

CS 393R

Lab Introduction

Katie Genter
katie@cs.utexas.edu

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

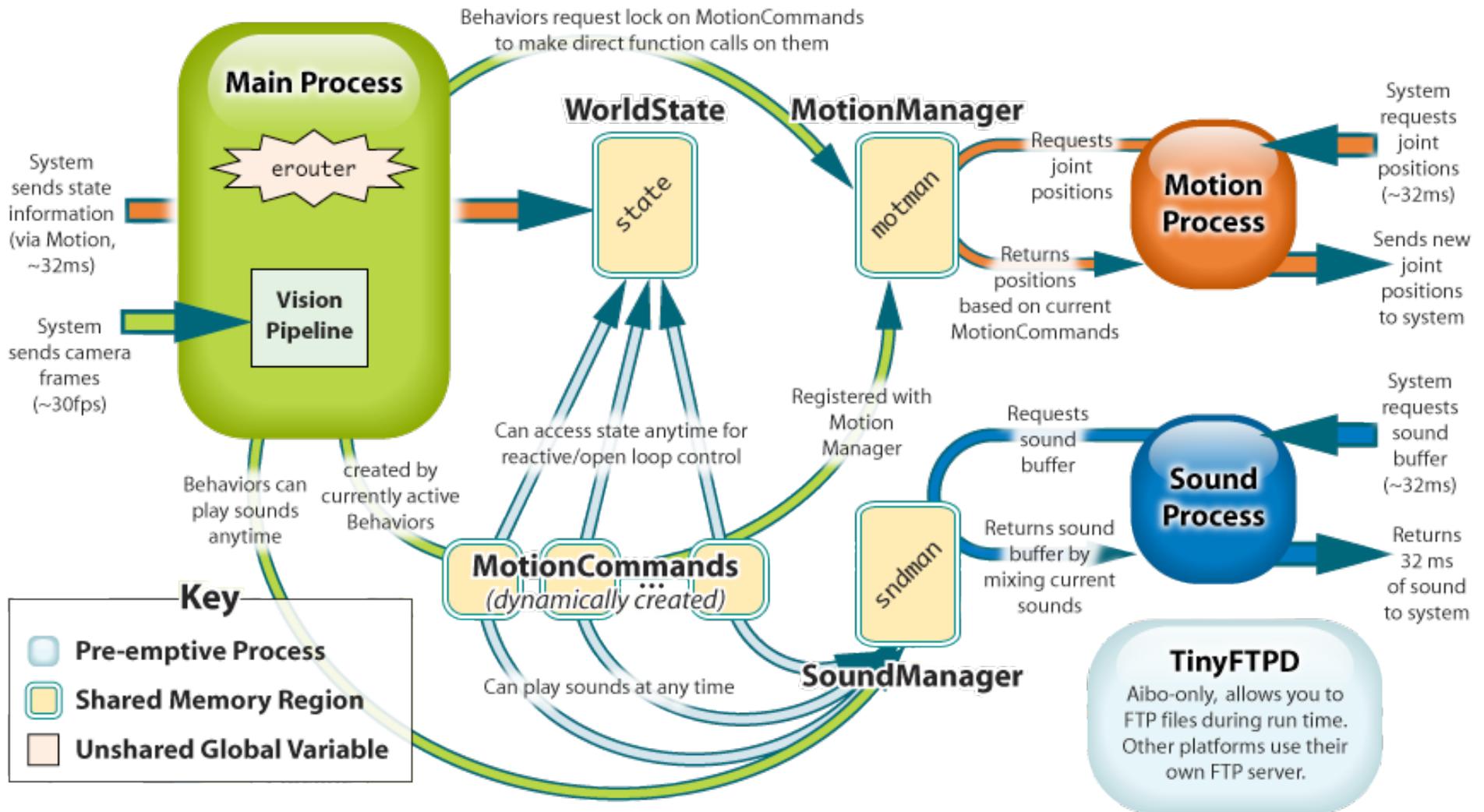
Tekkotsu

- 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

Tekkotsu Architecture

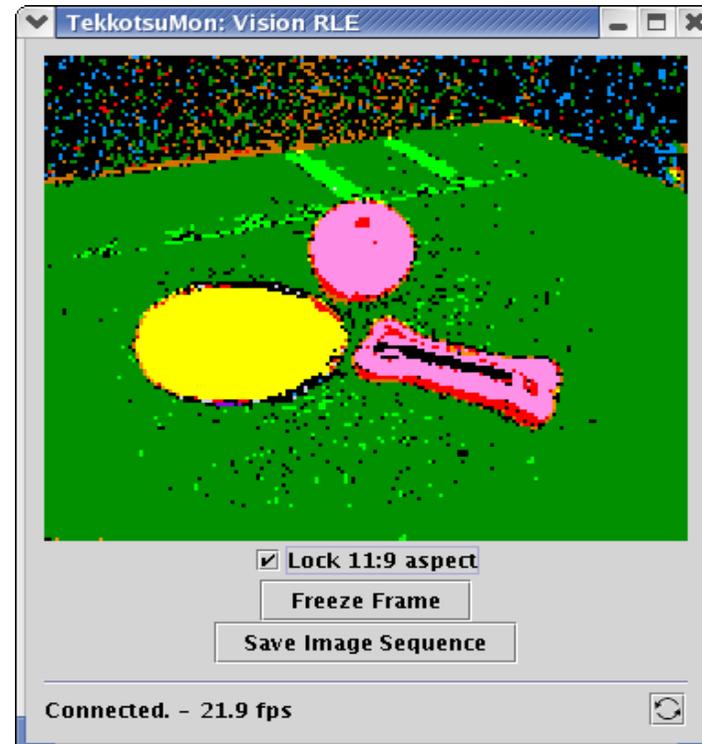
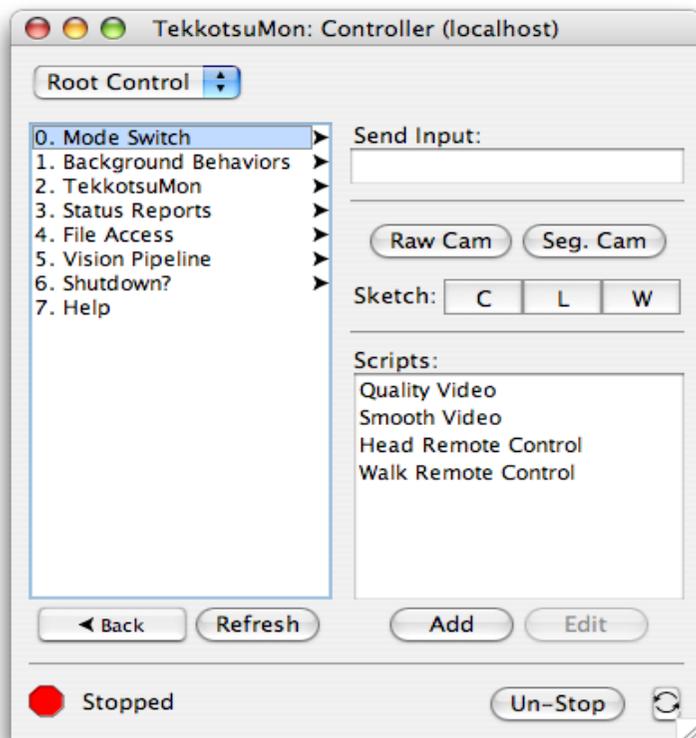
- You will be writing Aibo behaviors in C++
- Behaviors
 - Receive events (sensor signals, buttons, images, etc)
 - Create motion commands (motor commands)
 - Can also create events (state transitions)
- Tekkotsu provides many high level events
 - Color segmented images
 - Blob locations
- Tekkotsu provides many motion commands
 - Pre-programmed walks
- Some analogies:
 - Behavior:VisionObject - Agent Sensor
 - Behavior:MotionControl - Agent Effector

Tekkotsu Architecture



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

► Features-front



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
 - <http://www-2.cs.cmu.edu/~dst/Tekkotsu/Tutorial/colorsegment.shtml>
 - 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?