

RoboCup 2024
Standard Platform League (SPL)
Technical Challenge
— SHARED AUTONOMY —



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1 The Challenge 2024: Shared Autonomy

In the 2024 technical challenge, teams must create a mixed team comprising one human-operated Nao robot and one fully autonomous Nao robot. Matches will be played in a two vs. two format on the standard SPL field.

1.1 The Goal

The challenge aims to progress towards enabling robots to operate alongside agents with human-level intelligence. To ensure a level playing field in terms of physical capabilities, all participants will use Nao robots. Each team will have one robot remotely operated by a human, providing human-level intelligence, while the other robot will function autonomously, adhering to the main SPL competition rules. For further references and exact rules, see [the official challenge rules](#) provided by the technical committee.

2 Our Approach

Our approach involves developing a sophisticated web-based interface to control the robots and facilitate communication. The backend system communicates with the robots via TCP, sending byte commands that are interpreted and executed by the robots.

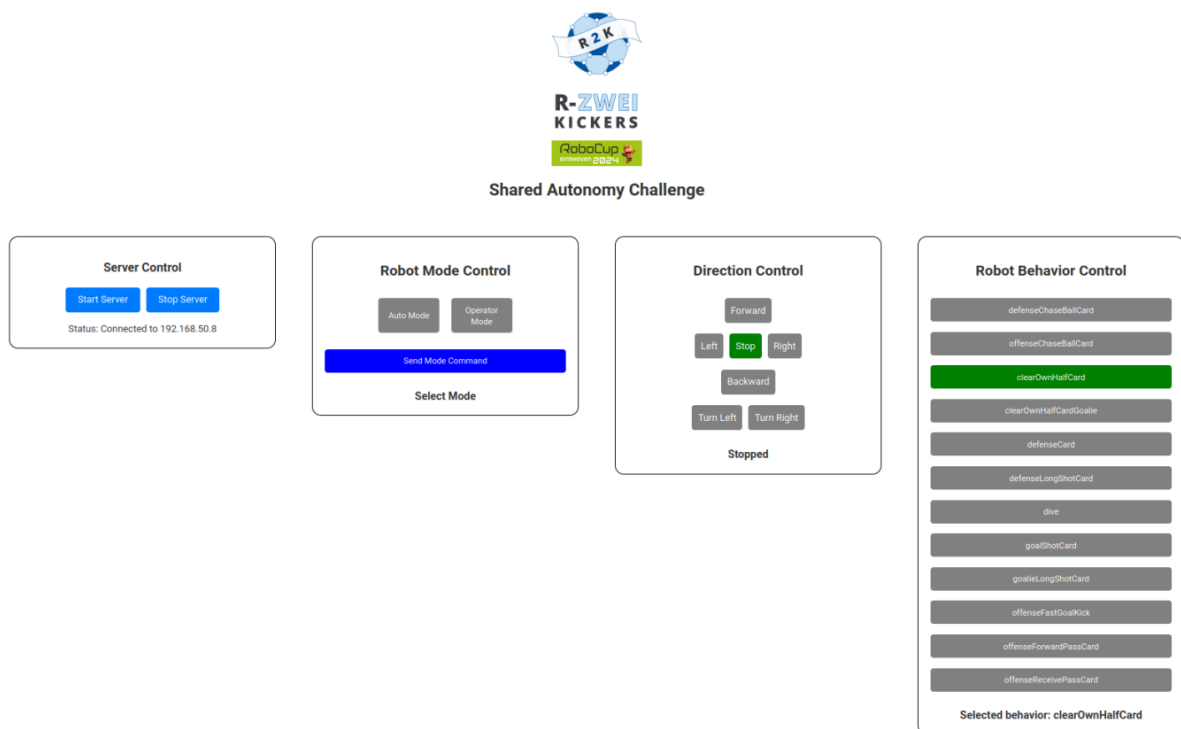


Figure 1: The Interface for the shared autonomy challenge consists of four distinct control modules.

2.1 Tactical Overview

The interface is divided into several control modules:

- **Robot Mode Control**: This module allows switching between autonomous operation and full human control.
- **Direction Control**: Provides an interface for complete human control over the robot's movements.
- **Behavior Control**: Enables manual selection of behaviors from a prepared card stack using the BHuman skills and cards framework.

2.2 Technical Overview

Our system is based on a minimalist web-app using Svelte for the frontend and a Python Flask server for the backend. The server acts as a REST interface, converting commands from the frontend to byte messages sent to the robot. The robot-side module interprets these messages, integrating the commands into its representation for use by other modules and parameterizing skills or behaviors.

3 Future Enhancements

To further enhance our system, we plan to improve inter-robot communication by enabling message exchanges between robots. Additionally, we aim to refine our tactical capabilities, offering more sophisticated and nuanced control options.

Roadmap

1. **Inter-Robot Communication:** Implement triggers for message exchanges between robots to coordinate actions and strategies.
2. **Enhanced Tactics:** Develop advanced tactical views and strategies to optimize robot performance in various scenarios.
3. **User Interface Improvements:** Enhance the web interface to provide more intuitive and user-friendly controls.