Faculty of Engineering and Applied Science

SOFE 4590U Embedded Systems

Group 6 CRN 74020

Lab 3

Name	Student #
Alexander Campbell	100703650
Atharshan Kennedy	100590243
Nicole Okeke	100769799
Tiwaloluwa Ojo	100700622

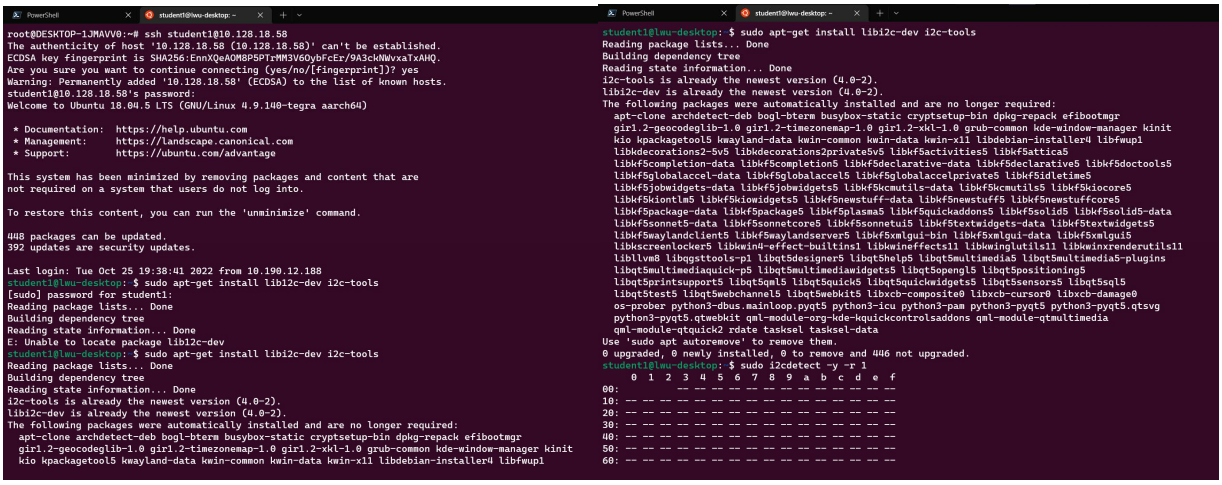
William Robinson	100751756

Introduction:

In this lab we continued with experimenting with the Jetson TX2 board to gain more understanding of how to program for embedded systems. We learned about the inter-integrated circuit serial communication method in which data is transferred along a single wire that the Jetson utilizes. We explored this by transferring data during the data transmission cycle to the LCD display that was connected to the Jetson TX2 board.

