

# Active Perception: Physically Plausible Scene Understanding

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Active perception enables robots to explore partially or completely unknown environments autonomously using physical interaction. The forceful physical interaction with the environment generates new sensory input, which would not have happened without it. By incorporating this new information, the robot is able to improve scene understanding and to build richer object representations. This process relies on visual and haptic sensors to perceive the environment and the objects in it. However, in order to interpret the signals and gain information about the scene, prior knowledge of what object relations constitute a physically plausible description of the environment is still needed. Since the physical interaction with the environment is a central part of active perception, physical plausibility allows to further constrain the usually strongly under constrained problem of scene understanding.

The student working on this project should learn how to integrate physical plausibility into an (active) perception pipeline. By implementing and evaluating a component for scene understanding for the real robot, the student shows the improvements gained compared to standard approaches.

The result of the project should be a system for physically plausible scene understanding, which will be integrated and evaluated on a real robot using our robot software framework ArmarX. Applicants must be interested in active perception and should possess good programming skills in C++.

