Lukas Cha

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Research Interests

Wearable technology, biomechanics, soft robotics, mechatronic design, applied machine learning and controls

Education

M.Sc. Mechanical Engineering — *Munich, Germany*
Technical University of Munich — *2022 - Present*
- Coursework focus: Mechatronics, Control Theory, Robotics, Machine Learning
- Expected German Grade: 1.5 (expected graduation: September 2024)

B.Sc. Mechanical Engineering — *Munich, Germany*
Technical University of Munich — *2018 - 2022*
- Electives focus: Mechatronics, Dynamics, Control Theory
- Bachelor's thesis: "Time-optimal Trajectory Parameterisation in Task Space", graded 1.3
- German Grade: 2.3

Research Experience

Master's Thesis Student — *Oxford, UK*
University of Oxford - Healthcare Biorobotics Lab — *April 2024 - Present*
- Advisor: Prof. Liang He
- Researching soft sensing skins for wearable applications

Visiting Research Student — *London, UK*
Imperial College London - Biomechatronics Lab — *April 2023 - September 2023*
- Advisor: Prof. Ravi Vaidyanathan
- Researched transparency control strategies for a lower-limb rehabilitative exoskeleton
- Paper (1st author) accepted at ICRA 2024

Undergraduate Research Assistant — *Munich, Germany*
Technical University of Munich - Chair of Applied Mechanics — *April 2022 - April 2023*
- Advisor: Prof. Daniel Rixen
- Biomechanics Lab: Analysed neuromuscular control model for human walking on Simulink; Performed sensitivity analysis of the model to investigate the importance of model parameters; Computed deformation and rigid body movement of foot from walking experiment videos; Setup and performed motion capture using open source motion capture software

Bachelor's Thesis Research — *Munich, Germany*
Technical University of Munich - Chair of Applied Mechanics — *March 2021 - December 2021*
- Advisor: Prof. Daniel Rixen
- Thesis: "Time-optimal Trajectory Parameterisation in Task Space"
- Investigated time optimisation strategies in task space for a robot manipulator with a focus on orientation interpolation
- Paper (2nd author) accepted at ICRA 2023

Teaching Experience

Undergraduate Teaching Assistant — *Munich, Germany*
Technical University of Munich - Chair of Vibroacoustics — *October 2021 - March 2022*
- Course: Engineering Dynamics (Technical Mechanics 3)
- Answered questions during tutorial hours and presented problem solutions ($\sim$ 100 students)

Undergraduate Teaching Assistant *Munich, Germany*

Technical University of Munich - Chair of Data-driven Materials Modeling *April 2021 - September 2021*

- Course: Modeling of Data and Uncertainties in Engineering (Statistics course)
- Created online quizzes and marked mid-terms ($\sim$ 300 students)

Publications

2024

L. Cha, A. Guez, C. Chen, S. Kim, Z. Yu, B. Xiao, R. Vaidyanathan. 2023. Transparency Control of a 1-DoF Knee Exoskeleton via Human-in-the-loop Optimisation. 2024 IEEE International Conference on Robotics and Automation (ICRA).

2023

J. Wittmann, **L. Cha**, M. Kappertz, P. Seiwald, D. Rixen. 2023. Spherical Cubic Blends: $\mathcal{C}^2$-Continuous, Zero-Clamped, and Time-Optimized Interpolation of Quaternions. 2023 IEEE International Conference on Robotics and Automation (ICRA).

Professional Development & Extracurriculars

Awards and Honours

2024	**Germany Scholarship (Deutschlandstipendium) (1800€)**, For excellent academic performance
2024	**TUM Erasmus+ Internship Scholarship (4200€)**, For research stays abroad
2023	**DAAD PROMOS Scholarship (1900€)**, For research stays abroad

Student Clubs

2022 - 2023	**TUM DASH - Lower-limb exoskeleton development**, Joint Control Team
2020 - 2021	**TUM Phoenix Robotics**, Mechanical Design Team

Technical Skills

Programming Languages: MATLAB/Simulink, Python, C++, Gcode
Software: PyTorch, ROS, Linux, Microcontrollers, CAD (Autodesk Inventor/Solidworks)

Languages

German - Fluent
English - Fluent
Chinese - Fluent

References

Prof. Daniel Rixen (rixen@tum.de) - Technical University of Munich
Prof. Ravi Vaidyanathan (r.vaidyanathan@imperial.ac.uk) - Imperial College London
Dr. Bo Xiao (b.xiao@imperial.ac.uk) - Imperial College London