

# Lukas Cha

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## Research Interests

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

## Education

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### 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

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### 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
- During my stay in the lab, I helped collect Machine Learning training data for a colleague in their bio-inspired robotic whiskers project

### 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

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### 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 ( ~ 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 ( ~ 300 students)

## Publications

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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).

### ACCEPTED

**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).

### UNDER REVIEW

Z. Yu, S. Kim, **L. Cha**, S. Jing, Z. Liu, X. Chen, R. Vaidyanathan. 2023. Bio-inspired Tapered Whisker-based Active Reservoir Computing System for Robot Rapid Tactile Objects Classification. IEEE Sensors Journal.

## Professional Experience

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### Pre-study engineering internship

FUTRONIKA AG

*Munich, Germany  
May 2018 - July 2018*

- Learned about machining along with other manufacturing methods as well as quality control

## Professional Development & Extracurriculars

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### ATTENDED CONFERENCES

- 2023 **International Conference on Robotics and Automation (ICRA) 2023**, Co-presented poster
- 2023 **Hamlyn Symposium on Medical Robotics 2023**, Volunteering and workshop attendance

### 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