Bachelor Thesis: Robotic Kitchen - Integrate a Simulated Robot into a Virtual Reality Kitchen Environment

Virtual environments allow us to work on interesting robotic and human-robot interaction tasks due to the exact information of all simulated objects. We created a virtual reality kitchen environment in Unity\(^1\), where a virtual agent can reenact different cooking recipes. This agent can be teleoperated by a human using the HTC Vive\(^2\) headset.

The aim of this project is to integrate a robot in the kitchen environment (e.g., Toyota Human Support Robot\(^3\)). To control the robot, an interface using the Robot Operating System\(^4\) (ROS) needs to be implemented. Multiple solutions exist to solve this problem, e.g., [1]. The first step is to investigate which one is suitable for the project and how to adapt it. When the robot can act (i.e., grasp, navigate) and sense in the VR Kitchen, a demonstration task needs to be implemented where a human agent and a robot solve a pick-and-place task like setting the dinner table cooperatively.

Tasks
- Get familiar with ROS and Unity
- Literature review and evaluation of different ROS - Unity interfaces
- Integrate a robot into the VR environment
- Implementation and adaptation of a chosen interface into existing VR project
- Implement and test a cooperative task in a kitchen environment with VR controls

Workload split
- Research and theory: 20%
- Programming and implementation: 50%
- Writing: 30%

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References

\(^1\)https://unity3d.com/
\(^2\)https://www.vive.com/
\(^3\)https://robots.ieee.org/robots/hsr/
\(^4\)https://www.ros.org