情報科学系セミナー（第3回）

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How did "DRC-HUBO+" win the DARPA Robotics Challenge? – Robust Computer Vision Algorithms for "DRC-HUBO+"

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日　時：平成28年12月20日（火）15：00～16：00

場　所：情報科学系Ⅲ棟5階　コラボ7

講演要旨：

For the intelligent robots to operate in very complex environments, it is essential to have a robust perception system using many different sensors, such as cameras and lidar depth sensors. There have been significant advances in the perception technology for intelligent robots in the last decade. We, however, encountered many problems in applying the state-of-the-art computer vision solutions to DRC-HUBO+ for the DRC challenge. It often failed to detect and grasp objects, such as a drill, a door handle, and a valve, which were important objects in the DRC missions. In this talk, we present the computer vision techniques to robustly detect those objects under challenging outdoor lighting conditions. Specifically, the camera exposure is adaptively updated to An effective fusion algorithm for the camera and Lidar sensors successfully aligns the color and depth images with the smallest error, as of today, in the Middlebury benchmarking data. The resulting fused images provide the accuracy required for the position-based DRC-HUBO+ to successfully carry out given missions in the DRC Finals, such as stair climbing, opening door, drilling a hole, and operating a valve. Our novel CNN network, called "AttentionNet", is developed to accurately classify and localize the target objects in the given input image. We also present the DRC-HUBO+ robot system with a video clip of the DARPA Robotics Challenge (DRC) Finals. After winning the challenge, we have further improved the robustness of the vision algorithms for more challenging and extreme conditions.

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