TUM

Technical University of Munich

Faculty of Mechanical Engineering

Prof. Dr.-Ing. Dirk Weuster-Botz · Institute of Biochemical Engineering· Boltzmannstr. 15 · 85748 Garching
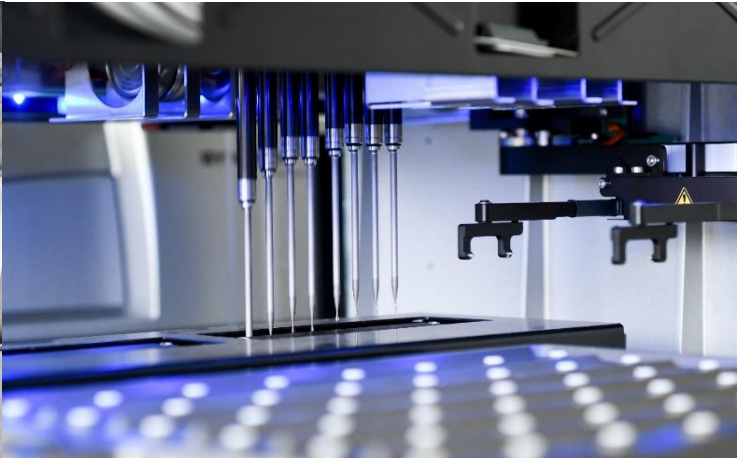
Laboratory Automation:
Development of an IoT Laboratory Control System
Interdisciplinary Project (IDP)

Project Context

Laboratory automation requires full digital control of all laboratory equipment. An IoT platform that is capable of discovering and integrating standardized device drivers enables scientists to conduct sophisticated experiments. Such a platform must allow intuitive experiment workflow design while guaranteeing operational stability.

With this project, we aim to improve an existing open-source software tool that has been developed at our institute in the past year. The software is aimed at devices that use the SiLA2 standard (Standardization in Laboratory Automation), of which we are an active working group member.

For further information check out the Git repositories of our own software and the SiLA2 standard:
https://gitlab.com/lukas.bromig/sila2_manager
https://gitlab.com/SiLA2/sila_base

Objective

The SiLA 2 Manager has been developed in a past IDP at our institute. It consists of a Python backend and a TypeScript (Angular) frontend using the FastAPI web framework. The core functionality is the auto-discovery of laboratory devices, interactive device control, a scripting and experiment design environment, as well as a data handler that links streams of device data to a database (PostgreSQL and InfluxDB).

Within this project, the software will be extended and refined. Especially the design of experiments and the interaction capability on running experiments (Docker) shall be improved. Furthermore, the current implementation is aimed at the SiLA 2 python repository but must be interoperable with the other standard implementations as well (C#, C++, Java). Therefore, some development in the SiLA 2 python repository will be necessary.

The project offers room for creativity and allows hands-on experience with a diverse stack of interesting and modern software solutions.

Your profile
- You have experience or interest in software engineering
- You are proficient in either English or German
- You have previous programming experience (e.g. Python, TypeScript)
- You are interested in working on open-source projects with VC on GitLab (ideal IDP group size of 3-4)
- You are interested in single-board computers (BeagleBone) and network communication (IoT)

Feel free to contact us for a tour through our lab!

Contact:

Lukas Bromig   lukas.bromig@tum.de   **(Tel. 089-289-15736)**   Office MW3429