SPQR Team Technical Challenge @ RoboCup 2024

Operator Interface
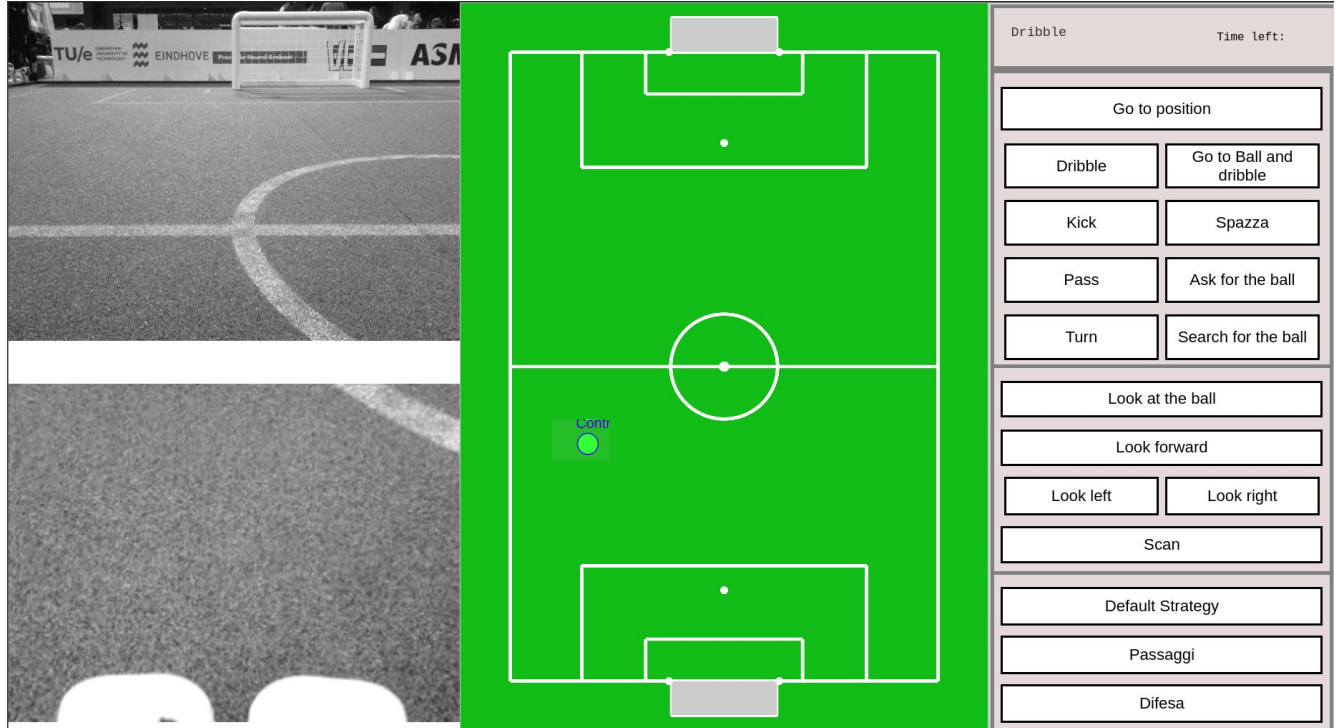
Interface Concept
Realized in Nodejs, using python sockets as "hub" to exchange data with the robot

Interface Architecture

2D view of the observations of the robot project in 2D

First-person view from the robot's cameras

Buttons for commands

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How data is exchanged

Command

Tuple of the following values: body command, head command, and a strategy command

There is no direct steering of the body movements, due to to possible latency of the network, or difficulties of the operator to understand the whole situation in real-time. Instead, we opted for a "Go to position" type of command which takes a position target

Observations

Information from the cameras is received, processed and sent to the operator's interface through a web socket on a point-to-point connection

The received data contains obstacles, teammates, the position of the controlled robot, the observations on the landmarks. This data is then saved in a ring buffer in python, such that we have observations of the last N instants

Coordination with autonomous

Some of the low-level commands are sent to the autonomous robot, like "Ask for the ball"

The strategy buttons are used to devise a high-level behavior, using the controlled robot like a coach

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Predictive World Model

A transformer-based world model provides the operator with a prediction of the game state (position of players and ball) in the immediate future.

The model has been trained with real game data from the last few competitions, collected from the YouTube streams (via our video analysis tool MARIO) and the GameController logs.