Project 4: Multi-MCU I2C

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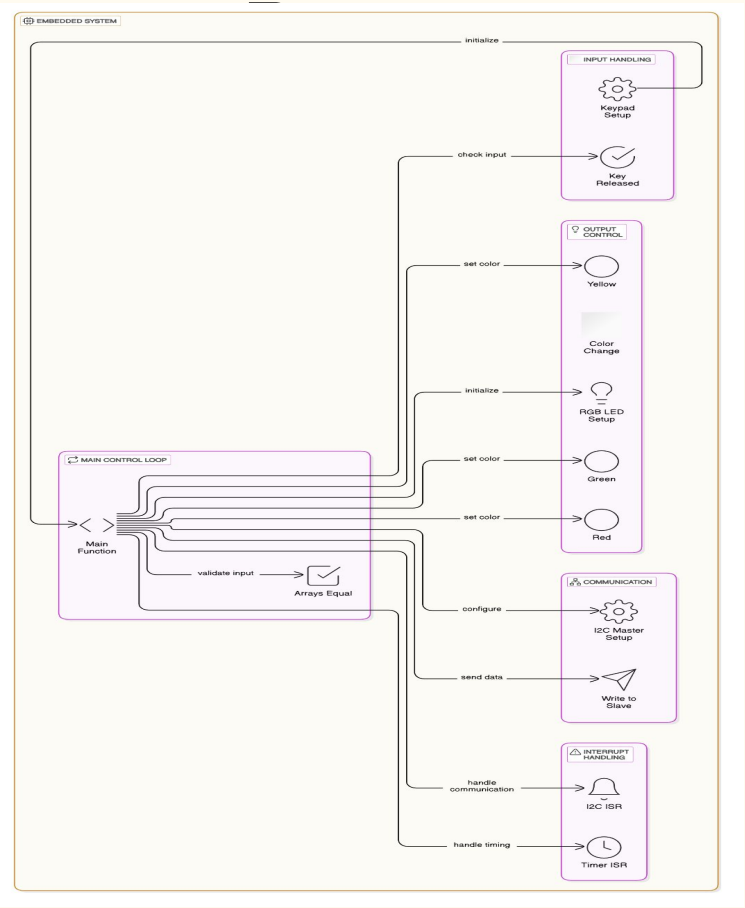
Project Introduction

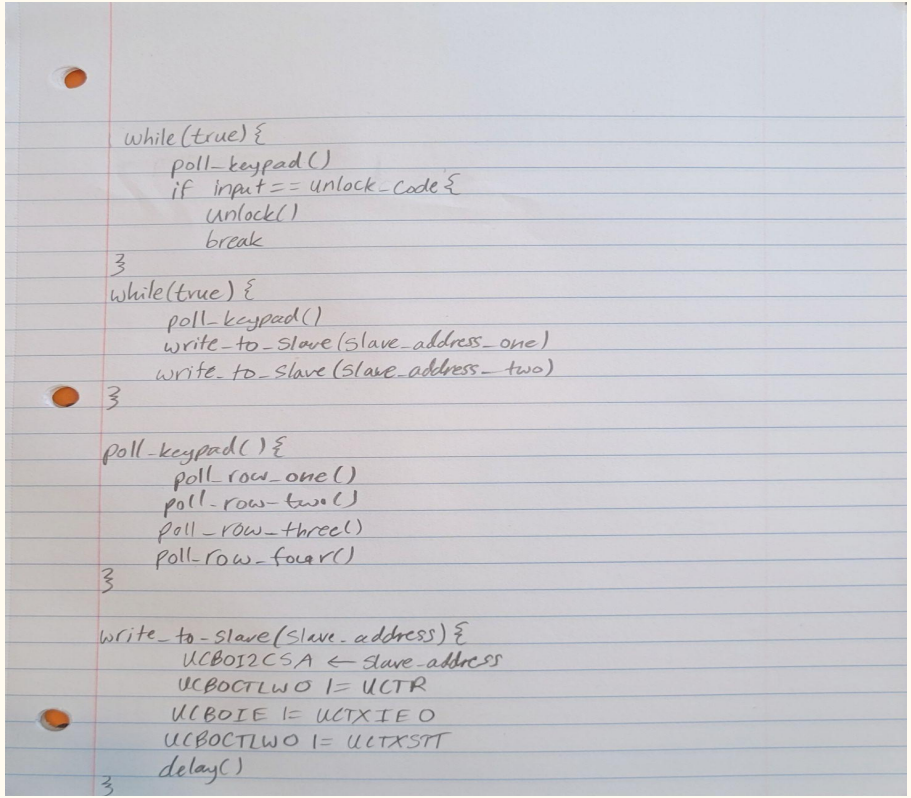
- In this project, we were to design a system in which an MSP430FR2355 communicates via I2C with two MSP430FR2310s in order to control an LED light bar system and and LCD screen system

- The purpose of this project was to understand in-circuit programming, and multi-slave I2C communication, as well as a more complex piece of hardware (the LCD screen).

