



20 June 2016

INGENIEURPRAXIS
for
Ziyu Wang
Student ID 03637901, Degree EI

The Role of Human Motion Anticipation in a Functional Reach Task

Problem description:

With drastic growth of the computing power in recent time, robots can be utilized in many diverse ways, e.g. as a caregiver for patient with impaired balance control. A robotic caregiver is required to physically interact with the patient in a safe manner, which is usually achieved via Force or Impedance control [1]. Another fundamental requirement for a robotic caregiver is to predict the patient behaviors in order to prevent dangerous situations, e.g. falls.

In this Ingenieurpraxis work the student has to test the effectiveness of human motion anticipation in a functional reach task, where the robot correct human hand oscillation providing a light touch. The local Gaussian process approach [2] will be used to predict the human hand state during the functional reach. Predicted states serve as references for a force controller, which guarantees a soft interaction between the patient and the robotic caregiver.

Work schedule:

- On-line data acquisition from a Xsense motion capturing suit
- Hand state prediction using local Gaussian processes
- Experimental evaluation with a Kuka LWR IV+ robot and different patients

[1] C. Ott. Cartesian Impedance Control of Redundant and Flexible-Joint Robots, in *Springer Tracts in Advanced Robotics (STAR)*, 2008.

[2] D. Nguyen-Tuong, M. Seeger and J. Peters. Local Gaussian process regression for real-time model-based control, in *International Conference on Robots and Systems*, 2008.

Supervisor: M. Sc. Matteo Saveriano
Start: 29.06.2016
Delivery: 31.08.2016

(D. Lee)
Univ.-Professor