Configuration Processes

19.1: Modular I2C Board Configuration / Setup Procedures

The modular I2C board has a configuration process to find and save new sensors that are connected to the board. This process is completely physical which means that the user does not need to modify and reprogram the board code to change what sensors the board is reading from.

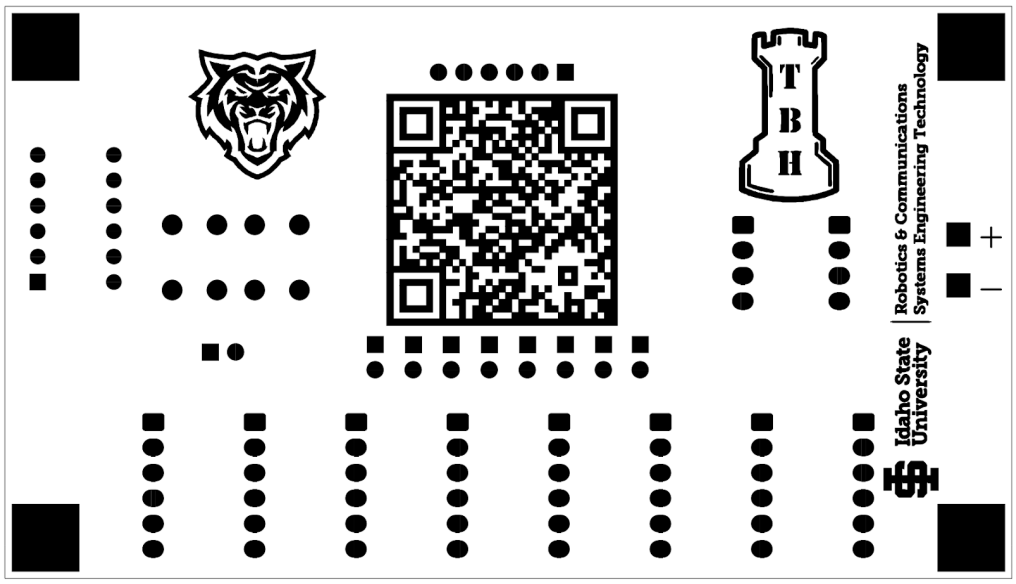

Figure 19.1: Modular I2C Board QR Code

The first step to configure the modular I2C board is to scan the QR code on the back of the board. This QR code will link to a GitHub with the circuit schematic, board files and the code for the board. The GitHub contains both a embedded C and assembly version of the code. In order to use the embedded C code, the XC8 compiler for MPLABX will be required. For the assembly code a MPLABX version before v5.40 will be required.