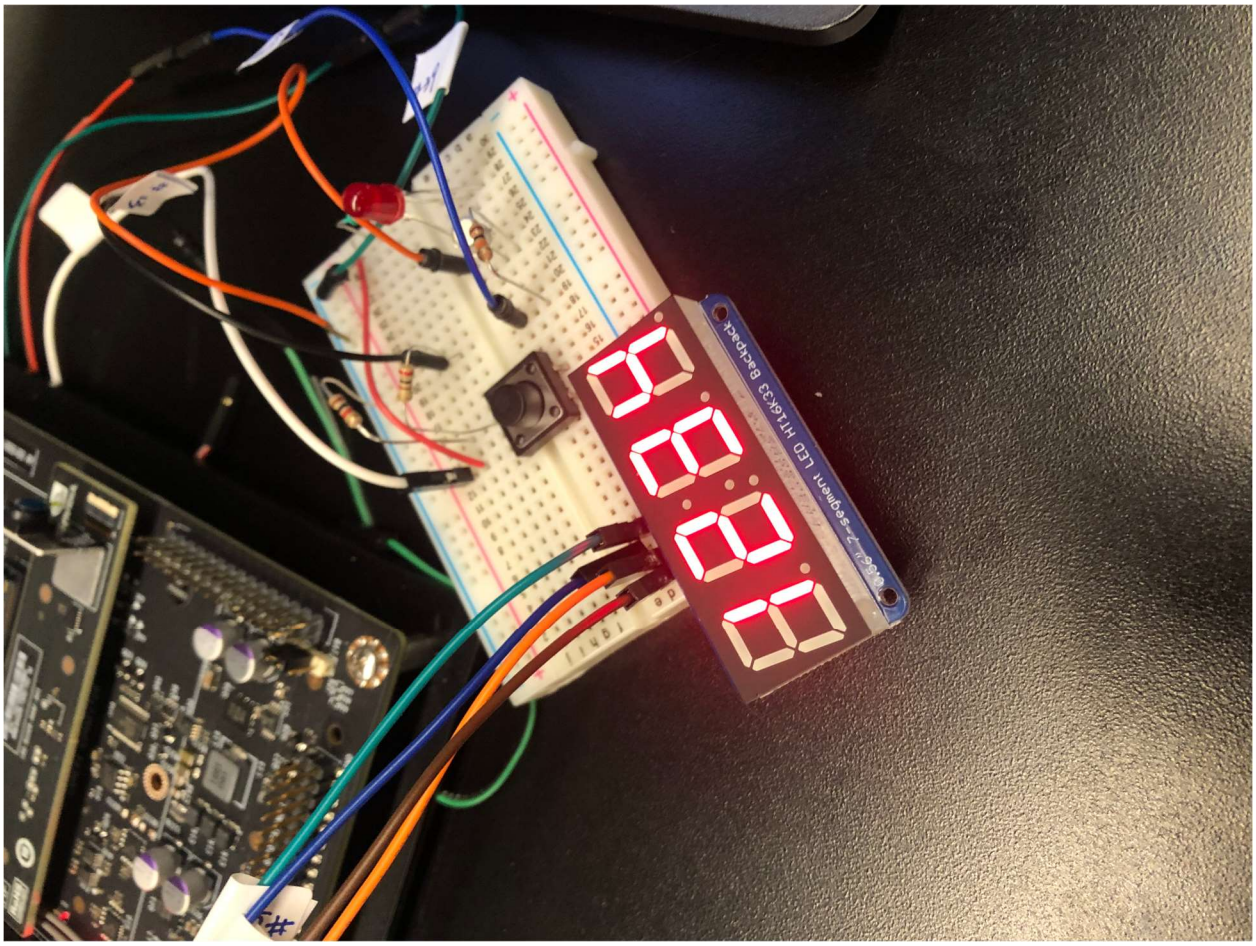
Task 1:

We started by entering the Jetson TX2 environment through the use of ssh, we then downloaded the necessary libraries on the device to complete the lab, such as the i2c library. We then ran a command that all confirmed the installation was successful.

