ISL RoboCup Project

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National Science Foundation
Celebrating 50 Years

Overview

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Overview

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

Project Background

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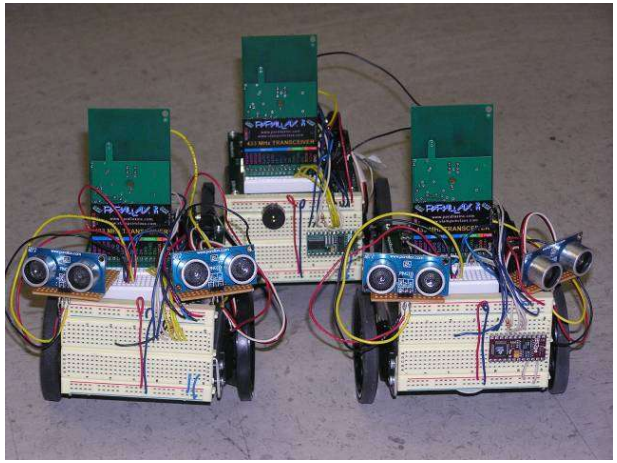
Project Background

- 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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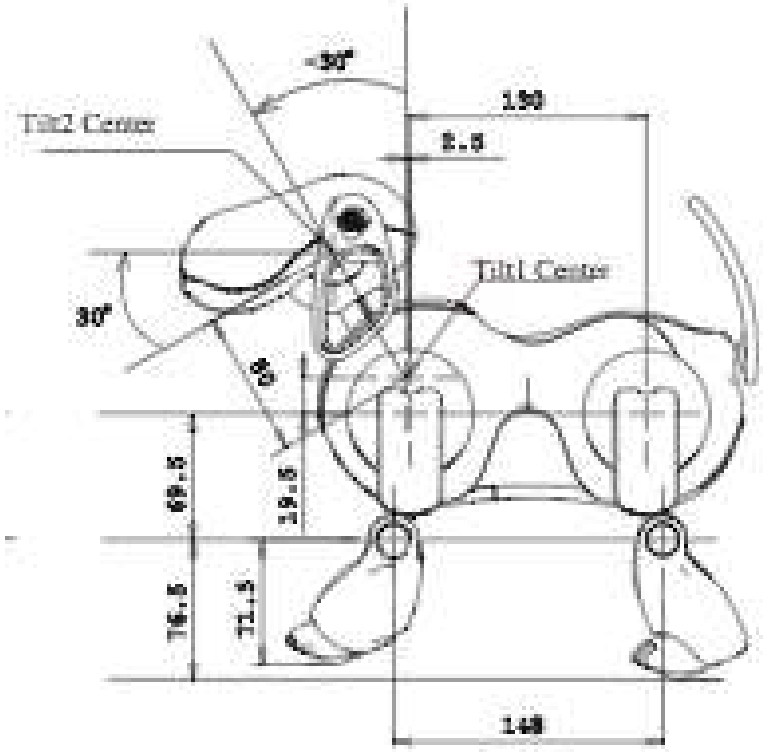
AIBO Design

- 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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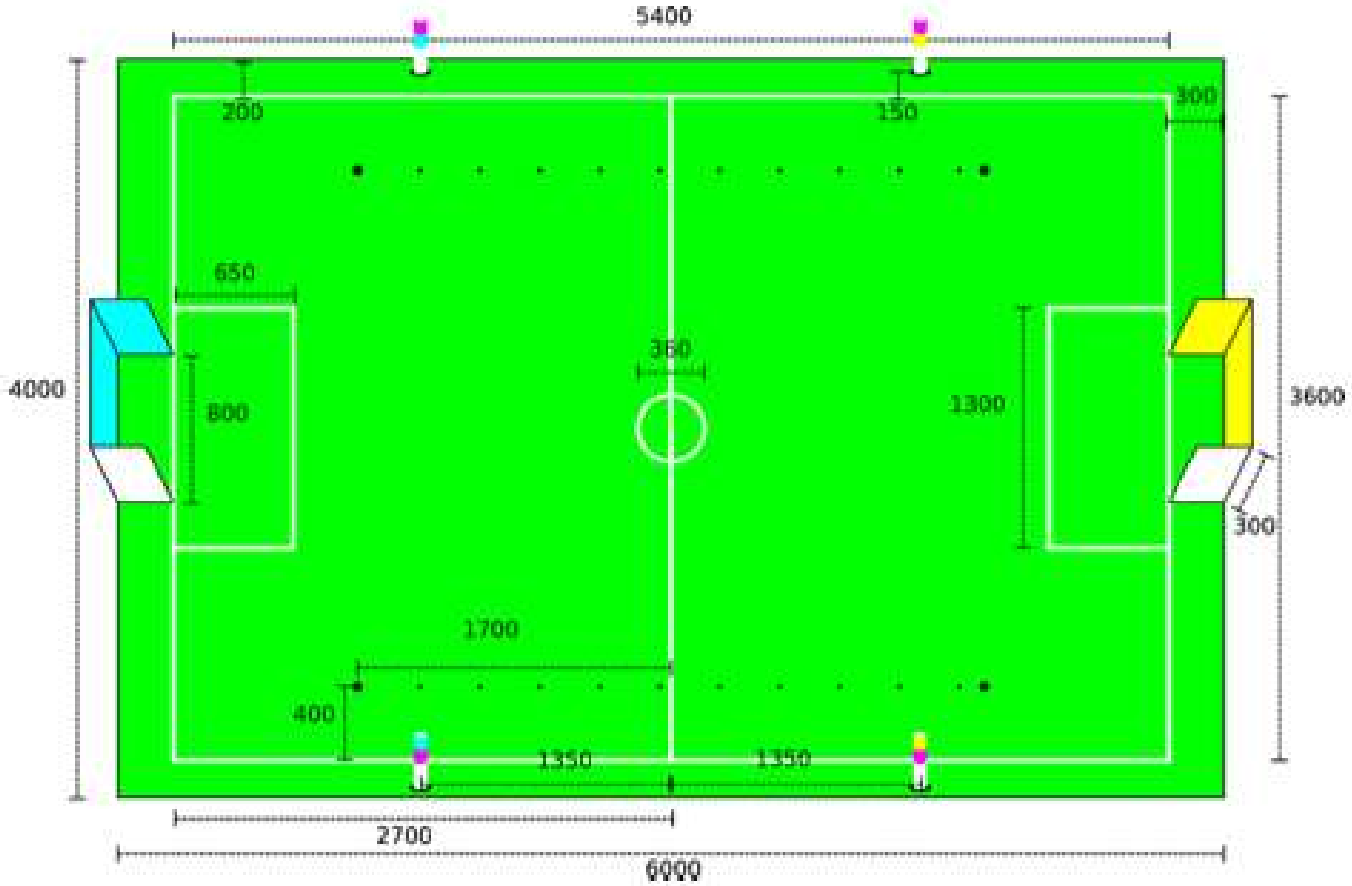

