# Zexian Ji

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## Education

**Harbin Engineering University (HEU)**, Harbin, China 2020 – Present

*i*n Mechanical Design Manufacturing and Automation, expected July 2024

## Research Interests

Autonomous Driving
Detection and Control of Robots
Reinforcement Learning

## Competition/Project Experience

**RoboMaster2021** Robot Team 'Winds of Dream' 2020.9 – 2021.8

*Embedded Engineer*

- Design and implementation of embedded and control systems for the robot
- Develop a dual-axis gimbal state feedback control system based on fuzzy PID control

**RoboMaster2022** Robot Team 'Nooploop Winds of Dream' Autonomous Robot 2021.9 – 2022.8

*Embedded Engineer* Control&Localization

- Design and implementation of embedded and control systems for an autonomous robot
- Design an extended Kalman filter that fuses wheel odom and imu information to estimate the accurate positioning for the robot on a one-dimensional track

*Algorithm Engineer* Computer Vision

- Design an auto aiming system based on Kalman filter which involves visual recognition and position solving, target motion state estimation and prediction, and dual-axis gimbal attitude estimation and control
- Design a MLP to achieve digit recognition with high accuracy, avoiding misidentification of targets

**RoboMaster2023** Robot Team 'Winds of Dream' Autonomous Robot 2022.9 – 2023.8

*Embedded Engineer* Control&Decision

- Develop a dual-axis gimbal state feedback control system based on system identification and linear quadratic regulator control, achieving nice rapidity and accuracy
- Design a decision-making system based on finite state machine which enables an autonomous robot to switch between behaviours

*Algorithm Engineer* Computer Vision&Navigation

- Utilize IPPE algorithm to obtain 6D pose of targets and design an extended Kalman filter to obtain a comprehensive state observer to achieve high accuracy target tracking
- Utilize move-base package and TEB planner to implement path planning for an autonomous robot based on ROS

**Cable Driven 7-DOF Manipulator** 2023.9 – Present

*Structural Engineerr&Algorithm Engineer*

- Design the structure of cable driven manipulator, reducing joint coupling and increasing workspace
- Utilize D-H Matrix and optimisation approach, completing the forward and inverse kinematics solution, including the transformation relationship between drive space, joint space and Cartesian space

## Paper

**Design of target recognition tracking and attack system based on Kalman filter** Journal of Ordnance Equipment Engineering 2022.11

## Honors and Awards

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|---|---|
| *1st Prize*,Award on Harbin Engineering University Scholarship | 2021 |
| *3rd Prize*,Award on Harbin Engineering University Scholarship | 2022 |
| *2nd Prize*,Award on RoboMaster University Championship 2021 Northern Regional | May 2021 |
| *2nd Prize*,Award on RoboMaster University Championship 2021 National Final | Aug. 2021 |
| *Championship*,Award on RoboMaster University Championship 2021 Eastern Regional | Jun. 2022 |
| *1st Prize*,Award on RoboMaster University Championship 2022 National Final | Aug. 2022 |
| *second Place*,Award on RoboMaster University Championship 2023 Northern Regional | Jun. 2023 |
| *2nd Prize*,Award on RoboMaster University Championship 2023 National Final | Aug. 2023 |

## Skills

- Extensive project experience with microprocessor, including peripherals such as can, spi, uart
- Extensive projects experience on Linux platform, including development based on OpenCV, ROS
- Solid foundation in mathematics, mastery of numerical calculations and their code implementations
- Programming Languages: c, c++, Python
- Applications: MATLAB, GIT, LATEX, SOLIDWORKS

## Work Practice

**Student Union** Publicity Department 2021.9 – 2022.7

*Vice President*

- Design and implement publicity campaigns for student events
- Design promotional posters, edit event videos and coordinate with other departments
- Organize interviews, talk to outstanding students or teachers and compile the interviews into articles

**RoboMaster2023** Robot Team 'Winds of Dream' 2022.9 – 2023.8

*Project Management*

- Manage and coordinate the scheduling of work and tasks for the technical and project teams
- Determine the functional requirements and technological direction of the robot, assessment of the technical difficulties and formulation of technical specifications

## Specialised Course Grades

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|---|---|
| Linear Algebra and Analytic Geometry | 97 |
| Engineering Mathematical Analysis | 99 |
| Mechanics of Material | 94 |
| Engineering Fluid Mechanics | 89 |
| Principle and Application of Embedded Microprocessor | 85 |
| Computational method | 94 |
| Mechanical Control Engineering | 88 |

## Miscellaneous

- GitHub https://github.com/Go2SchooI
- Personal Page https://go2schooi.github.io/
- Languages: English - Fluent- Ielts Score 6.5. Chinese - Native speaker