ELEC 3300

LAB 5: ADC FUNCTIONS

A. OBJECTIVE:

1. To familiarize yourself with the MINI-V3 Development Board.
2. To understand programming of the ADC function.

B. PRE-LAB ASSIGNMENT:

1. Watch the Video 1 – Part I : Development Environment from the course Canvas.
2. Watch the Video 2 : Intro to CubeIDE from the course Canvas.
3. Study the information about MINI-V3 Development Board from the course Canvas.
4. Study the ADC Section of the Reference Manual of STM32.
5. Study the Tutorial for LAB5.

C. LAB SETUP DETAILS

1. According to the information from Tutorial for LAB5, generate a Project for LAB5 Task 1 to Task 4 using CubeIDE.
2. This LAB is an extension from LAB2 and LAB3, it will use the LCD to display the ADC information and K2 for input. You need to refer to the Tutorial for LAB2 and LAB3 for corresponding information.

D. EXPERIMENT

In this LAB, there are 4 tasks.

Task 1 – Using ADC1 to display Single ADC Conversion result of the external VR on LCD when K2 is pressed.
Task 2 – Using ADC2 to display Continuous Conversion ADC results of the external VR on LCD.
Task 3 – LDR Measurements.
Task 4 – Light Intensity System.

E. PROCEDURES

Task 1 – Using ADC1 to display Single ADC Conversion result of the external VR on LCD when K2 is pressed.

You need to write a program to display an ADC conversion result in both decimal and hex.
The converted value will be updated when K2 is pressed.
You are required to use **Single Conversion Mode of ADC1** to finish Task 1.
You need to show to your TA your main.c for verifying the mode used.

Show your result to TA with your code.

Task 2 – Using ADC2 to display Continuous Conversion ADC results of the external VR on LCD.

Change your program such that the LCD will be able to update the result at a certain period without pressing K2.
You are required to use **Continuous Conversion Mode of ADC2** to finish Task 2.
You need to show to your TA your main.c for verifying the mode used.

Show your result to TA with your code.

Task 3 – LDR Measurements.

Step 1: Replace your Variable Resistor circuit with a LDR circuit.

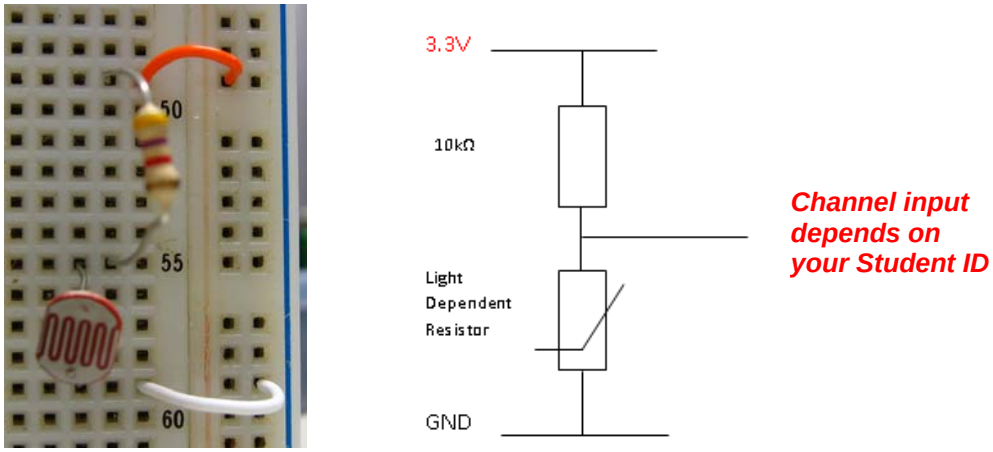

Figure 1: Light Dependent Resistor Circuit

Step 3: Run your program, observe LCD display and the value shown on Display

Step 4: Cover the Light Sensor by hand.

What is the value shown on LCD Display? _____

Step 5: Use some light to shine on the Light Sensor

What is the value shown on LCD Display? _____

Step 6: Stop the your program and swap the position of the sensors. i.e.

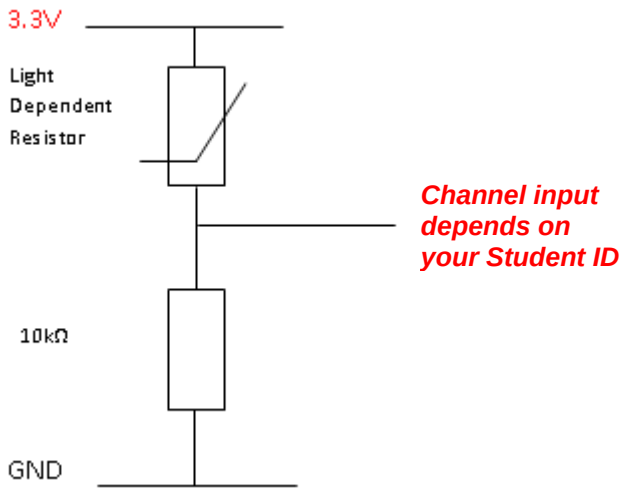

Figure 2: Swapped LDR Circuit

Step 7: Run your program, observe LCD display and the value shown on Display

Step 8: Observe LCD display and the value shown on Display

Step 9: Cover the Light Sensor by hand.

What is the value shown on LCD Display? _____

Step 10: Use some light to shine on the Light Sensor

What is the value shown on LCD Display? _____

What is the relationship between the intensity to the resistance of LDR?

_____

Show your result to TA.

Task 4 – Light Intensity System.

Using your knowledge from Task 3 and LAB2, together with the RGB LED on MINI V3 Development Board, implement a five-level Light Intensity System such that..

	Light Intensity				
	Very Dark	Dark	Medium	Bright	Very Bright
RGB LED Color	WHITE	RED	GREEN	BLUE	OFF

You can use either Figure 1 or Figure 2 on Page 2 of the LAB sheet to implement the system, as long as it follows above requirement.

You are free to choose the boundary for the system, but you need to clearly show the TA the five different levels according to the above requirement during the demo.

Show your result to TA with your code.