Figure 1: Scale diagram of entire field (dimensions in mm).

Development Environment

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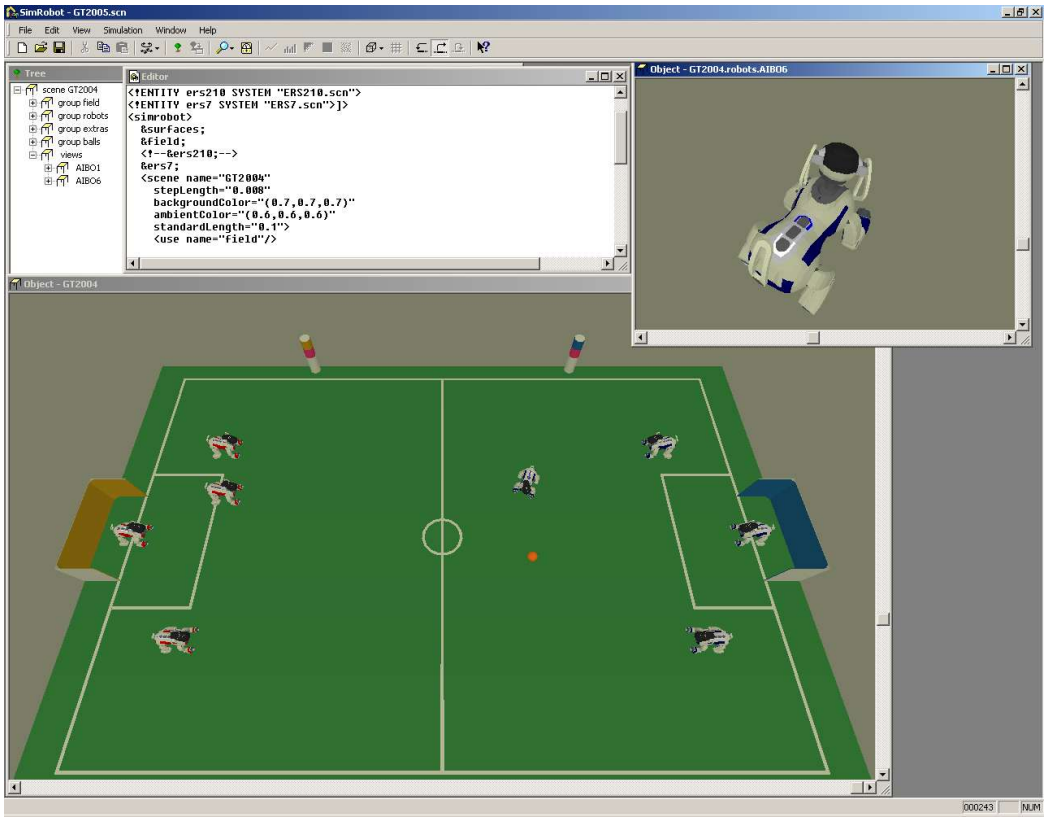
Development Environment

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



Behavior Modeling

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Behavior Modeling

- German Team
  - XML
  - XABSL
  - YABSL

Behavior Modeling

approach-and-kick written in *XABSL*.

```
<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

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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?

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Alex Di Ricco
Lindsey Schurig