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. Study the information about MINI-V3 Development Board from the course website.
2. Study the ADC Section of the Reference Manual of STM32.
3. Study the Tutorial for LAB5.

C. LAB SETUP DETAILS

1. Connect the Fire Debugger according to the information about Fire debugger. Make sure that the Green LED of the Fire Debugger is ON.
2. Follow the Tutorial for CubeMX, and information on Tutorial for LAB5 generate a Project for LAB5 Task 1 to Task 4 using CubeMX. Please be reminded to set the external clock and debugger interface in CubeMX

D. EXPERIMENT

In this LAB, there are 4 tasks.

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

E. PROCEDURES

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 Tutorial for LAB2 and LAB3 for corresponding information.

Task 1 – 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 ADC** 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 – 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 ADC** 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.

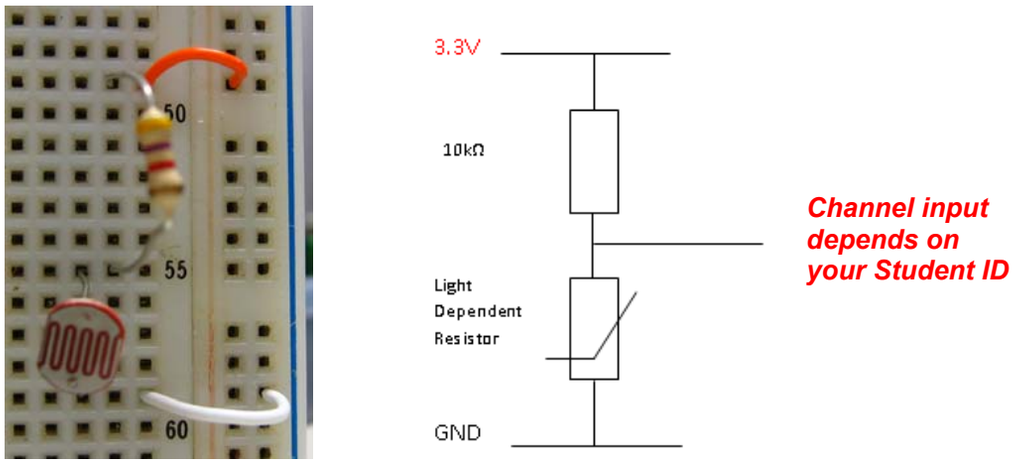


Figure 1: Light Dependent Resistor Circuit

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? 3200

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

What is the value shown on LCD Display? 200

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

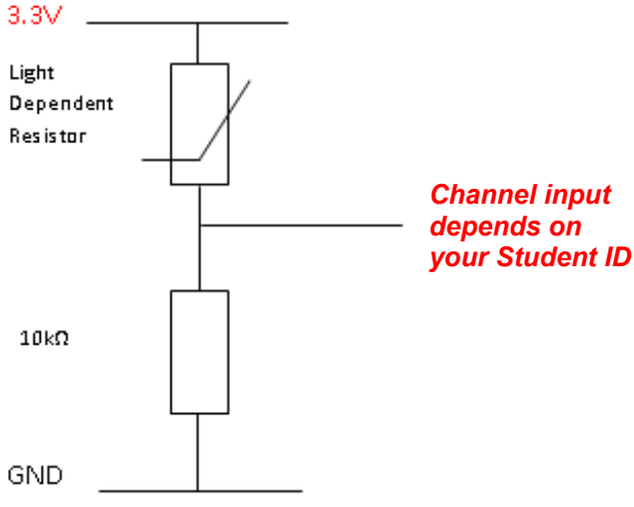


Figure 2: Swapped LDR Circuit

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? 920

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

What is the value shown on LCD Display? 3770

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

if intensity decrease, resistance increase

intensity increase, resistance decrease 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..

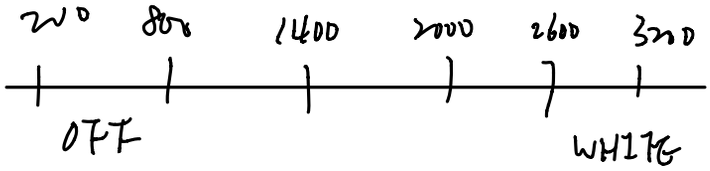
	Light Intensity				
	Very Dark	Dark	Medium	Bright	Very Bright
RGB LED Color	WHITE	RED	GREEN	BLUE	OFF

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.

Use fig 1:



bright ⟷ dark