

The *Carinthia University of Applied Sciences* sets high academic standards in an excellent environment in Southern Austria where education, culture and technology are optimally combined. We ensure modern and application oriented degree programs in the fields of Engineering, Management, Health Science and Social Work at superbly equipped FH-sites, with excellent teaching and research staff complemented by part-time lecturers from industry and international guest lecturers. Further information you can find on our website: [www.fh-kaernten.at/en](http://www.fh-kaernten.at/en).

The "School of Engineering & IT", ADMiRE Lab, is looking for applicants for the following position:

## 4 Junior Researcher - PhD-Student Positions (m/f/d)

### Project iLEAD - "intelligent Lightweight Functional and Hybrid 3D-Printing for Medical Assistive Devices"

#### Your tasks:

- Research in the field of the PhD-topic with the aim to achieve a PhD degree within three years,
- Collaboration within the research group and the research focus on additive manufacturing, fabrication strategies, simulation and optimization methods.

#### Your profile:

- Master Degree in Material Science, Mechanical Engineering, Electrical Engineering, Information Technology, Telematics or a related subject.
- High motivation, independence, diligence, teamwork
- Communication skills in scientific research and teaching (optional)
- Good academic record
- Experience and/or interest in at least one of the following fields:
  - Material science and mechanical engineering
  - Additive manufacturing (ideally multi-material, elastomers, fibre-materials)
  - Finite element method simulations
  - Optimization (topology, structure)
  - Object Oriented Programming (e.g. python, C++, Matlab, ...)
- Willingness to collaborate with industrial and academic partners.
- Excellent command of English (B2/C1) - spoken and written
- Basic command of (or willingness to learn) German (B2 – spoken and written)

#### Our offer:

The Carinthia University of Applied Sciences appreciates the motivation and the great commitment of its employees and offers attractive and family-friendly conditions.

**Start:** as soon as possible

**Location:** Campus Villach, Europastrasse 4, 9524 Villach-St. Magdalen

**Minimum Salary:** EUR 2.619,31 (minimum gross, monthly salary, 14 x per year, fulltime; negotiable - depending on your qualifications and professional experience)

**Application deadline:** 21<sup>st</sup> February 2021

You can find impressions of working and living in Villach/Carinthia, Austria at:  
<https://www.welcomezvillach.at/>  
[Carinthia - It's my life / MONTE NERO Productions - YouTube](#)

If you are interested in this position, please submit your **full application via our website:**  
[www.fh-kaernten.at/jobs](http://www.fh-kaernten.at/jobs).

Requested documents:

- Letter of motivation
- Curriculum vitae
- Certificates
- Transcript of records
- List of publications and projects (if available)
- Proofs of practical experience (if available)

**Note: Hearing will be organized as online-Meeting using Microsoft Teams.**

**We look forward to receiving your application!**

Further information:

**PhD-Topics**

1. Development of multi-material 3D-printing strategies, test benches for benchmarking and demonstrator design and fabrication.
2. Finite element method simulation, CAD interfacing, generative design, and optimization of lightweight lattices.
3. 3D-Printing strategy development, optimization and implementation on 5- and 6-axis robotic systems.
4. Finite element method simulation, design, optimization and fabrication of 3D-printed sensor devices to be integrated into medical devices.

## Project Description

Currently available medical assistance products (orthoses, rehabilitation equipment, etc.) are often laborious to manufacture (Functional Need FN<sub>1</sub>), the fabrication results in a considerable amount of waste (Social Need SN<sub>1</sub>), e.g. through casting molds, and so leads to expensive products (SN<sub>2</sub>). At the same time, products are optically not appealing (SN<sub>3</sub>), heavy (FN<sub>2</sub>) and lack individualization and functionalization. Similar to clothes with ready-made sizes, they often do not fit the respective user (FN<sub>3</sub>). Fit and function are not monitored (FN<sub>4</sub>), which can cause pain, infections and other injuries. This is where 3D-printing can offer a sustainable. 3D-printing is an essential technology to make today's manufacturing more resource-efficient, sustainable and flexible.

However, 3D printing has not yet been able to exploit its potential for medical devices due to the following technological needs:

- (TN<sub>1</sub>) Material can only be stacked in layers.
- (TN<sub>2</sub>) Material combinations have not yet been investigated thoroughly.
- (TN<sub>3</sub>) Support structures are complex and cannot be released easily.
- (TN<sub>4</sub>) Functional components are not considered in the design and manufacturing process.

iLEAD starts here and examines the following areas (Goals):

- (G<sub>1</sub>) Multimaterial 3D-printing: material structure, compatibility analyses and printhead design (addresses (FN<sub>1</sub>, SN<sub>1</sub>, TN<sub>2,3</sub>)).
- (G<sub>2</sub>) Lightweight lattice and simulation-based optimization (addresses (SN<sub>1,3</sub>, FN<sub>2</sub>, TN<sub>3</sub>)).
- (G<sub>3</sub>) 3D-printing strategies for 5-axis printing (addresses (FN<sub>2</sub>, TN<sub>1,3</sub>)).
- (G<sub>4</sub>) Intelligent functionalization of products (addresses (FN<sub>4</sub>, TN<sub>4</sub>)).
- (G<sub>5</sub>) Holistic participatory development process including users (addresses SN<sub>3</sub>, FN<sub>3,4</sub>).

By 3D-printing of endless fibre composites, load-bearing and adaptive structures can be integrated into medical assistance products (e.g. shafts for legs). Combination of different materials enables to adjust the stiffness of lightweight lattices and to integrate sensors at relevant points during production (e.g. individualized splints with monitoring of training state) for the first time. The developed technology enables products to be individualized, exhibit high mechanical strength, while at the same time being cost-efficient, material- and weight-saving. iLEAD aims to produce medical assistance products WITH AND FOR the users by continuous user-centered-design, involving future users and experts in the field of therapy. Thus, iLEAD leads to an international leadership and pioneering position in 3D-printing technology with focus on medical assistance products.