Specialization Project

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1 Course code and Name

IE505718 Specialization Project

2 Topic

Affordance Learning for Robotics Interaction Design

3 Course content

1. Robotic Design
   (a) Basic Concepts in Robotic design.
   (b) Key features in Robotic design.
2. Robotic Interaction
   (a) Basic Concepts in Robotic interaction.
   (b) Key design features in Robotic affordance.
3. Affordance Analysis
   (a) Affordance classfications.
   (b) Affordance analysis methods.
4. Simulation Design Platform Development
   (a) An overview of different simulation software
   (b) Detailed analysis of Nvidia Isaac Sim

4 Learning outcome

1. Knowledge
   (a) To understand the basic knowledge about robotic design.
   (b) To overview the robotic affordance analysis methods
   (c) To compare different simulation platform for affordance interaction robotic design.
   (d) To explore algorithmic changes needed to incorporate existing Reinforcement Learning implementations in related simulation platform.
2. Skill
   (a) To master Nvidia Isaac Sim platform for robot interaction design.
   (b) To implement an application case for robot interaction affordance design in Nvidia Isaac Sim platform.
   (c) To optimize the design process using Reinforcement learning methods.
3. General Competence
   (a) Ability to communicate affordance theory and deep learning concepts and main challenges in the robotic design areas.

5 Evaluation

1. A working prototype of affordance learning sandbox with documentation

6 References

1. Learning To Walk in Minutes by Rudin et al and Nvidia.
2. Graphics and Simulation Courses by Nvidia