

# EE2361 Final Project



Mastermind Game Using Flora Color Sensor

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# Purpose

- Create a game similar to Mastermind
  - Utilize the Flora color sensor peripheral
- Randomized master code
- Input 4 color code
- Guess master code 3 times

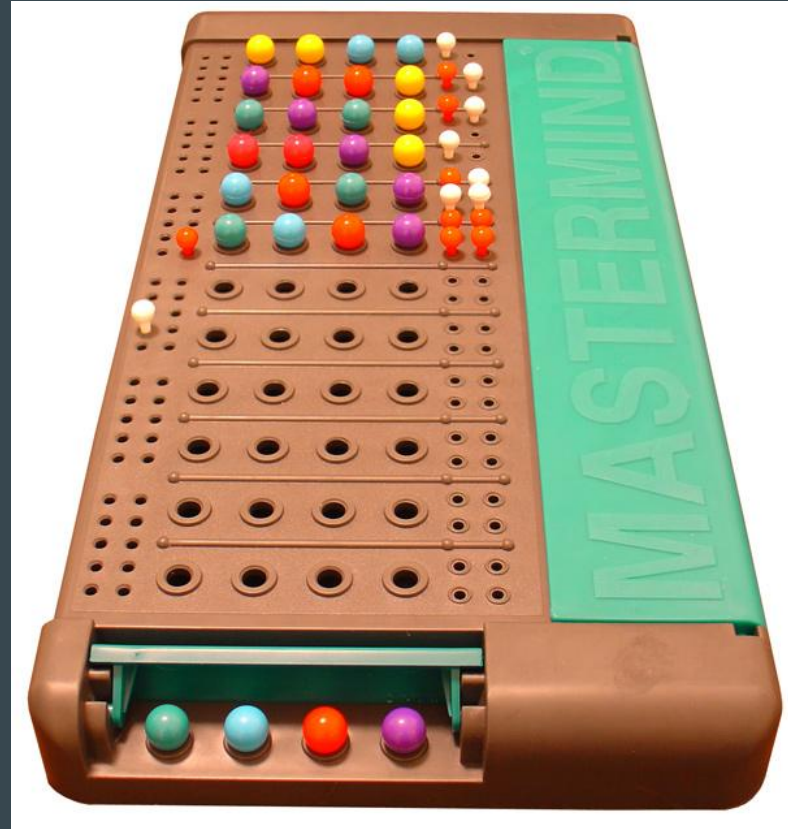
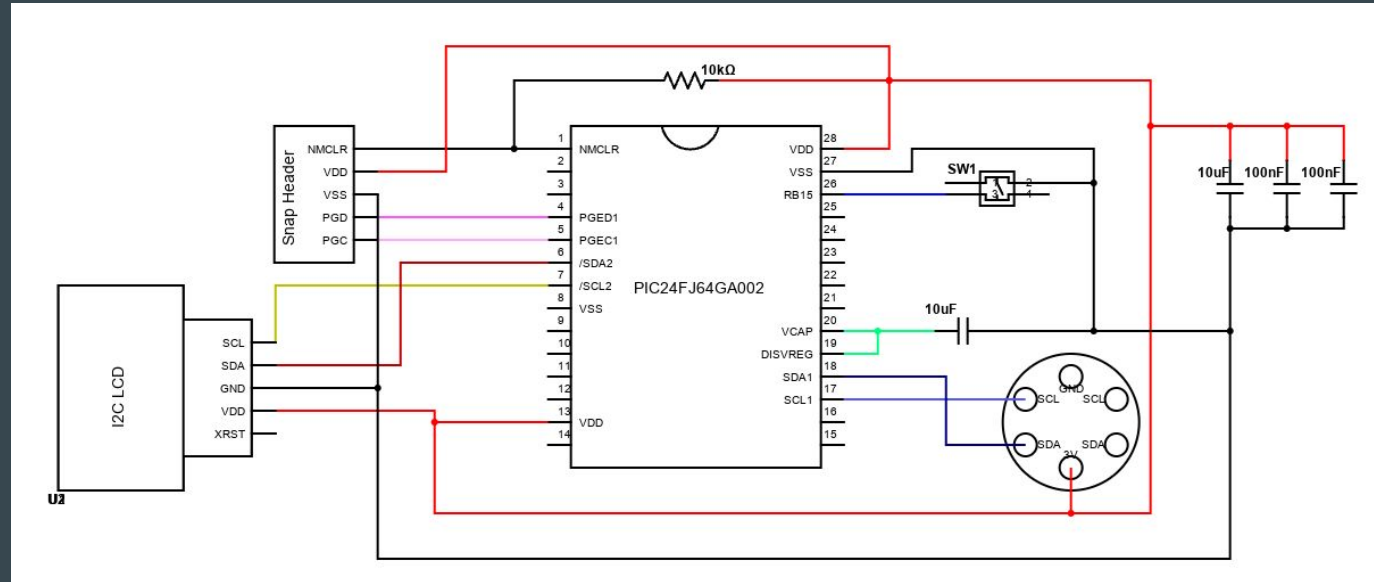


