TECHNISCHE UNIVERSITÄT MÜNCHEN
LEHRSTUHL FÜR STEUERUNGS- UND REGELUNGSTECHNIK
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B A C H E L O R T H E S I S
for
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Fast Robot-Obstacles Distance Evaluation in the Depth Space

Problem description:

Reactive collision avoidance, for its importance, has been one of the most studied field in robotics, and many different planning and control approaches for obstacle avoidance have been proposed. One of the problems in this field is that of estimating the distance between the robot and possible moving obstacles in a fast, robust and accurate way.

In this Bachelor thesis work the student has to implement the depth space approach to evaluate the robot-obstacle distance proposed in [1]. Instead of approximating the robot using geometric primitives (cylinders or spheres), a realistic 3D mesh will be used. In this way, the closest point on the robot's surface and the robot-obstacles distance will be estimated with higher accuracy. To speed up the procedure, making possible its application in real-time, parallel programming techniques on Graphics Processing Unit (GPU) will be used.

Tasks:

- Implementation of the distance evaluation algorithm on a GPU
- Obstacle velocity estimation (optional)
- Experimental evaluation with RGB-D sensor and KUKA LWR4+

Bibliography:

[1] F. Flacco, T. Kroeger, A. De Luca and O. Khatib. A Depth Space Approach to Human-Robot Collision Avoidance. in *International Conference on Robotic and Automation (ICRA)*, 2012.

Supervisor:	M. Sc. Matteo Saveriano
Start:	xx.xx.xxxx
Intermediate Report:	xx.xx.xxxx
Delivery:	xx.xx.xxxx

(D. Lee)
Carl-von-Linde Fellow