

ELEC 3300

LAB 6: I²C APPLICATION ON HMC5883L Digital Compass IC

A. OBJECTIVE:

1. To familiarize yourself with the I²C Communication using STM32.
2. To understand the HMC5883L Digital Compass IC module.

B. PRE-LAB ASSIGNMENT:

1. Study the information about MINI-V3 Development Board from the course website.
2. Study the I2C Section of the Reference Manual of STM32.
3. Study the Tutorial for LAB6.
4. Study the HMC5883L datasheet.

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 LAB6 generate a Project for LAB6 Task 1 to Task 2 using CubeMX. Please be reminded to set the external clock and debugger interface in CubeMX

D. EXPERIMENT

In this LAB, there are 2 tasks.

Task 1 – Display Compass Result on LCD

Task 2 – Build your 7-segment display circuit according to your student ID and display the last digit of the Digital Compass on the 7-segment display.

E. PROCEDURES

In this LAB, we will use the I²C function from the MINI-V3 development board to communicate to the HMC5883L Digital Compass IC module. For the details, please refer back to Tutorial for LAB6.

Task 1 – Display Compass Result on LCD

Refer to the information in Tutorial for LAB6, write a program to display angle information from the digital compass. **With the component side facing up**, you should be able to get 0 – 359 degrees reading when the compass is rotating **clockwise**. Below is an example.



You are welcomed to design your own output, say N 20° E, but at least the reading should be consistent.

Show your result to TA.

Task 2 – Build your 7-segment display circuit according to your student ID and display the last digit of the Digital Compass on the 7-segment display.

In order to let you familiar with the board.

You are required to display the last digit using a 7-segment LED.

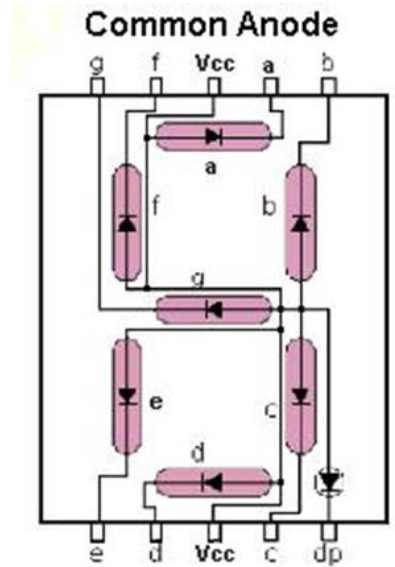
(e.g. if LCD is displaying 236, the 7-segment LED should display ‘6’)

You will be given a Common Anode 7-segment LED

Basically you need to control the 7 pins on and off.

You need to build your own decoding table.
(i.e. how to display 1, 2, 3, 4 ... 0)

Connect the V_{cc} of the 7-segment to 3.3V with a resistor.



Your Student ID 20472522

Pin Set	Actual Pin Number on STM32	Default Function of the pin on 100pin STM32F103VET6	I/O Function	Alternate Functions	Function on the MINI V3 Development Board	Can use for 7-segment LED?
A	22	VDDA	No			No
B	52	PB13	Yes	SP12-SCK / I2S2-CK USART3-CTS ^(a) / TIM1-CH1N	Camera data bus 5	Yes (not using camera)
C	25	PA2	Yes	USART2-TX ^(b) / TIM5-CH3 ADC123-1IN1 / TIM5-CH2 / TIM2-CH2 ^(b)	Camera FIFO KRST	Yes
D	72	PA13	Yes		SWD to JTAG TIM5 (debugger)	No
E	47	PB10	Yes	I2C2-SCL / USART3-TX ^(b)	Camera data bus 2	No (being used for I2C)
F	04	PE5	Yes	TRACE ₀ / FSMC-A21	IR Data	No (No external connector)
G	20	YREF-	No			No

Show your table, program, hardware and final result to TA.

In substitution, I use

PA4, PA5, PA6, PA7, PA8

+

original

PA2, PB13

a: PA2 e: PA7

b: PA4 f: PA8

c: PA5 g: PB13

d: PA6