Semester Thesis

Slicer implementation for a Filament-based Melt Electrowriting System

Filament-based melt electrowriting (F-MEW) is an adaptation of conventional melt electrowriting (MEW). MEW has evolved into a high-resolution additive manufacturing (AM) technology for fabricating freely designed high-resolution scaffolds, opening new opportunities for tissue engineering. To fabricate microstructured scaffolds, we employ an AM ecosystem. By modifying a conventional fused filament fabrication (FFF) printer, we can create patterns from fibers at the micrometer scale. Yet, the printer can operate like a conventional FFF printer.

We are currently seeking the development of a software extension that combines the capabilities of filament-based melt electrowriting and conventional fused filament fabrication. The aim is to provide a smart and integrated solution for controlling both processes seamlessly. This software extension will enable the creation of multiscale scaffolds by merging F-MEW and FFF technologies. The project focuses on developing an advanced control system that optimizes the printing process, considering the specific requirements of both F-MEW and FFF. This integrated approach will enhance the flexibility and efficiency of the manufacturing process for a wide range of applications in regenerative medicine and tissue engineering.

The work focuses on the development of an extension of the programming host software (Repetier-Host), which is based on the functions of a conventional slicer and is individually adapted to the process image of the F-MEW.

Requirements:

- Additive Manufacturing Enthusiasm
- Profound Knowledge of the Creation of Gcodes
- Slicer Background Knowledge
- Programming skills (Matlab/Python)
- Knowledge about the Printing Host Program „Repetier-Host“ (desirable)
- Familiarity with 3D Modeling and Computer-Aided Design (CAD)
- Polymer Material Science Basics (desirable)
- High Reliability and Self-Reliance

https://www.repetier.com/

https://www.prusa3d.com/de/

Contact: annika.hangleiter@tum.de
Application Scope: Short cover letter in the email; CV and Grade Report attached; Thank you!