

Assignment 1: “Hello, World!”

CS 393R: Autonomous Robots

08/29/2018

Assignment due: 11:59:59 PM Friday, September 7, 2018

The purpose of this assignment is to familiarize yourself with the Nao Robot.

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++11 and Python using many of the features developed by the Austin Villa team. You can find sample code within the codebase and a brief tutorial on the course resources page.

To get started, go to the lab and follow the instructions for the Lab/Robot Setup from the course resources page. 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.

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 may be docked points on assignments. Keep in mind that a broken robot will slow down your progress and may be difficult for us to replace.

Checklist

This assignment is worth 10 points, with 2 extra credit. Here's how you earn them. Partial credit is possible.

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

[] (1 point) Demonstrate the ability to read the changing values from the Nao's **pressure** 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 orange 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.

[] (1 point) Demonstrate that your Nao can move its head to keep looking directly at the ball.

[] (1 point) Take a log from the robot and replay it in the tool.

[] (1 point) Run a simulation in the tool.

Extra Credit

[] (1 point) Demonstrate that your Nao can spot the blue goal in the distance and walk toward it.

[] (1 point) Stop walking when the robot is between 75cm and 125cm away from the blue goal.

Initials:

TA

Teammates
