CS 393R

Lab Introduction

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Outline

- The Lab: ENS 19N
- Website
- Software: Tekkotsu
- Robots: Aibo ERS-7 M3
- Assignment 1
- Lab Rules

My information

- Office hours
  - Wednesday 11-noon
  - ENS 19N
- todd@cs.utexas.edu

Lab information

- The lab is in the basement of ENS
  - Room 19N
- The lab has 9 workstations
- The server: luigi.csres.utexas.edu
  - NIF+NFS server and wireless gateway
  - Use other machines if possible
  - Do not reboot!!

- Machine login
  - Username: your last name
  - Password: cs393r
  - Change your password! (type passwd)
- Door code!

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

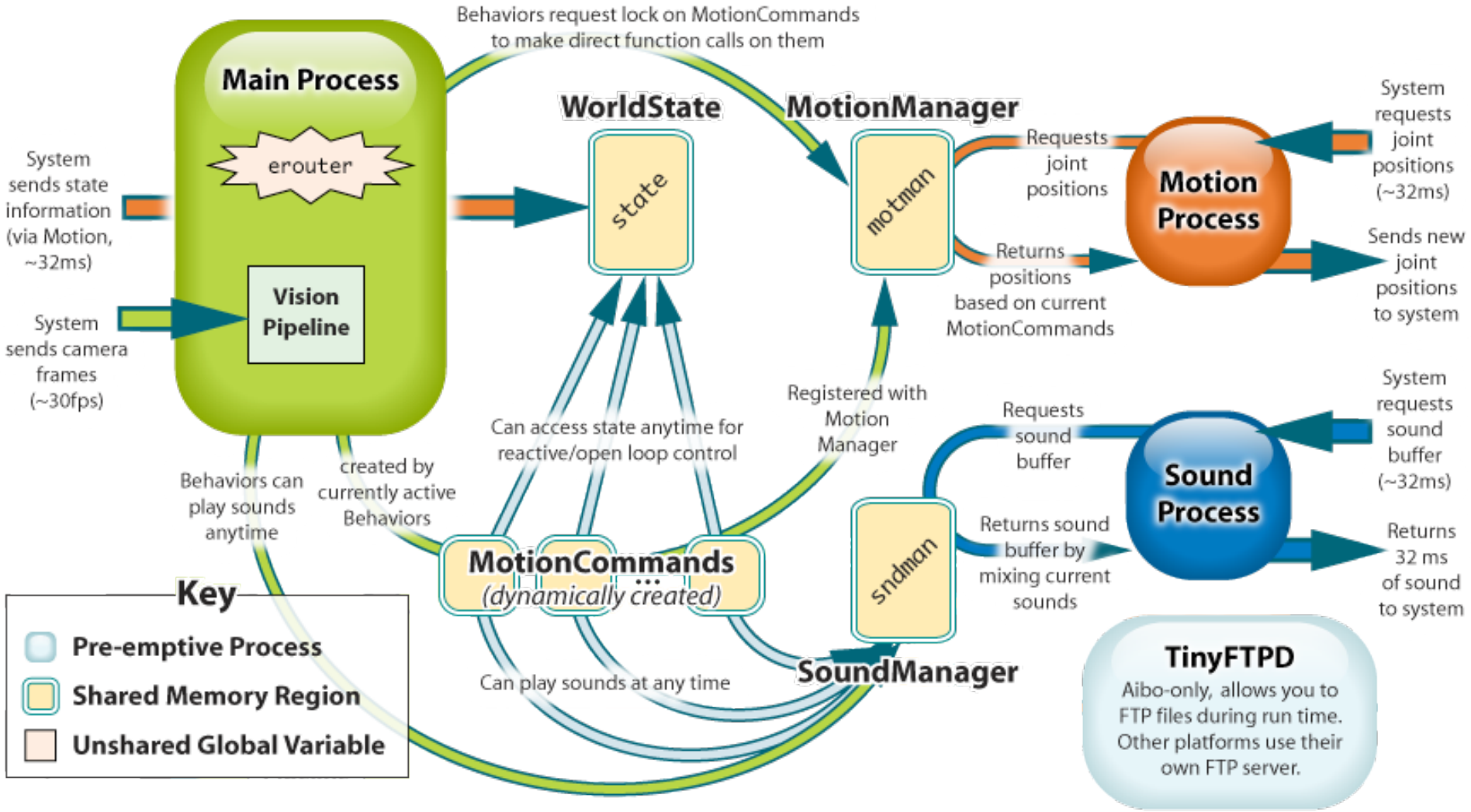
Tekkotsu

- Assignments will use Tekkotsu
  - Version 4.0
  - 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
- To get started, see webpage resource section for:
  - Tutorial on getting setup and compiling a stick
  - Tekkotsu Tutorial

