Computer Systems in Engineering

Programming Project

„Software development for industrial robotics“

In the next 3 weeks you will work on the design of a control system for an industrial robot. The implementation will be done in OpenRAVE environment in Python. During this time you can use lectures and practical classes for obtaining the individual assistance and advices.

The robot should have the following capabilities:

- Obtaining the current position and orientation of the TCP (Cartesian space and Euler angles).
- Calculating all possible solutions of the inverse kinematics solutions for a given point in (Cartesian) space.
- PTP movement
    - in axis space with synchronous and asynchronous trapezoid velocity profile
    - in Cartesian space with trapezoid velocity profile (and selection of a desired ending configuration in axis space)
- LIN movement with trapezoid velocity profile.

Tips:

- Movements&caluclations should also work in singularities
- Path interpolation must not exceed maximum joints accelerations
- Make sure that joints angles do not violate their maximum limits.
- For LIN movement you may restrict yourself to the situation, where the starting point is the current TCP and the ending point has the same orientation as the starting point

Use the values from the data sheet of the KUKA KR30l16 for calculations. These values should be consistent with the simulation model.

Please submit you work until 17.12.2013 per e-mail (the whole project as .zip). Pay attention for making clear comments and a good structure of the code. Make the appointment for defense until 10.12.2013. Defense should be made no later than 19.12.2013.