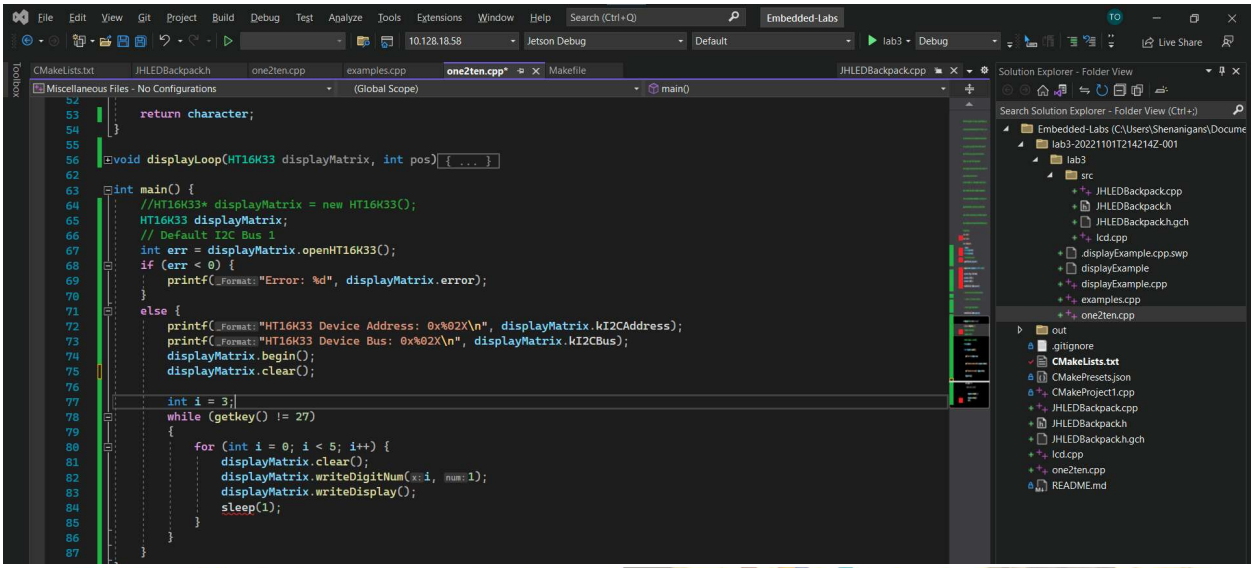


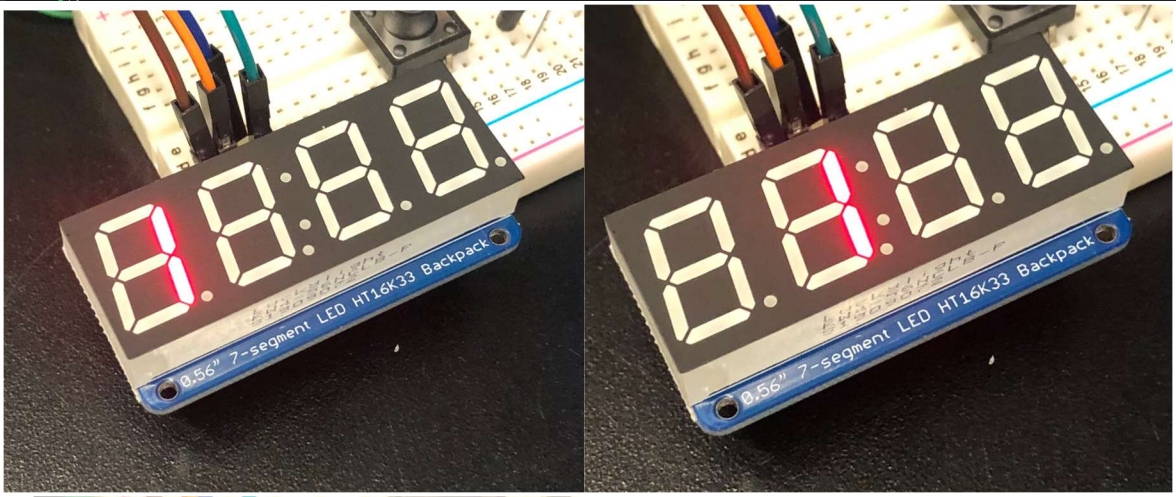
We then modified the one2ten.cpp file to display our group number(1) on the 7 segment display which iterates our group number through the segments of the display.

