

## **Tong Zhao**

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### **Education Background**

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#### **KTH Royal Institute of Technology**

**2022/08 – Present** *Master's Degree in Mechatronics and Embedded Control Systems*

- Courses: Dynamics and Motion Control, Nonlinear Control, Embedded Systems for Mechatronics, Simulation and Modeling Toolbox, Control Theory and Practice (Advanced Course), Mechatronics (Advanced Course), Smart Cyber-Physical Systems (CPS)

#### **NWPU Northwestern Polytechnic University**

**2018/09 - 2022/07** *Bachelor's Degree in Flight Vehicle Propulsion Engineering*

- Courses: Aerodynamics, Automatic Control Theory, Engineering Thermodynamics, Theoretical Mechanics, Heat Transfer, Turbo Pump Technology, Space Flight Dynamics, Solid Rocket Motor Design

### **Interests**

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- **Theory:** Control Theory, Robust Control, Optimization, Optimal Control, Nonlinear Control
- **Topics:** Distributed Optimization, Robust Optimization, Stochastic Programming, Dynamic Programming
- **Applications:** Trajectory Optimization, Coordination, Cooperation, Planning, Control, Navigation
- **Programming:** Python, MATLAB & Simulink, C/C++
- **Tools:** Linux, ROS, Keil, Microcontroller

### **Work Experience**

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#### **Teaching Assistant of Dynamics and Motion Control**

**Stockholm, Sweden 2023/09 – 2023/12**

- Design new experiments based on the C2000 microcontroller, update the contents of experiments, and repair the broken boards.
- Provide help to students who are taking this course and answer their questions.

#### **Research Assistant at Mechatronics KTH**

**Stockholm, Sweden 2023/03 – 2023/08**

- Review the Apollo platform which is an open-source platform and developed by Baidu and state-of-the-art in automated vehicles, related work of perception, motion planning and control.
- Focus on optimization-based motion planning and control strategy and come up with the research questions of the master's thesis project.

### **Research Experience**

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#### **Project: Digital Futures Summer Research Internship Programme (SRI)**

**2024/06 – 2024/09 KTH Digital Futures**

*Focus: Stochastic Programming, Robust Optimization, Semidefinite Programming*

- Extend the work of the master thesis project using other methods such as semidefinite programming, theory of measure and moment.

#### **Project: Next Generation Hydrofoil Systems for Robust and Cost-Effective Electric Work Boats (NG-FREEBS) Research Assistant**

**2024/05 – 2024/10 KTH Sustainable Power Laboratory**

*Focus: Model Predictive Control, Embedded Control System, Fluid Dynamics*

- Design robust model predictive control strategy to stabilize the hydrofoil system and enable autonomous navigation of the boat.

- <https://fudinfo.trafikverket.se/fudinfoexternwebb/pages/ProjektVisaNy.aspx?ProjektId=5189>

**Project: Master Thesis Distributed stochastic model predictive control for collision avoidance through vehicle coordination under network delays in Vehicle-to-Vehicle (V2V) Communication**

**2023/09 – 2024/08 KTH Mechatronics and Embedded Control Systems**

*Focus: Optimization, Optimal Control, Motion Planning and Control, Connected and Automated Vehicles*

- Develop the distributed optimization-based control algorithm and pose the collision avoidance through vehicle coordination as the optimal control problem in the networked system, which drives connected and automated vehicles coordinate to achieve the desired global goal.
- Formulate the effect of network delays in V2V communication as stochastic disturbances and analyze its impact on the local performance of the distributed MPC strategy and the global coherence of connected and automated vehicles.
- Formulate the stochastic disturbance as the chance constraint and use probability theory and Chebyshev's Inequality reduce the adverse effect of network delays using stochastic model predictive control.

**Project: Hydrofoil - Mechatronics (Advanced Course)**

**2023/03 – 2023/12 KTH Mechatronics and Embedded Control Systems**

*Focus: TCP/IP, UDP, VR, Unity, Hydrofoil*

- Design a hydrofoil simulator based on Stewart rig and combine the simulator with VR headset to get a better visual experience.
- <https://www.kth.se/social/files/64ec912f9f9d7e94d1d3c15c/drysurfers-springterm-report.pdf>
- <https://www.kth.se/social/files/65ae70fla2d3877714aee3e/drysurfers-final-report.pdf>

**Project: Ultralight composite wing structure design and molding technology**

**2021/03 – 2022/06 NWPU Northwestern Polytechnical University, China International College Students' Innovation Competition**

*Focus: Computer-Aided Design (CAD), Finite Element Analysis (FEA), Structural Mechanics*

- Design a structure of the wing using finite element analysis (Abaqus) to maximize the stress that the wing can withstand mostly and use composite material to build a real wing model for experiments.

**Patent: Extrusion type liquid rocket engine working process simulation device**

**2020/09 – 2021/10 NWPU Northwestern Polytechnical University**

*Focus: Mechanical Design, Manufacturing*

- Design an apparatus for simulating the operation of an extruded liquid rocket engine that can be used as teaching aids in the class.
- [CN113963618B - Working process simulation device of extrusion type liquid rocket engine - Google Patents](#)

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**Publication**

**Research Status and Prospects of Proton Exchange Membrane Fuel Cell Vehicle**, 2021 3rd International Academic Exchange Conference on Science and Technology Innovation (IAECST)

<https://ieeexplore.ieee.org/document/9695629>

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**GitHub**

<https://github.com/Ztcreazy>

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**LinkedIn**

[www.linkedin.com/in/tong-zhao-85711b25a](https://www.linkedin.com/in/tong-zhao-85711b25a)

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**Hobbies**

Traveling, Photography, Tennis, Table Tennis