Design, implementation and testing of a multiaxial, fully automated bioreactor system - Project/Bachelor/Master thesis -

Institute profile

The Institute of General Mechanics is an educational and research institute, teaching core and elective courses in mechanical engineering, biomedical engineering, and international master programs. Moreover, the institute runs in-house testing structural and biomechanical laboratories as well as mechanical and electrical construction workshops to provide and deliver state of the art theoretical modeling, numerical simulations, and experimental validations.

Description

Experimental biomechanics is an interdisciplinary and challenging research topic. In order to analyze mechanically induced cell processes, we have developed a uniaxial compressive-bioreactor system providing real-time information on the displacements and forces applied to cell-free scaffolds throughout the duration of the culture period. For further studies a fully automated, multiaxial bioreactor will be developed. The effect of multi-dimensional induced stresses, as they occur in the knee joint, on the cell stimulating process will be evaluated. The reproducibility of the results will be given by automating the culturing process parameters.

Requirements

- Curiosity and motivation
- Ability to work independently

Helpful knowledge:
- Python programming skills
- Experience with Raspberry Pi, Arduino and/or stepper motors

Language skills:
- English or German (native level)

Tasks

Depending on student’s preferences:
- Design of a multiaxial system
- Controlling complex movements of multiple stepper motors
- Installation of an automated medium exchange system
- Integration of a pH value and temperature controller
- Testing and validation

Application

Via e-mail:
- Short motivation letter
- Curriculum vitae
- Transcript of records

Contact: M.Sc. Nadja Wilmanns
Email: wilmanns@iam.rwth-aachen.de
Tel.: +49 241 80-90037

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