

# Software Lab:



## RTDE control; GUI and Dashboard

### Description

3D concrete printing is becoming increasingly important in the construction industry, and more and more new techniques are being developed for this purpose. In a previous study, a robot control tool based on the UR-RTDE module was implemented to follow predefined instructions provided via a FIM model [2]. Even though this production method is automated, certain tasks still have to be performed manually, such as the precise insertion of additional fixtures or any finishing work. To ensure successful cooperation between man and machine in such cases, user interactions with the robot control tool are required. Additionally, to provide a better oversight of the manufacturing process, a dashboard featuring real-time sensor data is needed.

The aim of this project is to improve the existing robot control implementation and to add additional features such as a GUI with integrated dashboard enabling the user to interact with the manufacturing process.

### Task

Extend the existing RTDE robot control tool. Enable user interaction with the AM process, i.e. manual Start-Stop, parameter adjustments and sensor data feedback.

#### GENERAL INSTRUCTIONS:

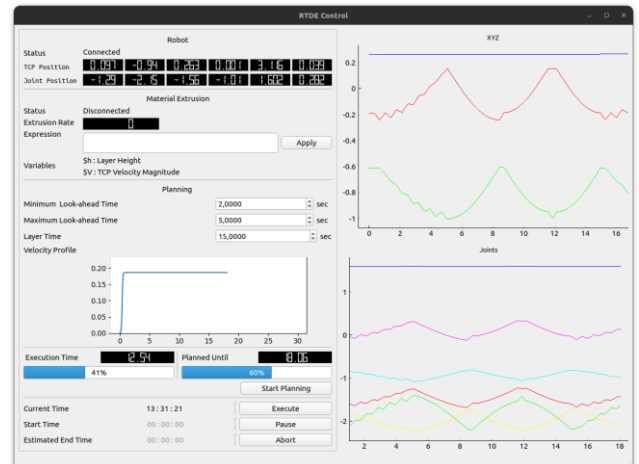
- Familiarize with the RTDE control tool
- Implement a PyQt GUI
- Enable user interaction for the 3D-printing process (Start, Stop, Pause, Resume, etc.)
- Integrate a dashboard for robot and sensor feedback

### Supervisor

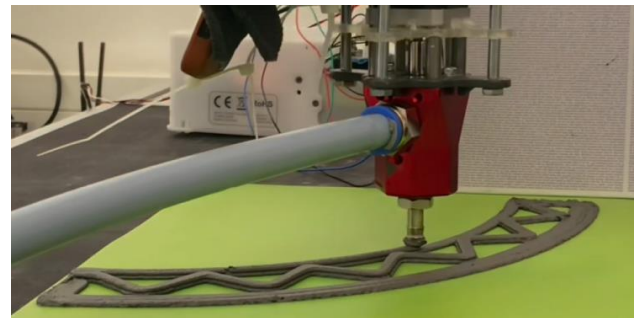
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### References

- [1] Slepicka, M., Helou, J., & Borrmann, A. (2023). Real-time data exchange (RTDE) robot control integration for Fabrication Information Modeling. In Proceedings of the 40th ISARC.
- [2] Slepicka, M., & Borrmann, A. (2024). Fabrication Information Modeling for Closed-Loop Design and Quality Improvement in Additive Manufacturing for construction. *Automation in Construction*, 168, 105792.



Prototype RTDE robot control GUI (Slepicka, M; Helou, J; Borrmann, A; 2023)



Borrmann, A; 2023)