

Mechatronics System Integration (MCTA3203)

Week 9: Image/Video input interfacing with microcontroller and computer based system: Software and hardware.

Color Detection and Analysis (Supplement)

To build a system using an Arduino Uno and Pixy camera to detect three different colored objects, follow these step-by-step instructions:

Step 1: Hardware Setup

Connect Pixy Camera to Arduino Uno:

- Connect the Pixy camera to the Arduino Uno. If you're using the I2C interface, connect the GND, +5V, SDA, and SCL pins. If you're using UART, connect the GND, +5V, TX, and RX pins.

Power Supply:

- Ensure that the Arduino Uno is powered either via USB or an external power supply.

Color Calibration:

- Before starting, you need to calibrate the Pixy camera for the three different colored objects. Open the PixyMon software on your computer, connect the Pixy camera, and configure color signatures for each of the three objects.

Step 2: Install Pixy Library

Download Pixy Library:

- Download and install the Pixy library for Arduino. You can find it on the Pixy website or through the Arduino Library Manager.

Include Pixy Library in Arduino IDE:

- In the Arduino IDE, go to Sketch -> Include Library -> Pixy.

Step 3: Write Arduino Code

Write Code to Detect Objects:

- Open the Arduino IDE and create a new sketch.

Use the following example code as a starting point:

```
#include <Pixy2.h>

Pixy2 pixy;

void setup() {
  Serial.begin(9600);
  pixy.init();
}
```

```

void loop() {
  int blocks = pixy.getBlocks();

  if (blocks) {
    // Loop through detected blocks
    for (int i = 0; i < blocks; i++) {
      Serial.print("Block ");
      Serial.print(i);
      Serial.print(": ");
      Serial.print("Signature: ");
      Serial.print(pixy.blocks[i].signature);
      Serial.print(" X: ");
      Serial.print(pixy.blocks[i].x);
      Serial.print(" Y: ");
      Serial.println(pixy.blocks[i].y);

      // Add logic to identify and react based on the color signature
      if (pixy.blocks[i].signature == 1) {
        // Object with signature 1 detected (Color 1)
        // Add your action or code here
      } else if (pixy.blocks[i].signature == 2) {
        // Object with signature 2 detected (Color 2)
        // Add your action or code here
      } else if (pixy.blocks[i].signature == 3) {
        // Object with signature 3 detected (Color 3)
        // Add your action or code here
      }
    }
  }
}

```

This code reads the blocks detected by the Pixy camera, prints their signatures, X, and Y coordinates, and provides a basic structure for identifying the three different colored objects.

Step 4: Upload Code to Arduino

Connect Arduino to Computer:

- Connect the Arduino Uno to your computer using a USB cable.

Select Board and Port:

- In the Arduino IDE, select the correct board (Tools -> Board -> Arduino Uno) and port (Tools -> Port -> [Select the port where Arduino is connected]).

Upload Code:

- Click the "Upload" button in the Arduino IDE to upload the code to the Arduino Uno.

Step 5: Test and Debug

Open Serial Monitor:

- Open the Serial Monitor in the Arduino IDE (Tools -> Serial Monitor) to view the output and debug any issues.

Adjust Thresholds:

- If needed, adjust color signatures and threshold values in the PixyMon software and the Arduino code to improve object detection.

Refine Actions:

- Add specific actions or behaviors for each detected color based on your project requirements.

With these steps, you should have a **basic** system that detects three different colored objects using the Arduino Uno and Pixy camera. Adjust the code and configurations as needed for your specific application.

Useful links:

- [1] <https://dronebotworkshop.com/pixy2-camera/>
Pixy2 Camera – Object Recognition with Arduino & Raspberry Pi
- [2] <https://www.youtube.com/watch?v=391dXDjqzXA>
Pixy2 Camera - Image Recognition for Arduino & Raspberry Pi (2018) 38'
- [3] <https://www.youtube.com/watch?v=Y7V7uf4-v70>
Arduino Prototyping Inputs #63: Image Tracking with the PIXY! Camera (2019)