

Topics for Master Theses

Natural Language Robot Programming

1 Background

The research project *VerbBot* deals with the natural language programming of robotic systems. The goal of the project is to enable intuitive and quick commanding of a robotic arm (analogous to *Amazon Alexa*). This is intended to train a robot in a manner similar to human employees (cf. figure). Humans are able to correctly interpret vaguely formulated instructions, due to their understanding of language and their cognitive abilities. In contrast, if we compare the “natural” way of exchanging information for a robot system, it is only able to interpret well-defined commands with sharply specified parameter values. Therefore, the inaccuracy of natural language communication results in a variety of challenges that must be overcome by intelligent solutions. Accordingly, various suggestions for topics are listed here in order to expand and further shape the research project *VerbBot*.



2 Possible Topics

- Natural Language Programming:
 - Automatic Speech Recognition
 - Word-Sense-Disambiguation
 - Constituency Programming
 - Temporal Logic via Natural Language
- Robot Programming:
 - Multi-robot programming with synchronization structures
 - Graphical Representation of Robot Programs
 - Behaviour-based Robot Programming
- Various topics in the field of computer vision
- After consultation, your own topic ideas can also be realized as a master's thesis!



3 General Information

Helpful Skills:

- Programming Languages: **C++**, **Python**
- Relevant Lectures: **Robotic I**, **Robotic II**, **Computer Vision**, **Pattern Recognition**, etc.

Rough outline of the thesis:

- Literature research: 30-45 references
- Concept, implementation, and evaluation
- Thesis: Write down all the results of the thesis (50-90 pages)
- Presentation: Introductory presentation (5+5 min discussion); Intermediate (20+10 min); Final presentation (30+15 min)

If you are interested or have any questions, just contact Sascha Sucker by e-mail (sascha.sucker@uni-bayreuth.de) or drop by in room INF-1.43! Many of the topics can also be done as a Master's project or seminar.