Garcia Robots, An Introduction

CS 23

Hardware Architecture

HW Architecture

- The Gumstix Board
  - Embedded Linux
- The Brainstem Board
  - On-board sensors
 - On-board motors.
- The Wireless Sensor
- The Webcam

HW Architecture

- Gumstix Verdex Pro
  - A Marvell 600MHz PXA270 Intel Processor flashed with a Linux OS.
  - On board flash disk and memory.
  - Multiple serial ports, one USB 1.1 port, an Ethernet port , a wifi 802.11 card.
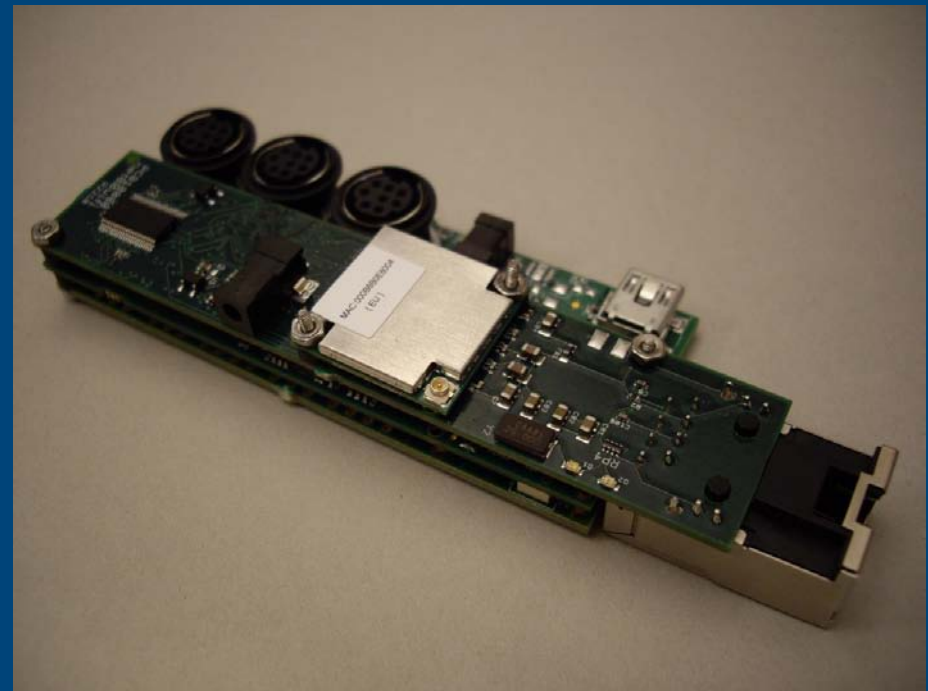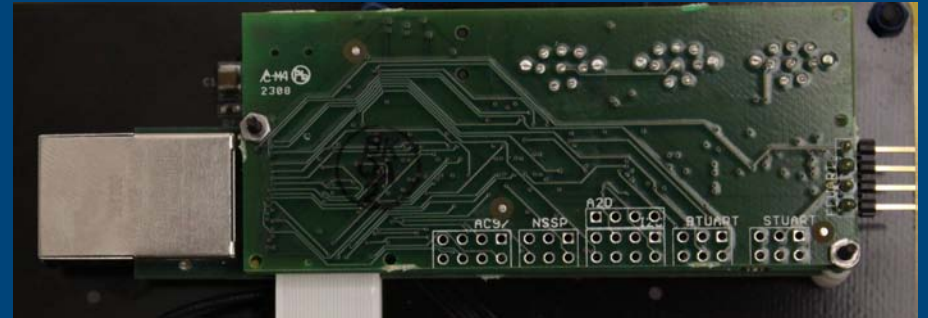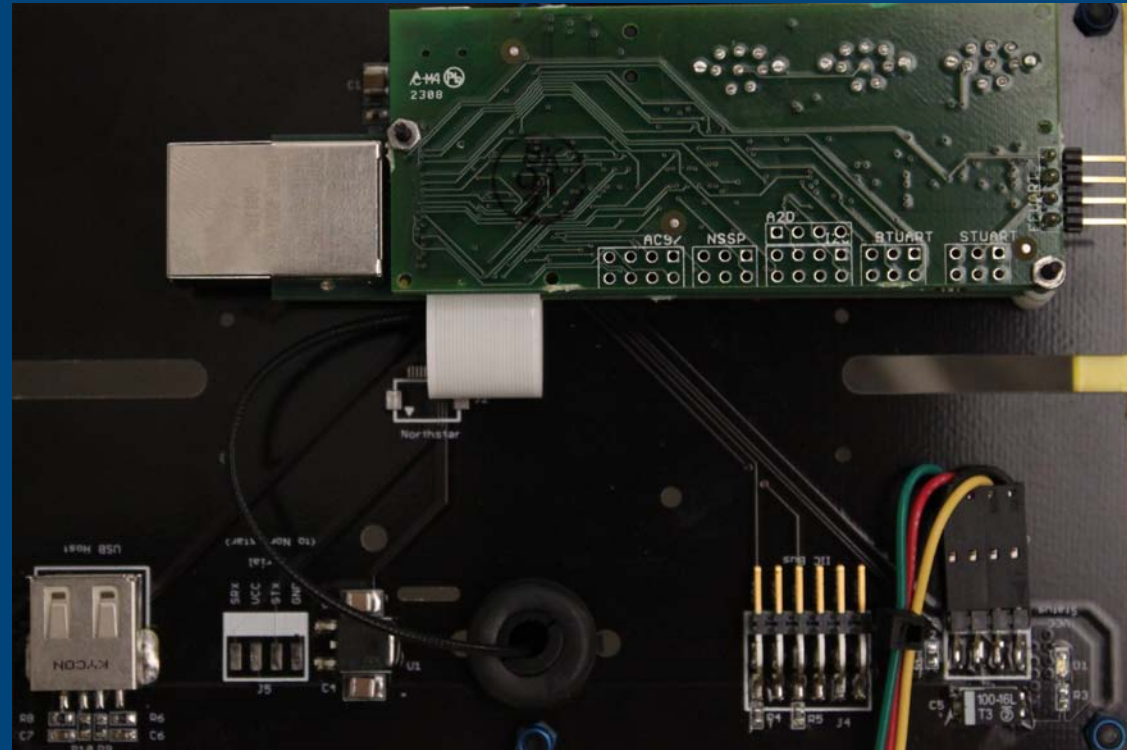
Gumstix Cont.....

