ISL RoboCup Project

Jeremiah Anderson
Alex Di Ricco
Lindsey Schurig
Overview

- Project Background
- AIBO Design
- Physical Environment
- Development Environment
- Behavior Modeling
- Competitions
- Project Issues
- What’s Next?
- Demonstrations
Project Background

Alex Di Ricco
Project Background

- **IRIS**
  - Institute for Research in Intelligent Systems
- **ISL**
  - Intelligent Systems Laboratory
Project Background

- RoboCup
  - Autonomous
  - Search and Rescue

- Initial Research
  - Play!
Project Background

- **Language Options**
  - Open-R (Sony)
  - R-Code (Sony)
  - Tekkotsu
  - Other Team’s Code
Project Background

• Considerations
  – Platform Limitations
    • Lack of a dedicated testing area
  – Simulator

• Decision
  – Open-R
  – German Team Code
AIBO Design

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AIBO Design

- **Sensors**
  - Tactile
  - Auditory
  - Balance
  - Visual
  - Temperature
AIBO Design

• Vision
  – Ball Detection
  – Beacon Detection
  – Goal Detection
  – Line Detection
  – Player Detection
AIBO Design

- Open-R
  - Proprietary Language
  - C++ based
  - Interface between code and AIBO
- Programming Environment
  - UNIX
AIBO Design

- Open-R (cont.)
  - Object Based
  - Passing Arguments
Physical Environment

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Figure 1: Scale diagram of entire field (dimensions in mm).
Development Environment

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Development Environment

- .Net (WinXP)
  - Cygwin
- Robot Control
- Makestick
- Simulator
Behavior Modeling

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Behavior Modeling

- German Team
  - XML
  - XABSL
  - YABSL
Behavior Modeling

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```xml
<condition description="kick possible">
  <and>
    <boolean-input-symbol-ref ref="ball.just-seen"/>
    <less-than>
      <decimal-input-function-call ref="abs">
        <with-parameter ref="abs.value">
          <decimal-input-symbol-ref ref="ball.seen.relative-speed.y"/>
        </with-parameter>
      </decimal-input-function-call>
      <decimal-value value="150"/>
    </less-than>
    <less-than>
      <decimal-input-symbol-ref ref="ball.seen.relative-speed.x"/>
      <decimal-value value="150"/>
    </less-than>
    <not-equal-to>
      <decimal-input-function-call ref="retrieve-kick">
        <with-parameter ref="retrieve-kick.angle">
          <option-parameter-ref ref="approach-and-kick.angle"/>
        </with-parameter>
        <with-parameter ref="retrieve-kick.table-id">
          <option-parameter-ref ref="approach-and-kick.table-id"/>
        </with-parameter>
      </decimal-input-function-call>
      <constant-ref ref="action.nothing"/>
    </not-equal-to>
  </and>
</condition>

approach-and-kick written in YABSL.

/** kick possible */
if (ball.just_seen && abs(value = ball.seen.relative_speed.y) < 150 &&
ball.seen.relative_speed.x < 150 &&
retrieve_kick(angle = @angle, table_id = @table_id) != action.nothing)
Behavior Modeling

- Agents
- Options
- States
- Basic Behaviors
Competitions

- US Open
- International RoboCup
Project Issues

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Project Issues

- Time Management
- Environment Setup
- Code/Documentation
- Code Modification
What’s Next?

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What’s Next

- Targeted Behaviors
  - Field Position
  - Ball Handling
  - Goalie Behavior
- Alternative Algorithms
- Future Competitions
Demonstrations
Any Questions?

Jeremiah Anderson
Alex Di Ricco
Lindsey Schurig