Software Archi



Controller Pseudocode

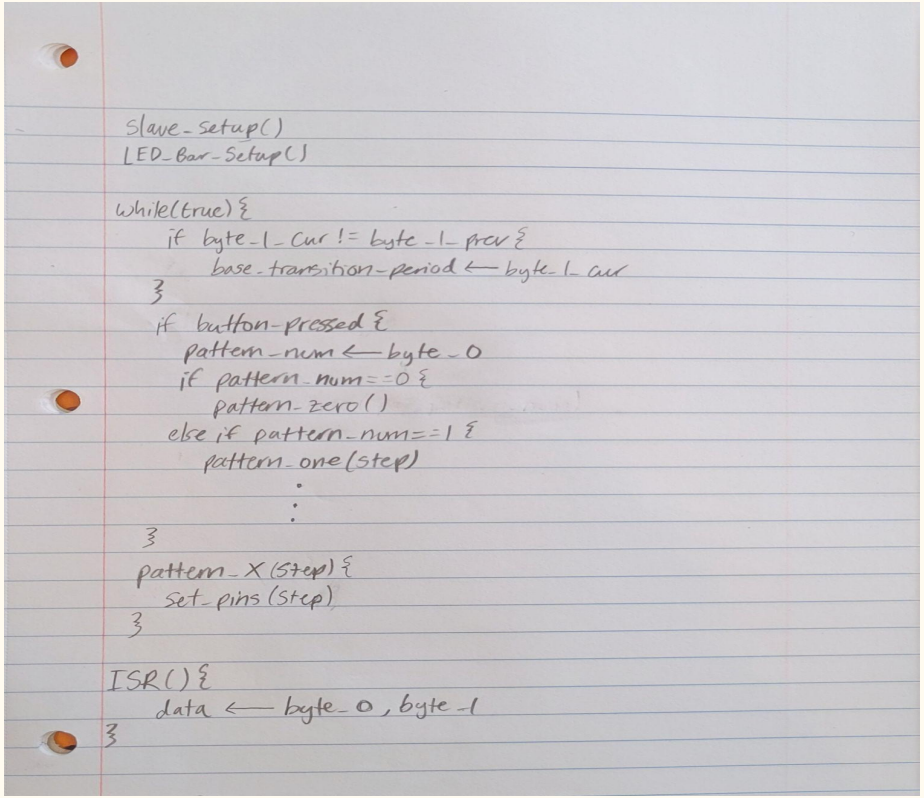


```
while (true) {
    poll_keypad()
    if input == unlock_code {
        unlock()
        break
}
while(true) {
    poll_keypad()
    write_to_slave(slave_address_one)
    write_to_slave(slave_address_two)
}

poll_keypad() {
    poll_row_one()
    poll_row_two()
    poll_row_three()
    poll_row_four()
}

write_to_slave(slave_address) {
    UCB0I2CSA ← slave_address
    UCB0CTLW0 |= UCTR
    UCB0IE |= UCTXIE0
    UCB0CTLW0 |= UCTXSTT
    delay()
}
```

LED Bar Pseudocode

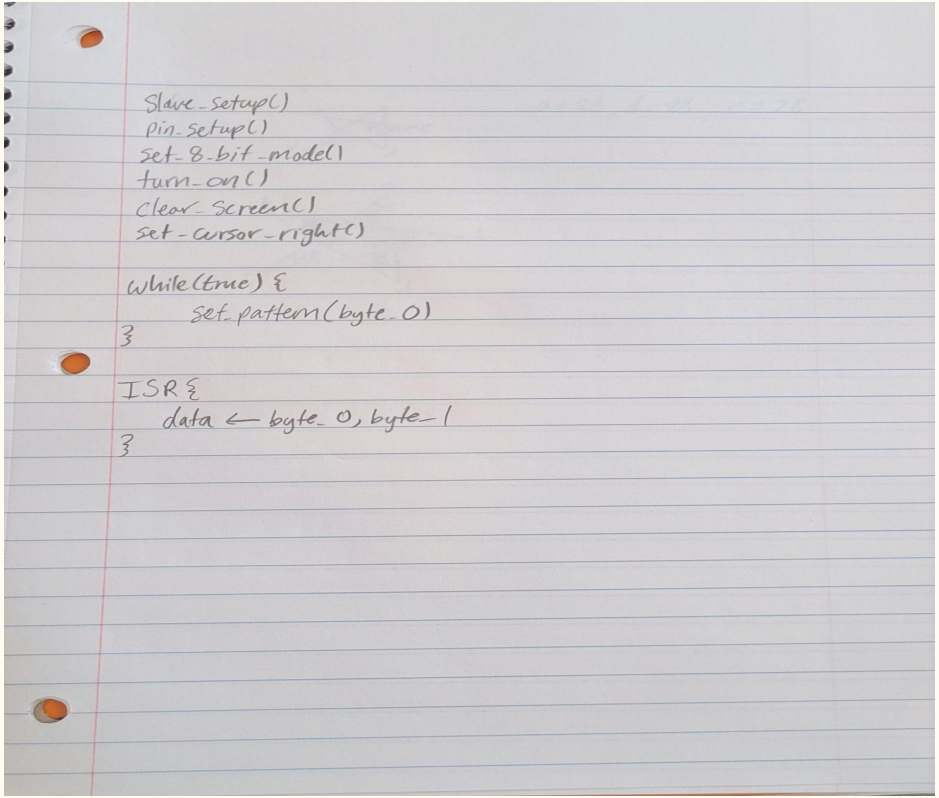


```
Slave_setup()
LED_Bar_Setup()

while(true){
    if byte_1_cur != byte_1_prev{
        base_transition_period ← byte_1_cur
    }
    if button_pressed{
      pattern_num ← byte_0
      if pattern_num==0{
        pattern_zero()
    else if pattern_num==1{
        pattern_one(step)
                .
                .
                .
  }
  pattern_X(step){
    set_pins(step)
  }

ISR(){
    data ← byte_0, byte_1
}
```

