

DR. CHAO YAO FULL - STACK ROBOTICS ENGINEER

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## 🎓 Education

### Technische Universität Dresden (University of Excellence)

Germany

Dr.-Ing. Robotics

📅 Mar. 2016 – Jul. 2022

- Ph.D thesis: A Contribution to the Design of Highly Redundant Compliant Aerial Manipulation Systems
- Supervisor: Prof. Dr. techn. Klaus Janschek
- Grade: Magna cum laude

Dipl.-Ing. Electrical Engineering

📅 Oct. 2011 – Jun. 2015

- Thesis: Edge-based Pose Estimation of Known Objects Using Mono-camera (score: **1,0**, poster)
- Student project: Position Measurement and Control of an Electrodynamical Planar Actuator (score: **1,3**, video)

### Wuhan University of Science and Technology

China

B.Sc Automation Engineering

📅 Sep. 2006 – Jul. 2010

- Thesis: Autonomous racing car design based on electromagnetic navigator (video)

B.B.A Bussiness Administration

📅 Sep. 2007 – Jul. 2010

- Thesis: Equipment Maintenance Strategy for Wuhan Iron and Steel Corp.

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## ✂ Skills

**Languages:** Chinese (native),  
German (study, work and teaching),  
English (teaching, work and research)

**Expertise:** design, modeling, simulation and control of serial, mobile and aerial robots; SLAM; path planning; linear and nonlinear controller design; observer design; sensor fusion; optimization algorithms; scientific writing; clean coding; software engineering; DevOps engineering; agile development; commercial software development process

### Project

**management:** Scrum, Confluence, Jira, Xray test, Miro, Polarion, Slack, MS Teams

**Prog. Language:** C++, bash, MATLAB, Markdown, Python, C,  $\LaTeX$ , LabVIEW, CAPL

**OS:** Linux, Pantacor, Windows, macOS

**Lib/framework:** ROS2, PX4, Linux Dbus, ALGLIB, Ceres Solver, NumPy, opencv, Qt

**Devops:** Docker, Git, vcstool, pre-commit, GitHub Actions, GitLab CI, Doxygen, Ansible, MkDocs, PlantUML, gtest, pytest, Harbor, semantic-release

**Simulation:** Gazebo, Simulink, Webots


**Software:** MS Office, Inkscape, Kdenlive, SOLIDWORKS, Fusion 360, Altium Designer, Blender, CANoe, Zotero, etc.

**Driver license:** China, EU, UAE

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## Experience

### Senior Robotics SW Engineer


 Jun. 2024 – present

*Autonomous Robotics Research Center, Technology Innovation Institute*

*Abu Dhabi, UAE*

- Founder of entire DevOps lifecycle, Docker orchestration and QA framework for indoor team
- Architect of the indoor navigation software stack
- Expert of robotic software integration
- Lead of ROS2 migration

### Robotics Software Developer


 Jan. 2022 – May. 2024

*Home Care Robotics, BSH Home Appliance GmbH (BOSCH subsidiary)*

*Bad Neustadt, Germany*

- Expert of robotic software for navigation & behavior
- Specialist of connectivity integration for Home Connect

### Teaching & research assistant


 Aug. 2015 – Oct. 2021

*Institute of Automation, TU Dresden*

*Dresden, Germany*

- Associate Lecturer for courses "Serial Manipulator Control" and "Mobile Robot Control"
- Teaching assistant for the course "Automation Technology"
- Supervisor of student projects (15+ master/diploma theses, 20+ bachelor/student theses)
- Administrator of robotic laboratory
- Associate Lecturer of annual undergraduate & graduate summer school for School of Mechanical Engineering, Zhejiang University
- Research assistant of teaching and research projects


### Session chair

 Sep. 2019

*WROCO 2019 - The 1st IFAC Workshop on Robot Control*

*Daejeon, Korea*

### Research visit


 Sep. 2017

*Department of Automation, East China University of Science and Technology*

*Shanghai, China*

- Visiting scholar in the robotics laboratory led by Prof. Yang Tang

### Internship


 Feb. 2014 – Aug. 2014

*ADC Automotive Distance Control Systems GmbH (Continental AG)*

*Lindau am Bodensee, Germany*

- Programmed MS Word and Access for automatic import of SAP data in local database
- Developed programs to run endurance HIL test for Radar sensors with CANoe and Matlab

### National university students competition

 Mar. 2009 – Aug. 2009

*Smart Car Laboratory, Wuhan University of Science and Technology*


*Wuhan, China*

- Developed a camera-based autonomous model car in a team of 3
- Lead of navigation, control and electronics

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## Projects

Crane Interior Inspection Drone | *ROS2, Gazebo, PX4, Docker, GitLab CI*

 Oct. 2025 – present


- Own DevOps and architecture
- Lead ROS Software development

Aerial RFID Scanning for Warehouses | *ROS2, Gazebo, PX4, Docker*

 Jun. 2024 – Oct. 2025

- Lead of software integration
- Lead of DevOps infrastructure

BOSCH Cleaning Robot 2 | *C++ , ROS2, Gazebo, Dbus, Python, Polarion*

 Jan. 2022 – Jul. 2023

- Integrated robot in the smart home devices ecosystem
- Developed robotics software for navigation & behavior

**Flying Manipulator** | *ROS, Gazebo, Matlab/Simulink, CAD, Python* 📅 Jun. 2018 – Sep. 2021

- Built a prototype of a fully actuated UAV
- Derived mathematical models for a high dimensional aerial manipulation system
- Developed simulation frameworks in Matlab & Gazebo
- Analyzed nonlinear controllability and control authority
- Evaluated various controllers and observers
- Designed an active fault-tolerant control scheme for rotor faults

**Teaching Robots in Saxony** | *ROS, Gazebo, Matlab/Simulink, L<sup>A</sup>T<sub>E</sub>X* 📅 Aug. 2015 – Mar. 2017

- Integrated advanced hardware for complex tasks
- Developed tools for joint controller tuning
- Developed cartesian space control with a demonstration of drawing the university logo
- Developed SLAM and Guidance-Navigation-Control stack for a mobile robot

**Image Recognition and Processing for Navigation** | *C++, OpenCV, Matlab* 📅 Dec. 2014 – May 2015

- contributed to the CV algorithms for visible spectrum camera in the navigation function for European Space Agency
- Developed algorithms for relative pose estimation on a scenario with uncooperative targets in an Active Debris Removal configuration

**Kleine Linear- und Planardirektantriebe** | *Altium Designer, Matlab* 📅 Jun. 2013 – Sep. 2013

- configured and verified the position measuring system based on optical encoder and interpolator for a small linear drive
- designed a position controller based on state feedback and Luenberger observer for a planar drive

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## 📖 Research

### Research interests

Aerial Robotics Over-actuated Systems Fault-tolerant Control Observer Design

Nonlinear Controllability Visual Inertial Odometry 3D Path Planning

**Publications** (✉ see  ORCID for a list)

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## 🏆 Awards

### **Best Poster Award**

*VDI Mechatronik 2019*

- Wrench space based design of fully actuated aerial robots

📅 Mar. 2019  
Paderborn, Germany

### **Best Bachelor Thesis**

*of Hubei Province (scope: 130 colleges and universities)*

- Autonomous racing car design based on electromagnetic navigator

📅 Jul. 2010  
Wuhan, China

### **Second prize of the National Final**

*National University Students Intelligent Car Race*

📅 Aug. 2009  
Beijing, China

### **First prize of the Qualifier South China**

*National University Students Intelligent Car Race*

📅 Jul. 2009  
Guangzhou, China