- Two serial ports:
  - Upper right is used as the default text terminal.
  - Lower right is used to connect to Brainstem.
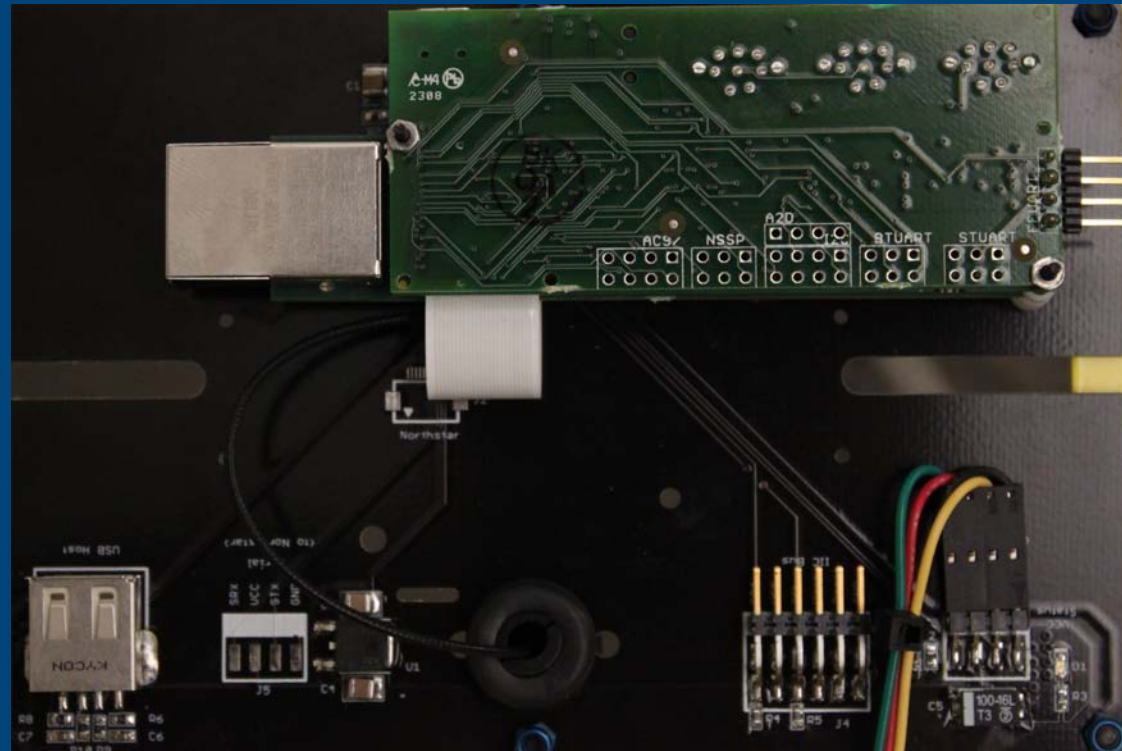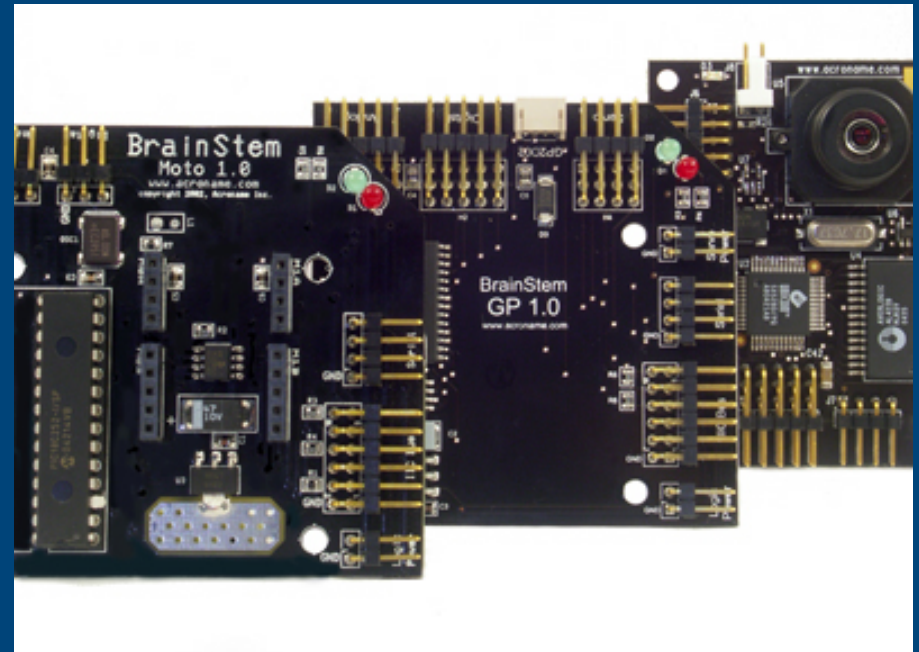
Gumstix Cont...

