Virtual Embodiment

Integrate a human 3D avatar into a neuro-robotics simulation environment. Control it through state-of-the-art VR hardware.

You can look at it like this: a humanoid robot (see picture) that needs to be controlled by a human user.

Goal: Don't just be visually part of the environment and act through scripted events, but feel physically integrated into the virtual environment through the avatar body.

What's already there?

- Neurorobotics Platform with physics engine
- Rigged avatar model with joint definitions
- VR client in Unity3D
- Data communication plugin to allow movement commands from client (using VR hardware) to server (running the simulation)

Core topics

- avatar is a rigged body model with joints inside a physically simulated environment containing other actors (robots). It needs to be moved physically (through velocities & forces) - not with setPosition/Rotation()
- mapping typical tracking data of VR hardware (head pose, 2 hand poses, additional tracking targets ...) to avatar target poses & movement commands
- how to handle mismatches between realities: avatar can't move through virtual walls, but virtual walls don't block a user's movement

Skills

- Unity3D
- Virtual Reality
- C++ (server-side control plugin)