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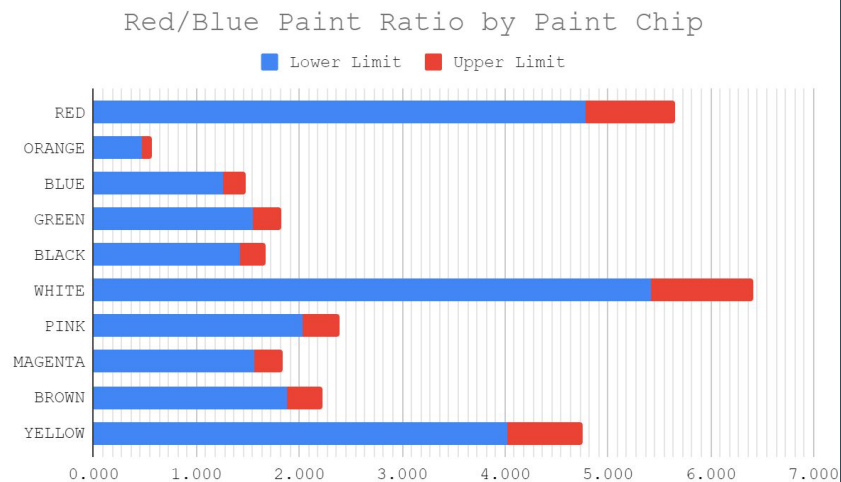
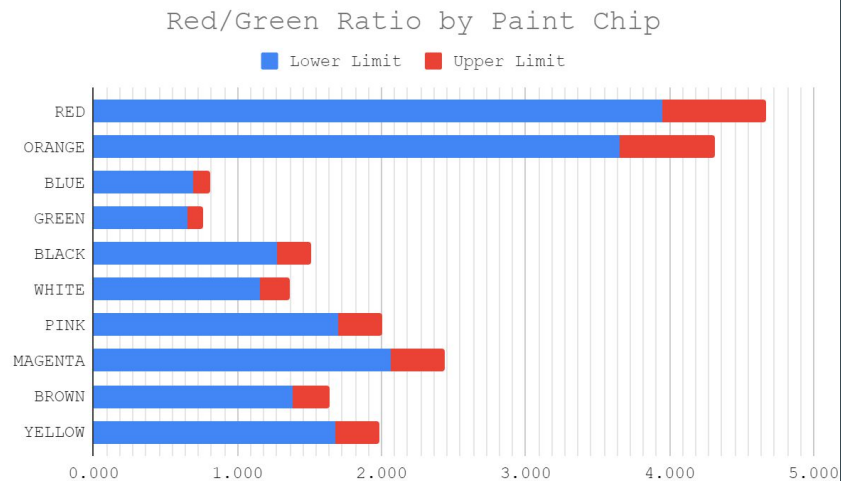
# Main Components

- Microchip - PIC24FJ64GA002
- Flora Color Sensor - TCS34725
- AQM0802A-RN-GBW - LCD
- MPLAB SNAP
- Button

