Assignment 1: “Hello, World!”
CS 393R: Robotics
8/29/2013
Assignment due: Thursday, September 5, 2013

The purpose of this assignment is for you to get the fairly complex hardware and software system that is your Nao robot to “turn over” (to use automotive terms).

You will learn how to connect to the Nao, read its sensors (joints, camera, and others), send motor commands to the head and legs, and write simple control programs to close the loop. For this assignment, the control programs should be very simple, so you can concentrate on getting all the pieces to work together.

You will do all of your work using a stripped version of the Austin Villa codebase, which we use in the annual RoboCup Soccer Competition in the Standard Platform League. You will be programming in both C++ and Python using many of the features developed by the Austin Villa team, including preprogrammed walks and color segmentation features. You can find sample code within the codebase and a brief tutorial at http://www.cs.utexas.edu/~pstone/Courses/393Rfall13/resources/tutorial.html.

To get started, go to the lab and visit http://www.cs.utexas.edu/~pstone/Courses/393Rfall13/resources/nao.html. Follow the Initial Setup steps and read the Robot Care section before beginning this assignment.

Your Tasks:

- Establish contact between your workstation and your Nao. Demonstrate that you can read the sensors and make the Nao move its head and walk.
- Get started using a colored-blob-tracker on the camera image.
- Write a couple of simple control programs to control the Nao’s gaze and walk.

Checklist

This assignment is worth 10 points. Here’s how you earn them. Partial credit is possible.

[____] (1 point) Demonstrate the ability to read the changing values from the Nao's sensors, and then display them on your workstation.

[____] (1 point) Demonstrate the ability to read and display the camera image on your workstation.

[____] (1 point) Demonstrate the ability to detect and locate an orange blob in the camera
image with the head held still.

[____] (1 point) Demonstrate that you can control sitting, standing, and head-turning.

[____] (1 point) Demonstrate that you can control walking: forward walking and turning in place.

[____] (1 point) Demonstrate that your Nao can walk in a curve: forward and turning at the same time.

[____] (2 points) Demonstrate that your Nao can move its head to keep the visible blob from an orange ball near the center of the image (if the ball isn't moving too fast).

[____] (2 points) Demonstrate that your Nao can spot a blue colored patch in the distance, and walk toward that patch until it fills more than half of its camera image, and then stop.

Extra Credit

[____] (1 point) Identify the orange ball in the distance, walk up to it, and dribble the ball forward for 1 meter.

Caring for the Robot

Stability is a significant issue with bipedal robots, and the Naos are no exception. These robots are expensive and can break relatively easily, so it's imperative that you take care to keep your robot from falling over, overheating, or performing other actions that could damage it. If your team is caught mishandling your robot you'll be docked points on this assignment.