Chair of Computational Modeling and Simulation
TUM School of Engineering and Design
Technical University of Munich

Software Lab:

RoboConstruction: Real-time interaction of BIM and robots on construction sites

Modeling:	
Mathematics:	
Programming:	
Science:	

Description

Semantically enriched 3D models serve as the basis for numerous use cases in construction planning and execution projects and can now be regarded as standard. Modern technologies such as BIM, IoT, AI and robotics are available and usable. The combination of individual technologies is being tested by both science and industry and is becoming increasingly practical.

Model-based planning provides a wealth of information that is required for the construction of the structure. For example, the type of component (attribute), the installation location (3D), the quantity (5D) and the time for the planned installation (4D) are defined by the model. With the help of this information, the process on the construction site is to be supported by auto-nom driving robots.

The aim is to develop a technology that enables real-time interaction between the digital model of the construction site and one or more autonomous robots. The robot is used to load and transport components from the storage location to the installation site. Changes to the model (e.g. quantity or time) are synchronized in real time with the robot's transport process. The robot reacts to the changes accordingly. The required equipment is provided by the supervisor. The processes are to be realized indoors in miniature format. The following equipment could be used as an example:

Source:

- https://www.berrybase.de/waveshare-roarm-m1-5-dof-desktop-roboterarm-set-mit-esp32-wifi-uart-edelstahl-greifer
- https://eu.robotshop.com/de/products/dagu-wild-thumper-6wd-all-terrain-chassis-schwarz-751

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Task

- Literature Review to identify state-of-the-art methods for robotics on construction sites
- Research on Equipment and tools for BIM, robotics and their interaction
- Collect data for infrastructure models
- Enrich model with process relevant data
- Implement algorithms that perform the described task

Supervisor

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References

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