19.1: Modular I2C Board Configuration / Setup Procedures

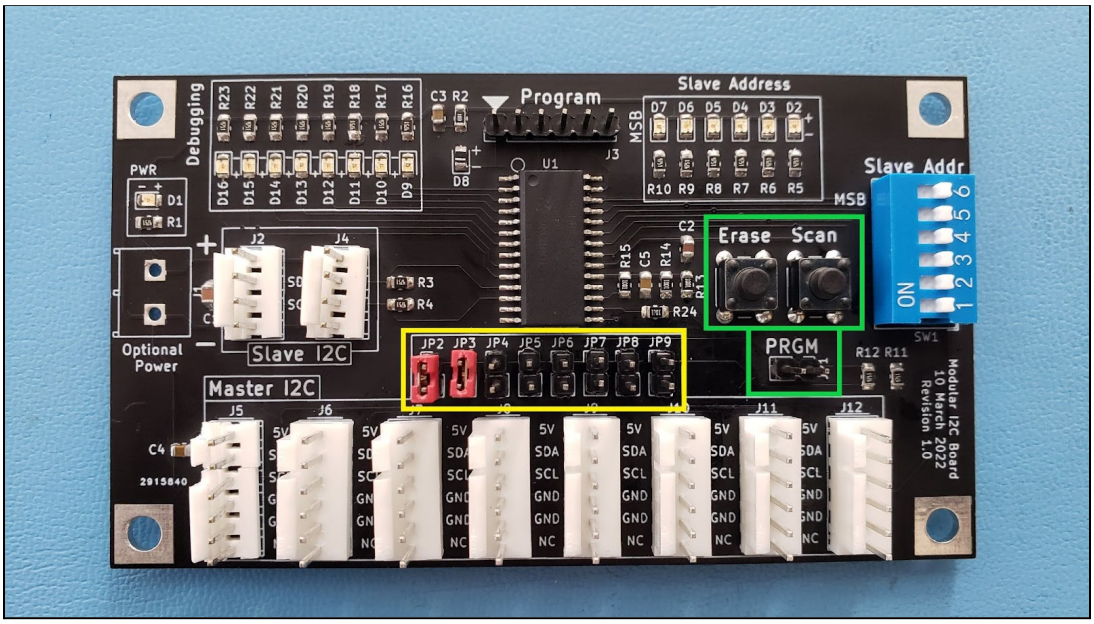

Figure 19.2: Modular I2C Board

Step 1:

Once the modular I2C board has been fully assembled and programmed with the GitHub code the configuration process can start. First, connect all of the desired sensors to the 6 pin headers at the bottom of the modular I2C board. Then remove any jumpers on the clock jumpers which are highlighted in yellow in figure 19.2. Finally, put a jumper acoss the PRGM header in the bottom right of the modular I2C board which is highlighted with green in figure 19.2.

Step 2:

Apply 5V to the board either through the slave I2C headers or the optional power inputs. Both of which are located in the center-left section of the modular I2C board. Once power is applied the debugging LEDs should start shifting a single bit from D9 to D16. This behavior indicates that the board is in programming mode and ready to start finding new sensors.

Step 3:

Once the board is indicating that it is in programming mode press the erase button, which is highlighted in green in figure 19.2. Once pressed, the debugging LEDs should display a 0x0F to indicate that the EEPROM of the board was erased and is ready to accept new sensors.

19.1: Modular I2C Board Configuration / Setup Procedures

Step 4:

Once the EEPROM of the board has been erased, connect one of the clock lines to the first sensor connected to the board. This is done by inserting a jumper to one of the clock jumpers highlighted in yellow in figure 19.2 **(1)**. The clock jumpers correspond logically to the headers below them ex: JP2 is the clock jumper for J5, JP3 is the clock jumper for J6, JP4 is the clock jumper for J7.

Step 5:

Once the correct clock jumper has been connected, press the scan button, which is highlighted in green in figure 19.2. Once the sensor has been found, saved into memory, and had its slave address reasssigned the debugging LEDs will display the new address of the found device. However, if the debugging LEDs display either 0xEE or 0xCC an error has occured when finding the new device **(2)**.

Step 6:

Repeat steps 4 and 5 until all sensors have been found and saved into memory. If at any point a mistake was made or an error occurred simply repeat step 4 to start the process again. Once all sensors have been found remove the PRGM header and connect all of the clock jumpers needed. Then power cycle the modular I2C board. Now the debugging LEDs will display the number of sensors that the modular board has been able to communicate with **(3)**. The slave address of the modular I2C board can be changed using the “Slave Addr” DIP switch array on the right side of the board **(4)**. The address of the slave will be displayed on the slave address LEDs on the top-right of the board.

19.1: Modular I2C Board Configuration / Setup Procedures

Configuration Process Notes

(1): It is important to only ever connect one of the clock lines when scanning for sensors. If multiple sensors are connected at once, a sensor could be found and saved multiple times.

(2): A 0xEE error code means that the modular I2C board could not find any devices with a valid address (0x10 to 0x7F). A 0xCC error code means that the sensor board was able to find a device but an error occurred when saving the device or reassigning its address. A 0xCC could also indicate that the maximum number of sensors have been saved and cannot save another.

(3): The debugging LEDs will only display the number of sensors when distance data is being requested from the modular I2C board. If an external master device is not requesting data then the debugging LEDs will read 0x00.

(4): The six bits of the slave address DIP switch array and slave address LEDs corespond to the middle six bits of the address (ADR<6:1>). The LSB and MSB are not included as the MSB must always be low for the address to be a valid I2C address and the LSB is the R/W bit of the address. Additionally, the board will only read the slave address after a restart has occoured.

If the address is changed while the board is powerd the slave address LEDs will indicate the change but the address will not change unil the next power-on. Finally, if no LEDs are on or the DIP switch array is not installed the default address of the board is 0x10.