

Topics for Master's thesis

HandCAD: 3D Reconstruction using quadrics

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The research project HandCAD investigates possibilities for object/scene and space reconstruction from 3D spatial data. A system is being developed that sequentially processes data from a depth camera (cf. Figure 1) and uses it to create a surface model (cf. Figure 2) of the recorded scene.

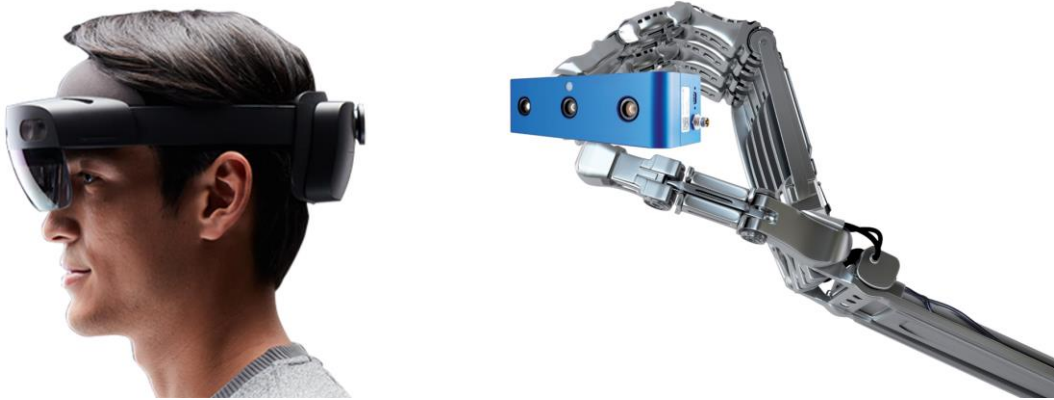


Figure 1: AR glasses Hololens 2 (left), depth camera Ensensio N10 (right); image sources: microsoft.com, IDS Imaging).

For this purpose, a depth sensor is freely guided by the user around this scene. The reconstruction of the recorded scene is to be created incrementally at runtime of the data acquisition and represent the scene as a surface model of quadrics.

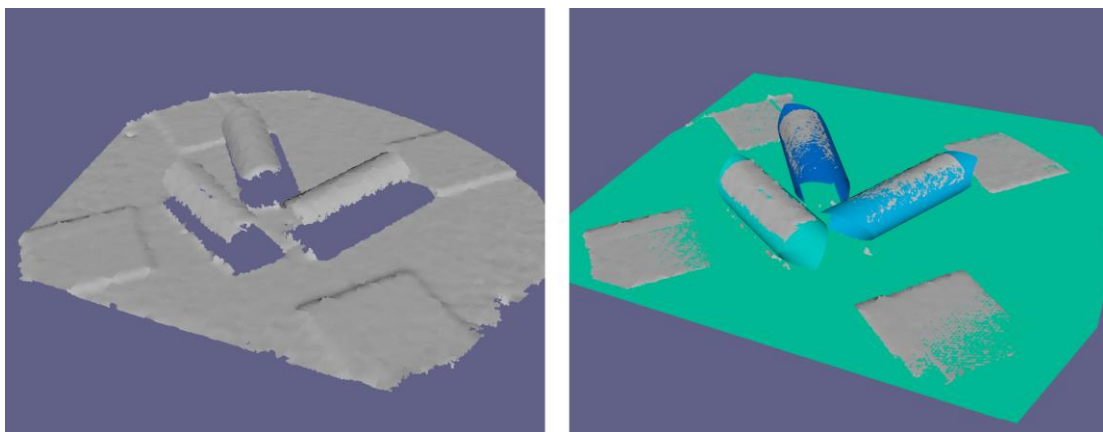


Figure 2: Unprocessed depth data (left); reconstruction of surfaces (right).

Possible topics:

- Segmentation of depth data
- Surface fitting to depth data
- Geometric algorithms on splines and quadrics
- Optimization of algorithms by GPU implementation
- Localization of a handheld sensor
- User feedback in an AR environment

Helpful background

- C++ programming language
- Robotics II
- Computer vision
- Pattern Recognition
- Mathematics for Engineers
- Computer graphics

Framework of the thesis:

- Literature research: review and evaluation
- Concept, implementation and evaluation
- Written elaboration
- Presentation: Inaugural presentation: 5+5 min discussion
- Intermediate presentation: 15+10 min discussion
- Final presentation: 30+15 min discussion

If you are interested or have any questions, just contact Josua Bloeiß via e-mail (josua.bloess@uni-bayreuth.de) or drop by in room INF-1.29! Many of the topics can also be worked on as a master project or seminar.