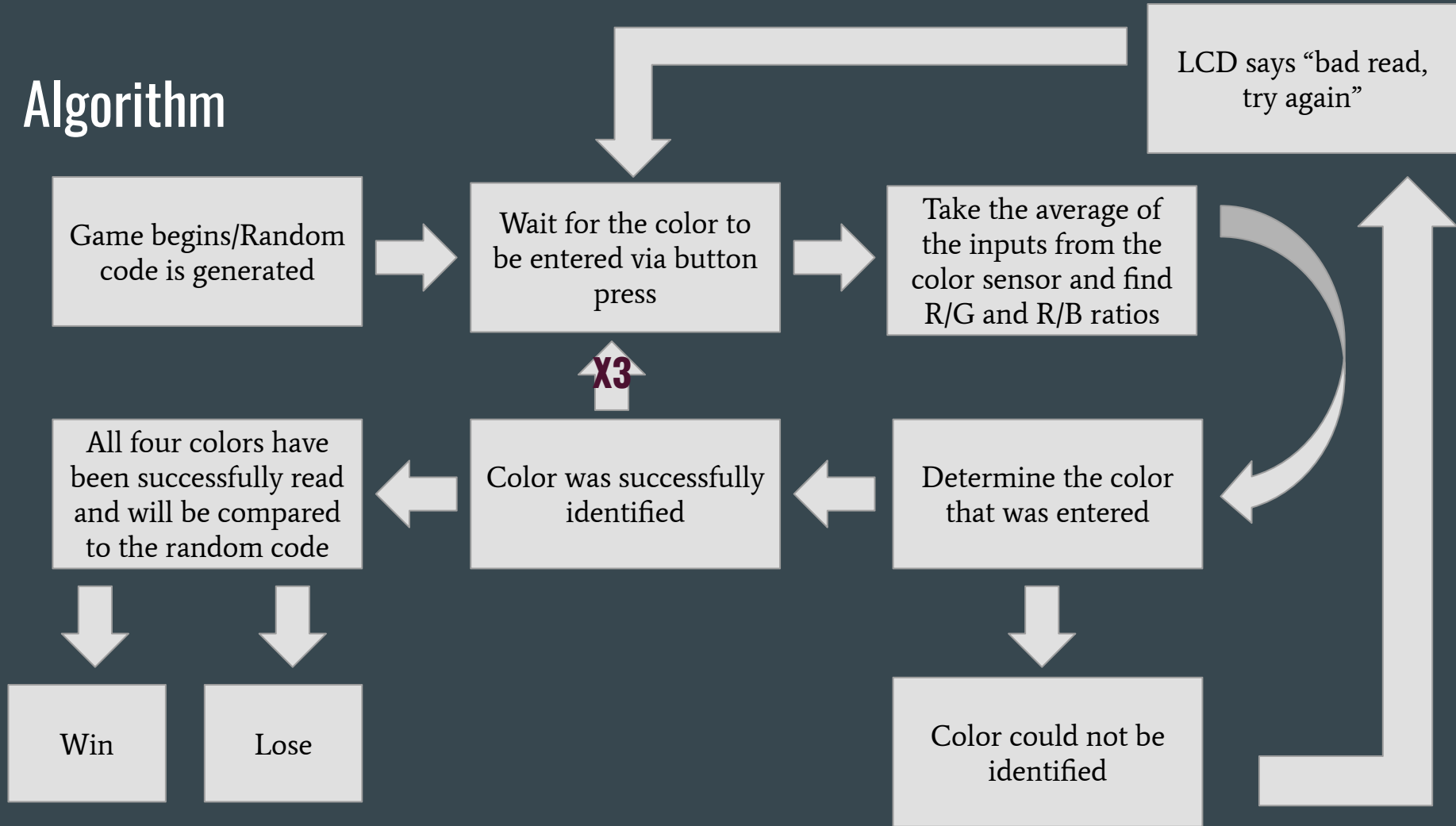


# Implementation

- The colors read through the color sensor are sent back through the I2C connection as a high and low byte
- The color numbers are then compared to each other with the Red/Green ratio and the Red/Blue ratio
- These values are used to compare to the measured range each color should be within



