

# Midterm Project: Color Blob Following

Due: Mon 2/18 in-class demo and written submissions due 2/25 @ 11:59 EST

## 1 Objective

The objective of the midterm project is to program the robot such that it will follow a visual cue. Specifically, the robot must be able to follow an orange color blob.

## 2 Task 1

You will have to first capture a few images of the orange blob using the SRV-1's camera. Once you have captured a few images, the next step is to perform your color calibration using the color calibration code you developed for Assignment 3. The goal for Task 1 is for you to empirically determine the range of  $(Y, U, V)$  values which correspond to the orange color of interest.

**For your report:** Describe in 1 page or less your color calibration procedure. Include any tables, pseudocode, etc.

## 3 Task 2

Once you have determined the color value of interest, you must develop an algorithm that will allow you to consistently segment out sections of the image that is orange. Using the result from the color calibration in Task 1, you will modify your Connected-Component Labeling Algorithm to segment out the portions of the image that correspond to the color of interest. Additionally, you will enable your code to output region properties such as centroid, area, etc.

**For your report:** Describe in 2 pages or less the modifications that you made to your original Connected-Component Labeling Algorithm.

## 4 Task 3

Using a PID controller, program the robot to follow the color blob. Specifically, task the robot to keep the blob centered in the image as well as maintain the size of the blob constant in the image. You will have to use the results you obtained in the previous tasks to do this. Additionally, download `follow_blob.m` from the course website. This file should contain some code that will get you started.

Due to potential network latency, I suggest you work with robot images at the smallest resolution supported. Lastly, you must demo your working code in class on Monday (2/18). You will be graded on how well your robot is able to follow the blob; whether it can recover if it loses sight of the blob; whether your controller produces smooth motion; how fast can your robot respond to the movement of the blob.

The guidelines for executing the demos will be provided one week before the midterm.

**For your report:** Describe in 1 page or less your code. Include any tables, pseudocode, etc.

**Grading:** Your grade for this assignment will consist of three components: 1) in-class demo (45 pts.); 2) report (45 pts); and 3) teamwork questionnaire (10 pts). Your in-class demo portion of your grade will depend on how well your robot can accomplish the given task. Each robot will be asked to follow the color blob down a straight path, around a circular path, and other more complicated paths. You will be judged based on a robot's ability to pick out the given color, the robot's responsiveness, and how well it is able to regulate its distance to the given color blob. Credit will not be given if your robot is unable to finish these tasks within a reasonable time (see demo guidelines).