LCD Screen Pseudocode

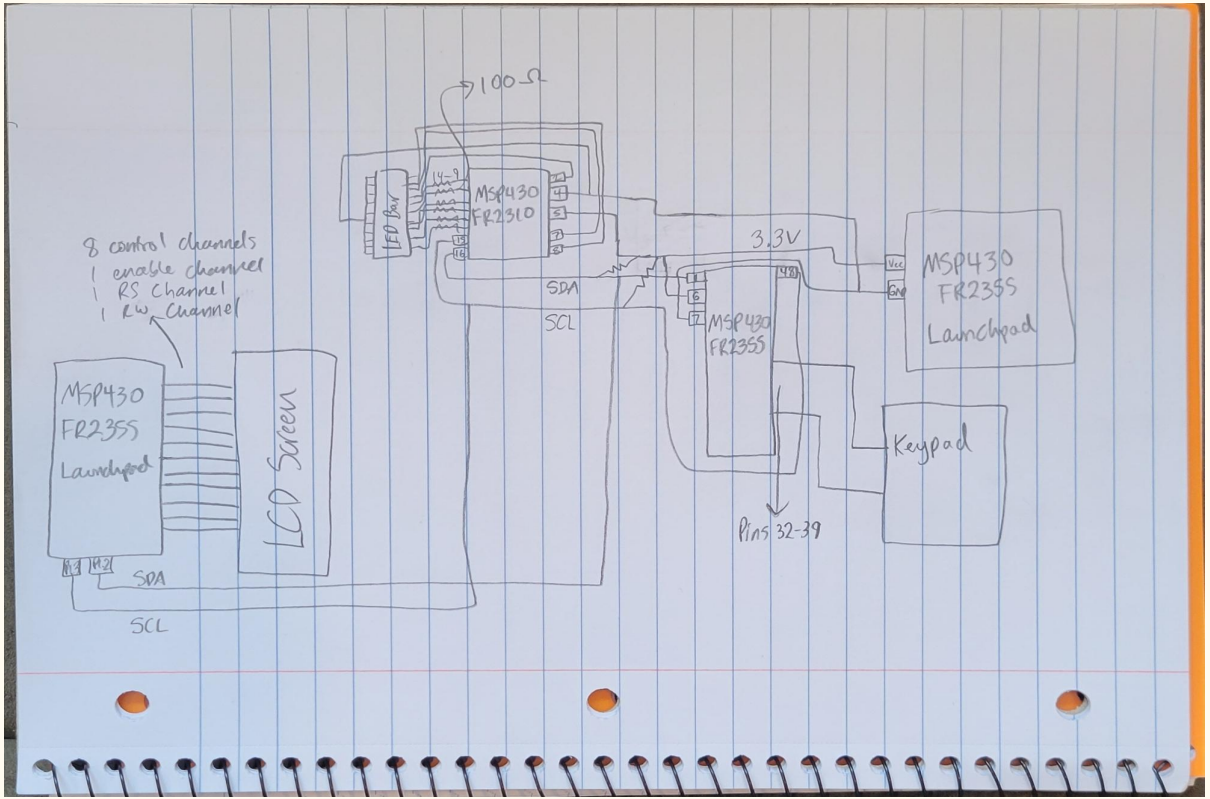


```
Slave_setup()
Pin_setup()
Set_8_bit_mode()
turn_on()
clear_screen()
set_cursor_right()

while(true) {
    set_pattern(byte_0)
}

ISR {
    data ← byte_0, byte_1
}
```

Circuit Diagram



Demo