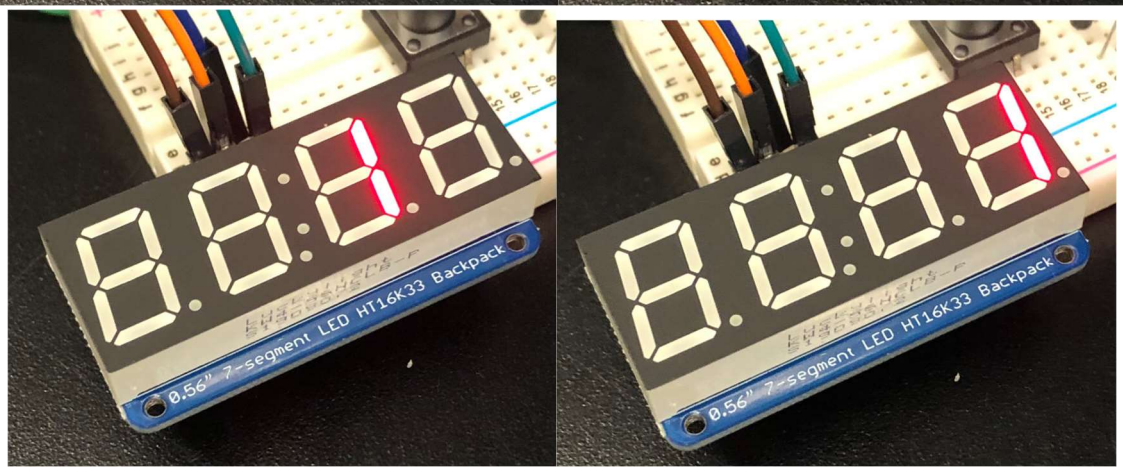
```
PowerShell                                  student1@lwu-desktop: ~/.vs/
student1@lwu-desktop:~/.vs/Embedded-Labs/lab3-20221101T214214Z-001/lab3$ make all
g++ one2ten.cpp src/JHLEDBackpack.cpp -Isrc -li2c -o displayExample
student1@lwu-desktop:~/.vs/Embedded-Labs/lab3-20221101T214214Z-001/lab3$ ./displayExample
HT16K33 Device Address: 0x70
HT16K33 Device Bus: 0x01
HT16K33 Write error: 9HT16K33 Write error: 9HT16K33 Write error: 9HT16K33 Write error: 9HT16K33 Device Address: 0x70
HT16K33 Device Bus: 0x01
^[^[^[^[^[^[^[^[^[^[^[^[^[^[^[HT16K33 Write error: 9HT16K33 Write error: 9HT16K33 Write error: 9HT16K33 Write error: 9*** stack smashing detecte
d ***: <unknown> terminated
^[Aborted (core dumped)
student1@lwu-desktop:~/.vs/Embedded-Labs/lab3-20221101T214214Z-001/lab3$ make all
g++ one2ten.cpp src/JHLEDBackpack.cpp -Isrc -li2c -o displayExample
student1@lwu-desktop:~/.vs/Embedded-Labs/lab3-20221101T214214Z-001/lab3$ ./displayExample
HT16K33 Device Address: 0x70
HT16K33 Device Bus: 0x01
HT16K33 Write error: 9HT16K33 Write error: 9HT16K33 Write error: 9HT16K33 Write error: 9HT16K33 Device Address: 0x70
HT16K33 Device Bus: 0x01
^C
student1@lwu-desktop:~/.vs/Embedded-Labs/lab3-20221101T214214Z-001/lab3$ sudo ./displayExample
[sudo] password for student1:
HT16K33 Device Address: 0x70
HT16K33 Device Bus: 0x01
HT16K33 Device Address: 0x70
HT16K33 Device Bus: 0x01
HT16K33 Device Address: 0x70
HT16K33 Device Bus: 0x01
HT16K33 Device Address: 0x70
HT16K33 Device Bus: 0x01
```



After successfully getting the example code to run on the Jetson TX2 board and display the correct numbers, we then moved onto making our own code that involved a loop and sleep function to display the group number moving across the LCD display.







Task 2:

After completing task 1, we moved onto task 2 in which we display the current time in hours and minutes on the LCD display. We did this by getting the current time using a standard

