Outline

- The Lab: ENS32NW
- Website
- Software: Tekkotsu
- Robots: Aibo ERS-7 M3
- Assignment 1
- Lab Rules
My information

● Office hours
  ○ Wednesdays 11am-noon
  ○ ENS32NW
● katie@cs.utexas.edu
Lab information

- The lab is in the basement of ENS
  - Room 32NW
- The lab has 11 workstations + 1 server
  - 8 working now
- The server: luigi.csres.utexas.edu
  - NIF+NFS server and wireless gateway
  - Do not use! (switch two of mario/luigi)
    - Will be locked down soon
  - Do not reboot!!
- Workstations (ie, any machine but luigi)
  - Okay to reboot if needed
  - Automatically update and reboot around 7:30am
  - /home and /usr/local are NFS mounted
Lab information

● Machine login
  ○ Username: your cs user name (____@cs.utexas.edu)
  ○ Password: cs393r
  ○ Change your password! (type passwd)
    ■ Must be done today on luigi
    ■ Not updated instantly - requires me to run script tonight

● Permissions
  ○ Your directories and files will be readable by classmates by default
  ○ Your responsibility to change permissions and protect your work
Lab information

- Lab security
  - Be aware when leaving anything unattended in the lab
  - Never leave the robots unattended!
  - Always lock up your robots when you leave
  - Do not give out the room code to anyone
- Let me know of the following issues:
  - Wireless network latency
  - Workstation unavailability
  - Lack of supplies
  - Hardware issues
Tekkotsu

- Assignments will use Tekkotsu
  - Version 5.1
  - http://www.tekkotsu.org
  - A C++ framework for Aibo development (from CMU)
- Contains many built in features you will need:
  - Color image segmentation
  - Pre-programmed walks
  - State machine
- To get started, see webpage resource section for:
  - Tutorial on getting setup and compiling a stick
  - Tekkotsu Tutorial
You will be writing Aibo behaviors in C++

Behaviors
- Receive events (sensor signals, buttons, images, etc)
- Create motion commands (motor commands)
- Can also create events (state transitions)

Tekkotsu provides many high level events
- Color segmented images
- Blob locations

Tekkotsu provides many motion commands
- Pre-programmed walks

Some analogies:
- Behavior:VisionObject - Agent Sensor
- Behavior:MotionControl - Agent Effector
Tekkotsu Controller GUI

- Joystick control of walk and head movements
- View of camera and segmented image
- Can start and stop behaviors
- Can interactively create new poses and motion files
AIBO ERS-7 M3

- Multiple Sensors
  - Vision
  - Touch sensors
  - Accelerometers
  - IR, etc
- Multiple Effectors
  - 4 legs with 3 DOF each
  - Head with 3 DOF
  - Tail, LEDs
- 64 bit RISC processor (576 MHz) and 64 MB RAM
- Communication through wireless LAN card
Robots

- Each team locker contains:
  - One Aibo (with memory stick and battery)
  - One charging cradle
  - One Aibo ball
  - You are responsible for returning all these items in working order!
- Each team locker only has one key
  - Coordinate among your team members!
- Each workstation has a memstick writer
  - Most have both a computer slot and a USB writer
- 3 official orange robot soccer balls and a blue goal are stored in the lab
  - Do not remove!
Battery Management

- A battery will last up to 45 minutes depending on the Aibo's actions
  - May only last 15 minutes when playing soccer
- Each Aibo has its own charger
  - The Aibo sits on the charger and charges the battery
  - You can charge the Aibo while it is stored in your locker
  - Display indicates if it is charging
  - Do not unplug the chargers from the power strip on top of the lockers
- There are three extra batteries charging on top of the lockers
Robot Care

- Robots are fragile
  - Don't set them on tables or chairs
  - Be aware of where they are at all times
    - Don't step on them or roll your chair into them
  - Don't let them walk into anything repeatedly
  - Don't force the joints to move once stiffness is enabled

- Let me know if you think your robot is broken or breaking
Memory Stick Care

- Don't remove the stick until reading/writing is finished - otherwise you can corrupt your stick
  - Wait if the green or blue light on the reader is still flashing
  - To be safe, run `umount /media/disk`
    - Wait until the robot is completely powered down
- Memory stick lock switch should stay unlocked
- Never reformat the memory stick in any way except using the `make newstick command`
- Think you have memory stick problems?
  - Solution 1: Try `make newstick and make install a few times`
  - Solution 2: Try putting a clean copy of Tekkotsu or another team's code on the stick
  - Solution 3: Email me
Assignment One Goals

- Establish contact between workstation and Aibo
- Demonstrate you can read the sensors and display them
- Make the Aibo move its head and walk
- Get started using a colored blob tracker on the camera image
- Write a couple of simple control programs
  - Control the Aibo's gaze to track the ball
  - Walk towards a blue goal
- Hint: Work through the Tekkotsu Tutorial first!
Assignment One

- Worth 1-2 points each:
  - Demonstrate the ability to read and display the changing values from the Aibo's sensors as useful data in your program
  - Same for camera image
  - Demonstrate the ability to detect and track a pink blob in the camera image with the head held still
  - Demonstrate that you can control sitting, standing, and head-turning
  - Demonstrate that you can control walking: forward and turning
  - Demonstrate that your Aibo can walk in an arc: forward and turning at the same time
  - Demonstrate that your Aibo can move its head to keep the visible blob from a pink ball near the center of the image
  - Demonstrate that your Aibo can spot a colored patch in the distance and walk towards that patch until it fills half the camera image, and then stop.
Assignment One

● Some hints
  ○ Good blob identification will be an essential aspect of future assignments
  ○ Tekkotsu already provides a decent color map
    ■ However, the carpet often looks blue
    ■ You can train your own color map
  ○ Look at the Tekkotsu tutorial!
Assignment One

- Everything runs on the robot
  - No using the joystick controls
- You should switch behaviors during your demo to show different things
  - Each checkpoint can be a different behavior
- You can also communicate with the robot via touch sensors
- Evaluations are done in person
  - Wednesday 11am-12pm (questions get priority)
  - Between 11am and class on Thursday
- You will turn in your code and memo
  - By email before class time
  - One email per team
Lab Rules

● Lab environment
  ○ Food is okay. Mind your drinks near the electronics.
  ○ Cleanup any mess when you leave.
  ○ Throw away trash in the garbage cans in the hallway or kitchen.
  ○ Turn off lights if you are the last one to leave the area.

● Class Territory
  ○ Don't borrow or use supplies found outside the class lab area
  ○ If you take a chair from a surrounding desk, return it

● Noise
  ○ PhD students are seated around you
    ■ Talk quietly
    ■ Try not to bother them
Lab Rules

- Security
  - Do not leave your robots unattended!
  - Robots can only be used in the lab. They are never allowed to be removed for any reason.
  - If no team members are present, the team's robot must be locked in its locker.
  - Never give your locker key to anyone outside your group.
  - Never tell the door combination to anybody outside of class.
  - Double check that your locker is secure if you are the last of your team to leave.
  - Make sure the lab door locks if you are last to leave.
  - Never give your robotics machine password to anyone.
- People who are not enrolled in cs393r:
  - May not be in the lab unless a class member accompanies them.
  - May not use any of the lab computers.
  - May not use any of the robots.
Administrative

- Form a team and fill out a team form
  - You will receive a locker key
  - Lockers already contain Aibo/Charger/Ball/Battery/Memstick
- Be sure to log on to luigi today and change your password
Questions?