CENG 3131: Lab for Telecom & networks – Lab 6 I2C communication

Goals: Introduce the students to I2C communication with Arduino.

1. Introduction

Equipment list:
1 Sparkfun starter kit
1 Adafruit BNO055 Absolute Orientation Sensor

2. TASK 1: Wiring

Answer the following questions:

1. Study I2C communication. What is the duplexing technology here (simplex, half-duplex, or full-duplex)? Is it asynchronous or synchronous serial communication?
2. Search I2C communication and draw a simple I2C diagram (one master device, one slave device, two resistors)
3. Check your Arduino board. What are the pins for SDA and SCL?
4. Link the Adafruit sensor board with Arduino board.
   a) Connect **Vin** to the power supply, 5V is fine.
   b) Connect **GND** to common power/data ground
   c) Connect the **SCL** pin to the I2C clock **SCL** pin on your Arduino. (refer to your pin in step 2)
   d) Connect the **SDA** pin to the I2C data **SDA** pin on your Arduino. (refer to your pin in step 2)
5. What network topology do you think it is?

3. TASK 2: Sensor reading

Download the libraries and place them under *Arduino/libraries/* folder. (find the correct libraries address)

1. Download Adafruit_BNO055 library from https://github.com/adafruit/Adafruit_BNO055. Download the zip file. Rename the uncompressed folder Adafruit_BNO055 and place it under your Arduino\libraries.
2. Download sensor reading library https://github.com/adafruit/Adafruit_Sensor and install just like step 1.
3. To test the Unified sensor system output, open the sensorapi demo in the Adafruit_BNO055 examples folder.
4. What is your port number? Please include your serial monitor screen shots. What are your sensor orientation calibration values?

4. TASK 3: Visualization

To help you visualize the data.

1. Download Processing 3.x from https://processing.org/download/.
2. Download the G4P GUI library (https://sourceforge.net/projects/g4p/files/?source=navbar) and copy the unzip file into the processing sketchbook libraries folder along with the OBJloader unzip folder (https://github.com/adafruit/Adafruit_BNO055/tree/master/OBJLoader). To find the Processing sketchbook location on your computer, open the preferences window from the Processing application and look for the "Sketchbook location" item at the top. You need to change the unzip folder names to G4P and OBJLoader.
3. Open the Processing 3.x, navigate to your Adafruit_BNO055 library folder, and open `'examples/bunny/processing/cuberotate/cuberotate.pde'`
4. Make sure that the "bunny" example is running on the Arduino. Then, click "play" icon in Processing to start the 3D animation. Print your animation.

5. Laboratory Report

In no later than 7 days from the starting time your lab section, provide the TA a hard copy of a lab report following the CENG 3311 Lab report Template given on the Black Board. You can write it down to the lab book or include your report in lab book. Each student will submit one lab report to the TA. Your report should have the reporting requirements needed for all tasks. **The TA will take off a significant number of points if your does not follow the lab template.**

6. GRADING POLICY

1. Completion of Task 1 with results included in lab report (20%)
2. Completion of Task 2 with results included in lab report (30%)
3. Completion of Task 3 with results included in lab report (40%)
4. Completeness, quality, and correctness of the lab report (10%)