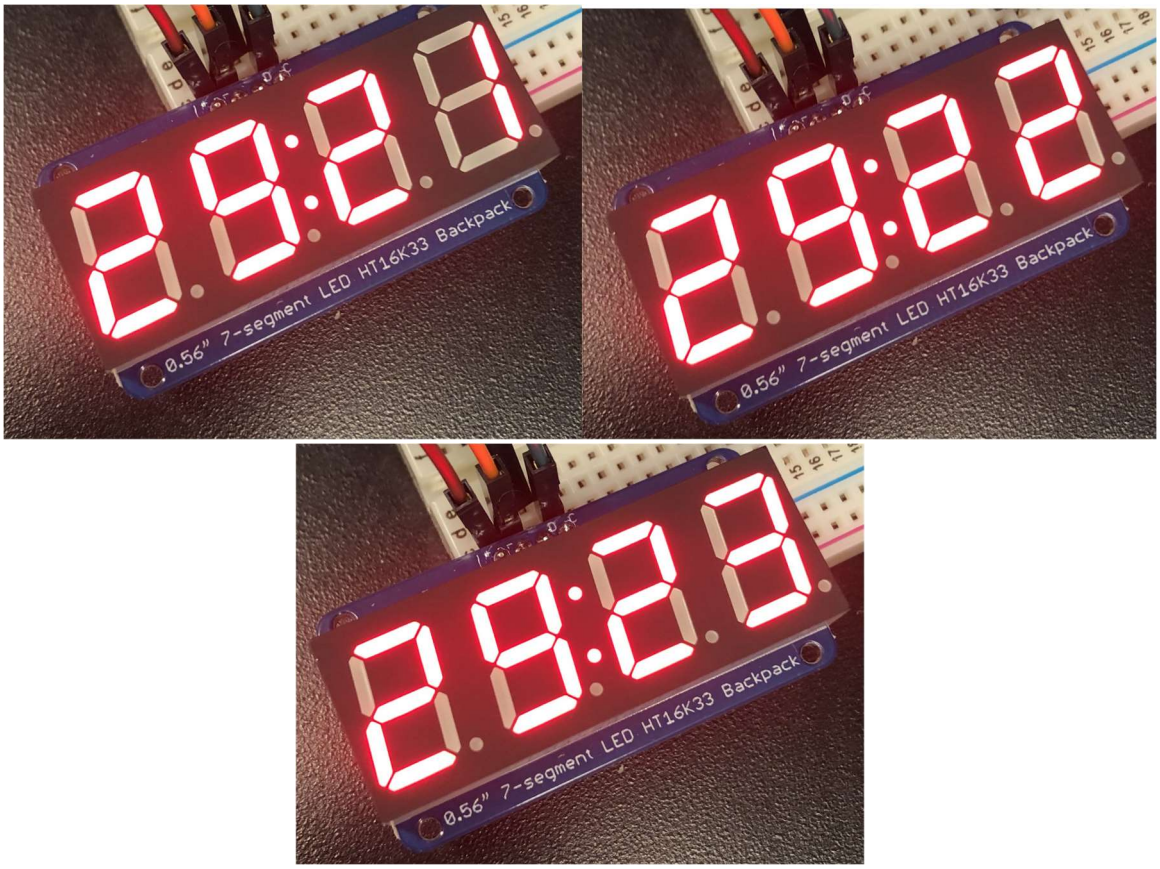
library to get the hours and minutes as the loop and updating the LCD display every second. The images below show the LCD display as it updates every second.

```
        }*/

        printf("Hit ESC key to exit\n");
        // Minutes and seconds - Start a 9:50 to show an exciting time change at 10:00!
        uint16_t counter = 590;
        auto start = std::chrono::system_clock::now();

        time_t currTime;
        struct tm* localTime;
        // Get the current time

        bool drawDots = false;
        while (displayMatrix.error >= 0 && getkey() != 27) {
        time(&currTime);
        localTime = localtime(&currTime);
            // display as hours and minutes
            int hours = localTime->tm_min;
            int minutes = localTime->tm_sec;
            // printf("Counter: %d\n", counter);
            displayMatrix.writeDigitNum(0, (hours / 10), drawDots);
            displayMatrix.writeDigitNum(1, hours % 10, drawDots);
            displayMatrix.drawColon(true);
            displayMatrix.writeDigitNum(3, (minutes / 10) % 10, drawDots);
            displayMatrix.writeDigitNum(4, minutes % 10, drawDots);
            displayMatrix.writeDisplay();
            counter++;
            sleep(1);
```



Conclusion:

This lab gave us practical experience in creating our own programs in an embedded development environment and programming devices that are attached to the embedded systems such as the LCD display.

Source Code Link: https://github.com/tiwaojo/Embedded-Labs/tree/Lab3