- USB is connected to a USB-hub, which is connected to a web cam and a wireless sensor (tMote)
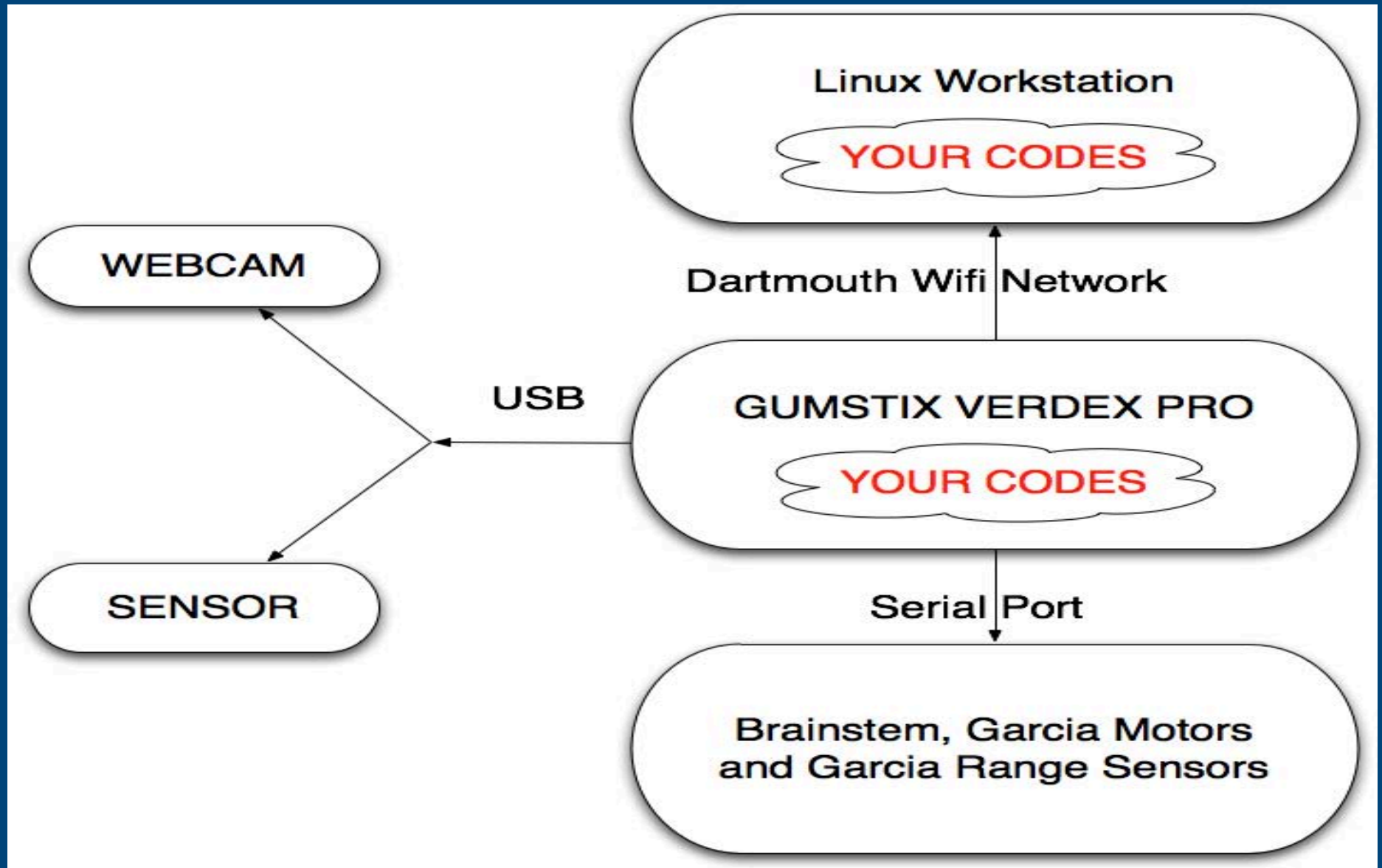
Brainstem (by Acroname)

