

# Zishuo Wang

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## EDUCATION

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Harbin Institute of Technology

Sep.2018 - Jun.2022

- First Degree: *Bachelor of Engineering in Automation*

GPA: 90.57/100

Main Courses: Graduation Design (Thesis) (87'), C Programming Language A (100'),  
Theory of Automatic Control (2) (98.8'), Automatic Control Practice (2) (95.8')

- Second Degree: *Bachelor of Engineering in Artificial Intelligence*

GPA: 87.60/100

Main Courses: Graduation Design (Thesis) (91.5'), Introduction to Machine Learning (95')

National University of Singapore

Aug.2022 - Dec.2023 (Expected)

- Master of Computing - Artificial Intelligence Specialisation

## UNDERGRADUATE THESIS

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### Research on Bulk Cargo Ship Hatch Identification Method Based on Deep Learning

*Advised by Prof. Zhan Li, Prof. Huijun Gao, Research Institute of Intelligent Control and System, HIT*

- Applied a moving scan measurement system for point cloud data collection from multiple lidars.
- Used geometric transformation matrix and *combined filter algorithm* to merge them within ROS, reconstructing the whole ship, calculating the pose of the ship and the ship nose's position.
- Built my own ship point cloud segmentation dataset in order to split cabin, cargo and hatch cover.
- A novel algorithm combining *3D point part segmentation* with orthodox *2D image processing* method for real-time cabin detection based on PointNet.
- Achieved **94.59%** accuracy and **88.60%** MIOU for part segmentation on test set.

### Research on Anti-photographic Detection Algorithm Based on Semi-supervised Learning

*Advised by Prof. Hongzhi Zhang, Prof. Qiushi Zhao, Center on Machine Learning Research, HIT*

- Built my own object detection dataset of photographic devices by crawling search engines and simulating photographic scenario.
- Trained a basic *target detection* network with various data augmentation methods based on FCOS.
- Fine-tuned and retrained the network based on *pseudo-label* algorithm, which improved the accuracy and robustness of the system, expanding the range of detectable devices.
- Achieved **97.0%** AP50 on test set, improved **34.8%** than the baseline.
- Completed a system which achieved good *generalizability* and *accuracy* among the detection of photographic equipment, including different styles of phones, cameras, monitors, and etc.

## OTHER RESEARCH EXPERIENCE

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### Biomedical Image Classification & Segmentation for Brain Tumour

Jul.2021 - Aug.2021

*Advised by Prof. Yike Guo, Data Science Institute, Imperial College London*

- Proposed medical image segmentation approach for raw MRI dataset based on **modified U-net**.
- Data preprocessing and data augmentation for 3D MRI data to improve the generalization of the model.
- Designed a novel loss function with dice-coef and gain **16.3%** more dice score on validation set than baseline and got grade A in the summer school.

### Table Curling Robot

Sep.2020 - Sep.2021

*Advised by Prof. Dandan Li, Nvidia A.I. & Control Research Center, HIT*

- Devised **hierarchical control strategy**: High-level planning with vision and low level PID steer control.
- Detected the existing curling balls with **image detection algorithm**, containing auto-perspective transformation, edge detection, and circle detection to identify the position of curling balls.
- For the high-level planning, based on the processed visual information, train a RL agent in the simulation with **DDPG** for decision making.
- As for control, adopted a **road following algorithm** based on Resnet18, predicting the next direction and use TensorRT to speed up the inference.

### Intelligent Vision PTZ for Face Tracking and Alerting

Nov.2019 - Nov.2020

*Advised by Prof. Jiawei Wang, National Demonstration Center for Experimental Flight Vehicle Control Education, HIT*

- Built a 2-Dof Vision PTZ with two servos to control the PTZ's pose and one camera to track the face.
- To track the face, applied **Cascade Classifier algorithm** to examine human face and calculate the error from the center of the screen, extract face feature through **Resnet34**, saving in the database.
- **Face identification**. If a stranger is detected, alert with the speaker and take a picture of the face, sending message to the host.

### Multi Legged Bionic Robot

Sep.2018 - Sep.2019

*Advised by Prof. Jiawei Wang, National Demonstration Center for Experimental Flight Vehicle Control Education, HIT*

- Built a quadrupedal/ hexapedal robot system capable of avoiding obstacles with ultrasonic distance measurer and following lines with gray-scale measurer based on Arduino.
- Developed a **biomimetic gait control algorithm** for legged locomotion and deployed it on a real robot.

## SKILLS

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- Programming Language: C, C++ (ROS), Python (OpenCV, Pytorch), MATLAB, Verilog
- AutoCAD, Pspice, Multism, Altium Designer, ISE Design

## AWARDS

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- Special Scholarship (Top 2%) Dec.2021
- The third prize in National College Curling AI competition (Top 8) Aug.2021
- Individual Scholarship of HIT (4 of 163) three times, Jun.2020, Dec.2020, Jun.2021
- Excellent Student Leader (5% in the faculty) twice, Dec.2019, Dec.2020