ECHORD++ Experiment

CoHRoS - Cooperate Programming of Highly Redundant Robot Systems

Deliverable D4.1 - Design of user study in real-world welding tasks

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Regenerated for re-upload on: December 13, 2016 by J.Steil

1 Introduction

The major goal of this user study is the evaluation of the proposed interaction concept in a realistic, real-world welding scenario. For this purpose, the experiment will be conducted with application developers from CLOOS. The evaluation addresses effectiveness and efficiency of the interaction scheme:

- What is the interaction/teach-in experience? Does the proposed approach simplify the teach-in? What is the quality of the taught welding trajectories?
- What is the time consumption during teach-in? What is the time benefit during execution? Does the approach lead to more energy efficient trajectories?

2 Reference Application

According to the requirements analysis in deliverable D1.1, the robot platform to be used in this experiment is the 7-DoF Qirox QRC350E robot as shown in Fig. 1.

During the study, the participants will use the developed interaction concepts to conduct a realistic welding task (TODO: yet to come). In order to ensure the feasibility of the study, this should consist in a realistic welding task but should not exceed a predicted programming time of approx. 2 hours.



Figure 1: Robot used in the study: CLOOS Qirox QRC350E robot with 7 axes for increased workspace reachability.

3 Study Design

In order to answer the mentioned research question, the developed interaction scheme needs to be compared to the current state-of-the-art programming procedure for CLOOS welding robots. However, since the number of CLOOS application developers available in the targeted schedule time is limited, we plan to conduct the study with 10 to 15 subjects.

Due to this low number the two interfaces can not be compared in a between-subject experiment design. Therefore, the study is designed according to the within-subject paradigm. That is, each application developer will be asked to conduct the presented welding task first with one interface and then repeat it with the other. The order of interfaces will be randomized.

During the experiment, all system data will be recorded in order to analyze the quality of the provided training data and the executed welding trajectory in a further post-processing step. After each participant's run, a questionnaire will access the user's interaction experience during that run.

4 Schedule

The preliminary schedule for the user study is two distinct weeks in May 2016. Depending on the actual number of study participants, this allows some pre-tests with CLOOS application developers before the actual start of the study. Depending on the actual predicted time needed to conduct the welding task, we schedule one or two participants per day.