# Algorithm



# Libraries

## LCD:

- `void lcd_cmd(char Package)`
- `void lcd_init()`
- `lcd_printChar(char Package)`
- `void lcd_setCursor(char x, char y)`
- `void lcd_printStr(const char s[])`
- `void clearLCD()`

## Color Sensor:

- `void i2c_write_byte(char device_address, char register_address, char data)`
- `void read_device_id(void)`
- `void color_init()`
- `void read_color_red(void)`
- `void putRed(int red)`
- `unsigned int redAvg()`
- `void get_color_avg(void)`

## Game:

- `void masterCodeGen(void)`
- `void get_color_inputs(void)`
- `void printCompare(int row)`
- `void calculateCompare(void)`
- `void winCondition(void)`

Master Code:

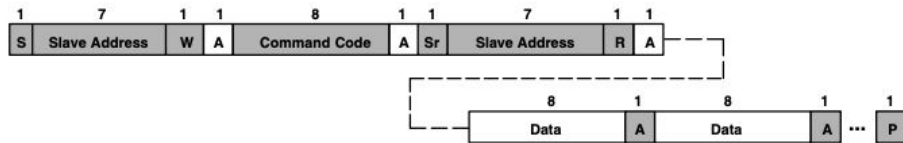
0	2	1	0
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Input Code:

3	2	0	3
---	---	---	---

Output:

X	1	0	X
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I<sup>2</sup>C Read Protocol — Combined Format

# Team Member Contributions

Sam - Hardware, Button Debugging/Implementation

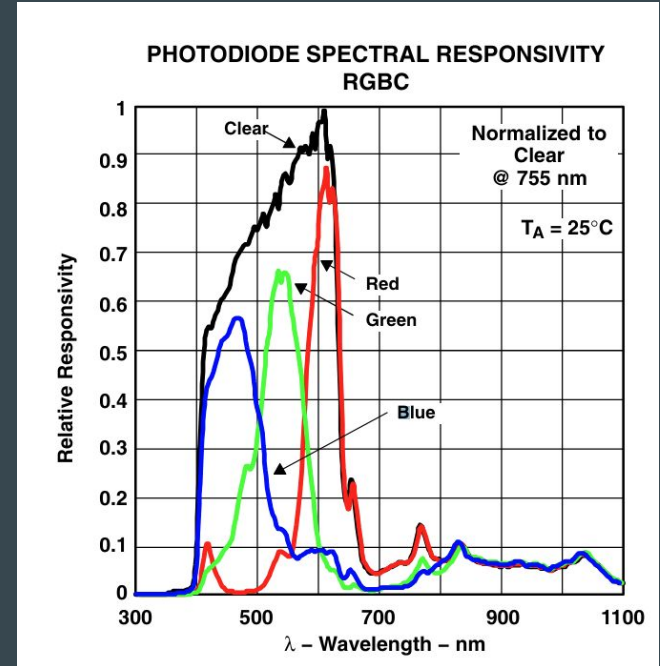
Kirnesh - Software, I2C implementation, Color Sensor Programming

Emily - Game Rules, Game code, LCD code



# Shortfalls/Issues Present

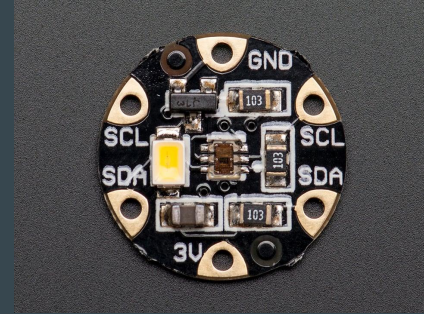
- Bigger LCD
  - Allow for longer codes
  - Allow for more colors
- Long amount of time to accurately read color from sensor
  - Newer Sensor
  - Interrupts
- Sensor distance calibration





# Conclusion

- Peripherals Used
  - Adafruit Flora Sensor
- Other Uses for Library
  - Quality control (**Spectrophotometer**)
  - Object Identification for AI/Machine learning



Picture Credit: Adafruit  
<https://www.adafruit.com/product/1356>



Picture Credit: xRite Pantone  
<https://www.xrite.com/categories/portable-spectrophotometers/exact>

# Questions?