- A special circuit board to receive commands from the serial port and execute them.
- Motors and range sensors are connected to Brainstem.

HW Architecture Overall

Embedded Linux

Gumstix Embedded Linux

- A 2.6.21 patched linux kernel.
- Full support for many devices (webcam, sensors,…)
- JSFF2 file-system, accessing files on Flash chips as on hard drives.

Demo 1: Log on to Gumstix

- Connect robots to the computer with a RS232 cable.

- Type "minicom" in the computer

- Start the robot!
- User: root
- Password: gumstix
- *Be careful, because you have the power to delete things you shouldn't!*

Demo 2: Using Dartmouth Wireless

- Your robot is running under the "Dartmouth Registered" network with a fixed IP address 129.170.210.x.
  - Actual IP addresses listed on project page
- Let's ssh to the robot and play with the linux for a while.

Demo 3: Hello World Cross-Compiling

- Write a helloworld.c
- Compile it with cross-compiler at:
    - [fedora]$/usr/local/gumstix/gumstix-oe/tmp/cross/bin/arm-angstrom-linux-gnueabi-gcc -o helloworld helloworld.c
- Now try type:
    - [fedora]$file helloworld
    - helloworld: ELF 32-bit LSB executable, ARM, version 1 (SYSV), dynamically linked (uses shared libs), for GNU/Linux 2.6.14, not stripped

Demo 3:
Copying helloworld to Gumstix and run

- We need scp (copy via ssh).
  - [fedora]$scp ./helloworld root@[the gumstix ip]:~/