre-requisite

This lab assumes you have completed Lab-1, which means you are aware of the working and how to interface GLCD module with the eYFi-Mega board.

3 Problem Statement

In this lab you have to use **Joystick module**, **Servo Motor**, on-board **USER_SW** and **GLCD** provided in the lab kit and interface them with the board.

1. Use the inbuilt ADC to interface a Joystick module with eYFi-Mega board. You can refer to the pin diagram of the Joystick module as shown in the figure below. You have to interface the **V_x** pin of the module to **ADC1**, **V_y** pin to **ADC2** and **SW** pin to **PA0** on the board. Write a program to get the **10-bit** digital readings of the X and Y values of the module. You can refer to the **6. Analog Input ADC** experiment of ATmega 2560 from the Quick Bytes <http://products.e-yantra.org/eyfi-mega/tutorials/>.

The digital readings of the module should be displayed on the GLCD in the following format:

- (a) **X value** = <digital_X_reading> on Line 1
- (b) **Y value** = <digital_Y_reading> on Line 2

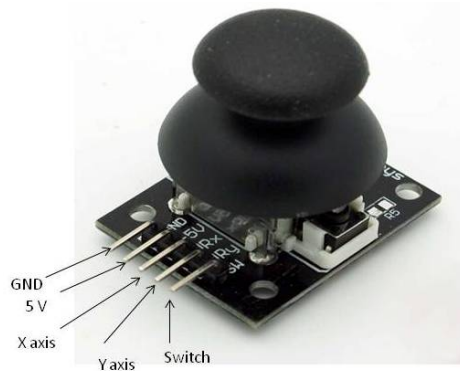


Figure 1: Joystick module pinout

(c) **Switch** = <ON/OFF> on Line 3

2. Interface a Servo Motor with eYFi-Mega board and control it using the on-board **USER_SW** switch. The motor should first rotate by **20° clockwise** on each switch press, and then should rotate **anti-clockwise** back to its original position.

This cycle should repeat itself, meaning one should be able to rotate the motor clockwise, anti-clockwise, again clockwise and so on based on each switch press.

Make sure the motor does not rotate beyond the operating range.

3. Interface GLCD with the eYFi-Mega board as you did in Lab-1. You have to place **plus "+"** symbol at the centre on GLCD (Team can choose to whether use **Page 0** or **Page 1**).

The plus symbol should move on the GLCD according to the movement of the Joystick module (up to down, left to right, top-left to bottom-right and top-right to bottom-left).

When the Joystick is stationary, the plus symbol should be at the centre and only when the knob of Joystick is moved, the plus symbol should displace accordingly.

4 Demo and Submissions

- You have been issued a take-away kit to work on the experiment.
- You have to get your output verified by your TA on the lab day.
- There will be a folder **Lab-2** already created on that repo. Add Project folders of all the above **three** Problem Statements in that folder of Github repository shared with you.
- Name each folder as **Problem_Statement-1**, **Problem_Statement-2** and so on.
- Deadline for completing **Lab 2** is **Wednesday, 5th February 2020** by **3 PM**.
- Upload a well documented code with comments of the experiment every week after you have completed the experiment.