Tekkotsu Architecture

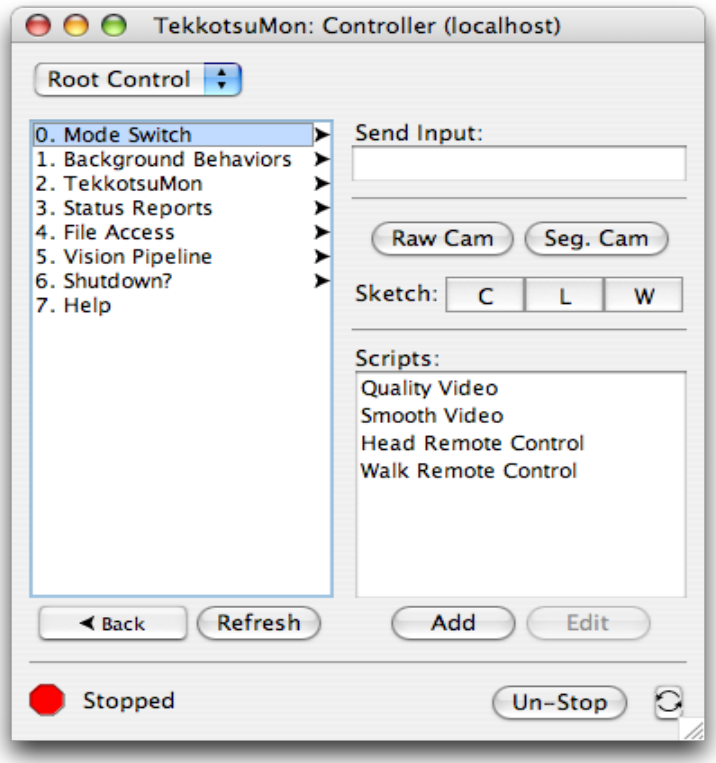
- You will be writing Aibo behaviors in C++
- Behaviors
  - Receive events (sensor signals, buttons, images, etc)
  - Create motion commands (motor commands)
  - Can also create events (state transitions)
- Tekkotsu provides many high level events
  - Color segmented images
  - Blob locations
- Tekkotsu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

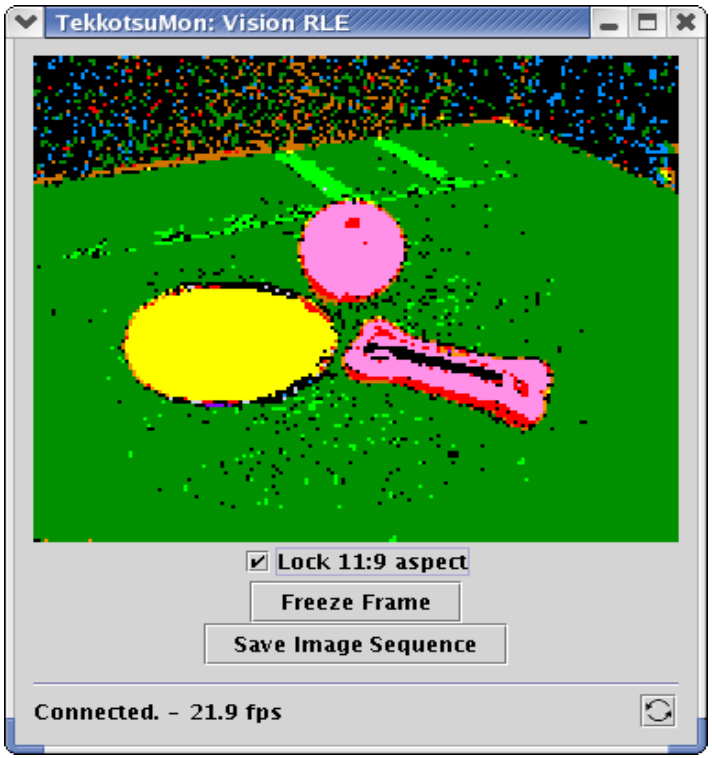
Tekkotsu Architecture



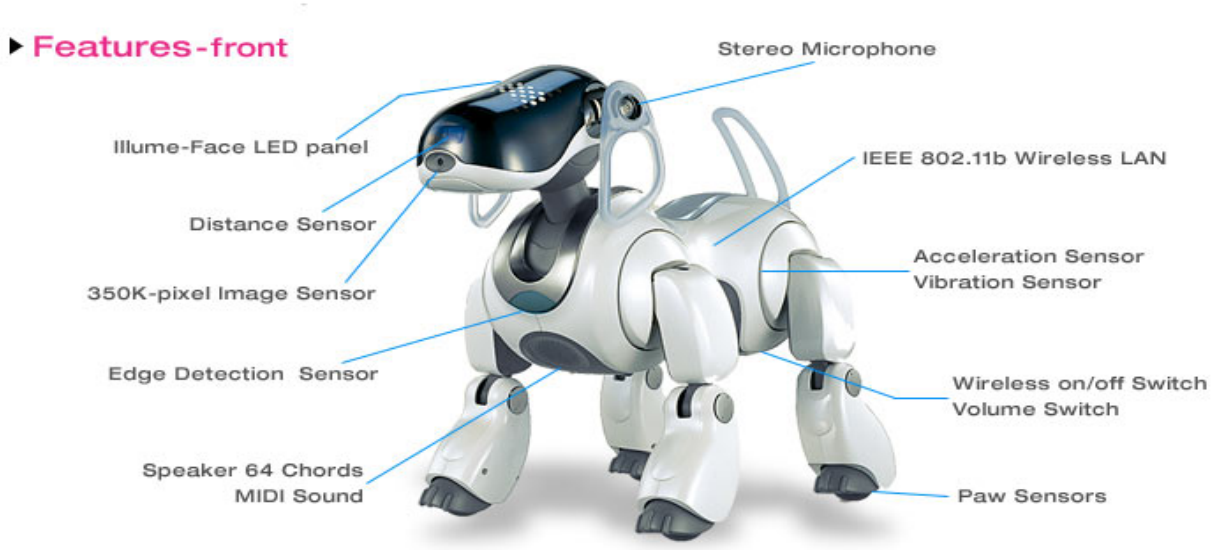
Tekkotsu Controller GUI

- Joystick control of walk and head movements
- View of camera and segmentd 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 workstation will have a memstick writer
- 3 official robot soccer balls 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
- Each robot locker only has one key
  - Coordinate among your team members!

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: Take a look at the Tekkotsu Tutorial!

Assignment One

- Worth 1 point 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 chairs sometimes register as pink
    - 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 can switch behaviors between evaluations
- You can also communicate with the robot via touch sensors
- Evaluations are done in person
- You will turn in your code and memo

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
- 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.
    - Many 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

Questions?