Institute of Robotics, University of Innopolis

Sensation and Perception
Home Work 04
Ilya Afanasyev (Primary Instructor), Geesara Prathap (Teaching Assistant)

October 31, 2018

1 Attention

This is valid for the each and every lab class, you can do your lab tasks with the most preferred language but these standards need to be fulfilled.

- JAVA 8
- C++ 11
- C 99
- Python 2.7.x or 3.6.x
- Matlab 17a onwards
- Arduino
- JavaScript or Nodejs

You need to submit your source code along with a clear description of how to run your implementation.

2 Task One

Build the hardware, and program and implement suitable code, for a simple color sensor suitable for an application of interest to you. Examples of applications might be:

- Distinguishing different kinds of fruit, e.g., green apples, red apples. oranges, and kiwis;
- Enabling a robot to follow a path specified in terms of lines and intersections of lines of different colored tape laid out on the floor;
- Enabling a robot to arrange by color the shirts hanging in your closet, etc.

An example of the principle you might employ is illustrated either Fig. 01 or Fig. 02 where the component in the center is a photo transistor; it detects light – with varying sensitivity – across the full visible spectrum, a little into the ultraviolet, and into the infrared to a little.

Basic idea of the color meter is that LEDs are turned on and off in sequence, and the correspondingly-detected signals are recorded. When all the LEDs are off the ambient (background) is recorded.

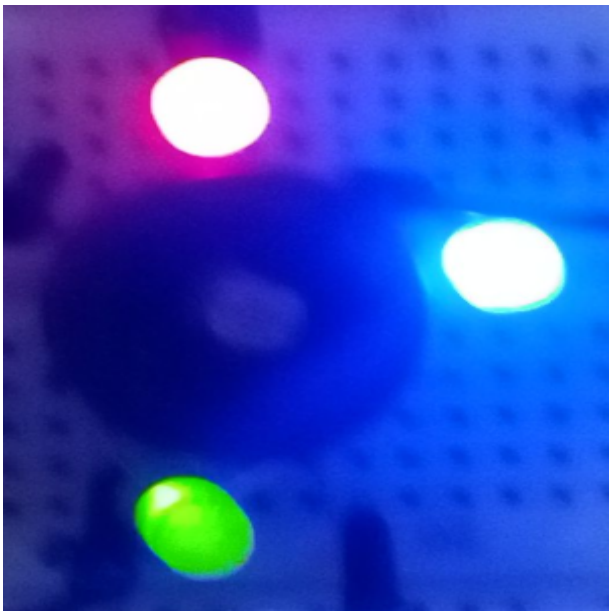

Figure 1: Example of simple color meter

In this way a ”signature” of any particular color patch placed in a location that is illuminated by the LEDs and seen by the phototransistor is generated. You could then, for example, compare the signature that you obtain from an ”unknown” item with the signatures of various items that you previously stored in a ”library”, hence identify (with some quantifiable degree of certainty) the ”unknown” item. Even If you do use this principle, you don't have to use exactly these components. In your Arduino kit you probably have a variety of LEDs, probably including one ”tri-color” LED, and a phototransistor that you can use.

Figure 2: Another example of a color meter

3 Submit

What should you turn in? Please, upload the single zip file which includes your source code, dataset you used to test your color sensor and the report (a small description of your hardware design and description of how your program works).

4 Deadline

The deadline: November 15, 23:59:59 GMT+3.