Tekkotsu
Robotics Application Framework
tekkotsu.org
Goals

➢ Develop a common research platform for the Aibo
➢ Reduce barrier to entry for new Aibo programmers
➢ Encourage hobbyists to become developers
Open Source Model

Why start a new code base?

RoboCup competition is good...
- Drives rapid development
- Optimizes real-time performance

...and bad
- Source is “closed” for most of the year
- Single task causes specialization
Open Source Model

➢ Our answer: Tekkotsu

- First release March 4, 2003
- Three releases in first two months
- New features released as soon as they are ready
- Support for cygwin and ERS-220 contributed by one of our users
Out of the Box

- Vision processing (uses CMVision)
- Wireless interfaces
- Motion primitives
  - Walk (from CMPack), poser, keyframed playback, emergency stop, etc.
- Mapping and localization
- Sound Playback (with mixing)
Architectural Overview

- 3 processes: Main, Motion, Sound
- Event-based interface; no polling
  - Flexible state machine formalism
- Modular “plug-and-play” organization
- Utility functions: timers, mutex, event logging, profiling
- Online documentation & tutorials
Remote Monitoring

- Raw and color-segmented video
- Full 25 frames per second over wireless
Teleoperation
Joint Monitoring

Joint position and force graphs
Spherical Depth Map
Horizontal Height Map
Future Development

> Fast SLAM for Aibo

- Simultaneous Localization and Mapping (Montemerlo et al.)
- Efficient particle filtering technique
- Allows the robot to track position in a relatively unstructured environment
Future Development

➢ New representations for behaviors
  - Hierarchical state machines
  - Automated problem solving through keyframe based task descriptions
  - Visual routines for parsing world maps

➢ New animal learning models
  - Train Aibos just like real dogs
Credits

> Tekkotsu developers
  - Ethan Tira-Thompson, Alok Ladsariya, Tom Stepleton, Neil Halelamien, David Touretzky at Carnegie Mellon University

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