P3-DX Robot Primer

Spring 2008

- 5 P3-DX robots are available to be used in CS 404/591 of Spring 2008. There are five robots that will be used for the group project and two class demonstrations. The robots are manufactured by the New Hampshire based company MobileRobots.com, formerly known as ActivMedia. The robots are commonly used in research and teaching.

- The robots are currently maintained in a cabinet in Faner Hall 2127. Dr. Hexmoor and Ms. Georgia Norman have keys. The robots are accessible during the work day from Dr. Hexmoor and from Ms. Norman.

- The robots communicate through a wireless connection. Attached to each robot is a Wibox that allows wireless communication between the remote PC and the robots. The IP address of each robot is found on the Wibox and will be required to establish a connection.

- Each robot contains three internal batteries. When the 12 volt charge descends to 11.5 volts, there will be a constant beeping sound letting you know to recharge them. The robot's LED will be green, orange, and then red to display battery discharge levels. There is a battery charger to recharge the batteries when necessary. Do not overcharge the batteries since it is dangerous.

Connecting to the P3-DX robots

- There is a common server currently located in Faner Hall 2127 running the redHat Linux operating system. You will find a wireless Linksys router that will need to be connected. Once connected, turn the computer on and the wireless device will be automatically configured. You MUST connect and power-on the wireless router BEFORE you start the server.

- Everyone in class has an account on the server. Your user name and password pair are the first part of your e-mail address. You can change your password from Applications -> System Tools -> Terminal and issuing the "passwd" command.

Programming the P3-DX robots

- C++ and the Aria API are used to program the robots. Aria is an object-oriented API that is used extensively in development.

- vi, emacs, GNU nano, and gedit are currently installed as editors. Located in your "/home" directory is a very simple shell script to assist in compiling code written in C++. The script is a modified version adapted from Amanda Whitbrook's thesis found in the resources below.

- C++ code can be compiled with the GNU C++ compiler, g++ with the command "./compile <compiled-file-name> <file-name.cpp>"

- Once your code is compiled, you may run it on robot 'xx' with the command : "./<file-name> -rh 192.168.1.xx"

- Running the command "/usr/local/Aria/bin/demo –rh 192.168.1.xx" will run a demonstration that will allow you to interact with the robot 'xx'.

Resources

- Examples of code used to control and connect to the P3-DX robots can be found in the "/usr/local/Aria/examples" directory. Files such as twoRobotWander.cpp, wander.cpp, demo.cpp, and ActionExample.cpp are good resources.

- Robot documentation can be found at "/usr/local/Aria/docs/index.html" and the ActivMedia Pioneer 3 Operations Manual. Viewing the ArSimpleConnector and ArTcpConnection classes are recommended.

- Amanda Whitbrook's thesis can be found at http://grumpy.cs.nott.ac.uk/~robots/pioneer_manuals/pioneer_guide.pdf

- Information on using SWIG can be found at http://www.swig.org/tutorial.html