

# Yuhao Tao

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## EDUCATION

### ETH Zürich, Switzerland

M.Sc. in Robotics, Systems and Control

Sept. 2023-present

**Grade:** 5.73/6.0

- **Core Courses:** Microrobotics, Nanorobotics, Introduction to Machine Learning, Image Analysis and Computer Vision, Dynamic Programming and Optimal Control, Linear System Theory, Recursive Estimation, Biomedical Imaging.

### RWTH Aachen University, Germany

Oct. 2018-Jul. 2023

B.Sc. in Mechanical Engineering (Graduation with distinction)

**Grade:** 1.1/1.0 (Ranking: 2/1885)

- **Awards:** Dean's List 2019/2020, 2020/2021 (Top 5%); Germany Scholarship 2020/2021, 2022/2023
- **Core Courses:** Mechanics, Material Science, Machine Design, Simulation Methods in Engineering, Automatic Control, Numerical Mathematics, Fluid Mechanics, Thermodynamics, etc.
- **GRE on-site:** 336 (Verbal 166, Quantitative 170) + 3.5 (Writing); **TOEFL on-site:** 112 (Reading 30, Listening 28, Speaking 28, Writing 26)

## RESEARCH EXPERIENCE

### Design and Fabrication of An Smart Millirobot with On-board Sensing and Control

Apr. 2024-present

(Semester Project @ Multi-Scale Robotics Lab)

**ETH Zürich**

**Supervisor:** Dr. Bradley Nelson, Professor / **Advisor:** Quan Gao, Ph.D. Candidate

- Designed, fabricated and optimized the umbrella structure of the robot based on Pop-up MEMS fabrication technique
- Designed, optimized and characterized the 3D antenna and integrated it onto the robot structure
- Designed the on-board PCB for control and sensing, and implemented the code for MCU
- Developed a simulation platform based on ABAQUS using Python and Fortran for simulating interactions between mobile cube magnets

### Design and Fabrication of An Untethered Adhesive Patch Robot with On-board Power and Sensing

Sept. 2024-present

(Master Thesis @ Multi-Scale Robotics Lab)

**ETH Zürich**

**Supervisor:** Dr. Bradley Nelson, Professor / **Advisor:** Quan Gao, Ph.D. Candidate

- Optimized and calibrated the on-board PCB for low power consumption, and precise voltage measurement and data transmission
- Fabricated the adhesive patches based on different recipes and compared their performance using peeling force test
- Fabricated the magnetic PDMS layer and integrated it with the adhesive patch

### Modeling and simulation of deformable Kolmogorov-sized bubbles and droplets in turbulent flows

Jan. 2023-Apr. 2023

(Bachelor Thesis @ Institute of Aerodynamics)

**RWTH Aachen University**

**Supervisor:** Dr. Wolfgang Schröder, Professor / **Advisor:** Julian Vorspohl, Ph.D. Candidate

- Extended the Lagrangian Particle Tracking (LPT) solver of the in-house flow solver in AIA using C++ to account for particle deformability
- Tested the implemented module in relaxation, shear flow, vortex, and rising bubble test cases
- Studied the influence of the density ratio, particle size, and deformability on bubble/droplet-laden decaying isotropic turbulence flow

### Atomistic Simulations of Tensile Deformation in A CrCoNi Medium-Entropy Alloy

Dec. 2021-Nov. 2022

(External Research Project @ State Key Laboratory of Nonlinear Mechanics)

**Institute of Mechanics, CAS**

**Supervisor:** Dr. Xiaolei Wu, Professor / **Advisor:** Wenqiang Cheng, Ph.D. Candidate

- Designed the simulation process and modeled the initial atom arrangements using the Voronoi method on MATLAB
- Conducted the molecular dynamics simulations with LAMMPS
- Developed algorithms to investigate the structural and strain features of simulation results utilizing OVITO and MATLAB

### Simulation of Electric Current Assisted Sintering of Oxide Ceramics

Nov. 2021-May 2022

(Semester Project @ Institute for Materials Applications in Mechanical Engineering)

**RWTH Aachen University**

**Supervisor:** Dr. Christoph Broeckmann, Professor / **Advisor:** Shufan Wang, Ph.D. Candidate

- Simulated the Flash sintering process on MATLAB via Skorohod-Olevsky Viscous Sintering (SOVS) model
- Simulated the UHS- and Flash sintering process using finite element method on ABAQUS with user subroutine of SOVS model
- Applied the Parameter Calibration on MATLAB using damped Newton's method

### Phase-Field Simulation of Sintering Process

Sept. 2020-Feb. 2021

(Undergraduate Research Assistant @ Institute for Materials Applications in Mechanical Engineering)

**RWTH Aachen University**

**Supervisor:** Dr. Christoph Broeckmann, Professor / **Advisor:** Shufan Wang, Ph.D. Candidate

- Built a distributed-parameter Phase Field model considering grain orientation and rigid body motion on MATLAB
- Simulated the sintering process on MATLAB utilizing the developed Phase-Field model and on MOOSE

## PUBLICATION

Tao Y, Cheng W and Wang W (2023) Atomistic tensile deformation mechanisms in a CrCoNi medium-entropy alloy with gradient nano-grained structure at cryogenic temperature. *Front. Mater.* 9:1118952. doi: 10.3389/fmats.2022.1118952

## INTERNSHIP

**Mercedes-Benz Group** | Research & Development Intern | Untertürkheim, Stuttgart, Germany

Jul. 2022-Jan. 2023

- Developed numerical algorithms for 2D~3D scattering points interpolation on MATLAB to improve the battery cell models
- Optimized the distribution of test points utilizing the Monte Carlo method to minimize the interpolation error of the battery cell model
- Developed graphical user interfaces (GUI) on MATLAB for visualization and post-processing of experimental data of battery cells

## SKILLS

Language: Chinese (Native); English (Fluent); German (Fluent); Russian (Elementary)

Software: Siemens NX, MATLAB, ABAQUS, Ansys HFSS, LAMMPS, MOOSE, OVITO, Origin, Blender, Keil, CubeMX

Programming language: C++, Python, MATLAB, Fortran, Java