

Project 1: Computer Vision

Out: 16 October 2003

Due: 6 November 2003

(Note: Dates were shifted back by one week due to cancelled class.)

Some project ideas are listed below. You may choose to do one of the suggested projects, or you may come up with your own idea. The only restriction for this project is that it be vision related. The project may be done individually or in a two person team. Team projects will require more work than an individual project. You will need to discuss your project idea with me before class starts on Thursday, 23 October. We can have e-mail or phone discussions if it is difficult for you to get to campus before the next class.

For all projects, you will need to perform a literature search to see what has been done on the topic. You can implement algorithms from papers – you need not come up with novel algorithms for your project, although you can if you'd like. More information about what you'll need to turn in will come next week; there will be a paper to write and a five minute presentation to the class on your project.

Project Ideas:

- Shape determination of a blob. Calculate if an object is a circle, square, etc. (One person project.)
- Faster vision processing, particularly median filtering. Optimize the vision code. (One person project.)
- Motion detection using edge detection. Allow parameter selection to choose to either pinpoint where an object is moving or just output if there is movement in the image. (One person project. A two person version of this project would need to take the robot's self-movement into account when computing motion.)
- Optical flow to determine distance of objects. (Two person project.)
- Color histogramming. All of the vision code to date works well for filtering a single color. If we want to be able to identify a multi-colored object, color histogramming is much more useful. See Swain and Ballard, "Color indexing," *International Journal of Computer Vision*, Vol. 7, 1991, pp. 11-32; color histogramming is also described in the Murphy text on pp. 228 – 231. (Could be one or two person project, depending upon planned scope. A two person project would need to add more functionality to the histogram such as dumping it to view it, allowing variable bucket size, etc.)
- HSV color space. Write code to convert an image from RGB to HSV. Then write code to filter and blob in HSV space. (Could be one or two person project, depending upon the project's scope.)
- Finding the edges of the hallway path. (One person project.)