

# TIANXING WU

<https://tianxingwu.github.io>

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## 🎓 EDUCATION

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### Nanyang Technological University (NTU)

Singapore

*Master of Science in Computer Control & Automation*

*Jan. 2021 – Jan. 2022 (Expected)*

- Deferred enrollment to January 2021 due to COVID-19

### Harbin Engineering University (HEU)

Harbin, China

*Bachelor of Engineering in Automation*

*Aug. 2015 – June 2020*

- Research Intern at [Institute of Intelligent Control](#)
- Supervisor: [Prof. Qidan Zhu](#), [Prof. Zhi Zhang](#)
- GPA: 89.14 / 100

### Harbin Institute of Technology Robot Group

Hefei, China

*2019 ROS Summer School in China*

*July 2019 – Aug. 2019*

- Topics: ROS, Industrial robots, RTS, Reinforcement learning, Humanoid robot, Simulation, SLAM
- *2<sup>nd</sup> Prize* of the final robot competition

## 🔬 RESEARCH & PROJECTS

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### Deep Learning Based Image Preprocessing for Maritime Scenes

*Jan. 2020 – July 2020*

*B.Eng Thesis, Supervised by Prof. Zhi Zhang*

- **Excellent presentation** (6 awardees of 42 students in the lab)
- Designed a new foggy image synthesis algorithm based on air scattering characteristics of sea fog
- Analysed the effectiveness and optimal parameter settings of AOD-Net, DnCNN and traditional methods for maritime image defogging and denoising, implementing with PyTorch and OpenCV
- Proposed a modular image preprocessing framework that can be effectively applied to maritime scenes

### OpenVHead

*Sept. 2019 – Present*

*Independent Project ([Open-sourced on Github](#))*

- **Top 5** most stars under the topic 'Vtuber' on Github
- Built a vision-based head motion & facial expressions capture system for VTubers
- Front-end: Face landmarks tracking using Kalman filter and mean filter; pose estimation with PnP algorithm; robust facial expression measure construction
- Back-end: Smooth pose control with Kalman filter; robust facial expression control using incomplete derivative PD control with deadzone; eye-blink modeling

### From QoS to QoE: A Data-Driven Model for Mobile Video Services

*July 2017 – Present*

*Project Leader, 'Shenzhen Cup' Mathematical Modeling Challenge, Supervised by Dr. Shujuan Wang*

- **Champion** (2 awardees of 65 finalist, including THU/FDU/ZJU teams)
- Built an accurate mathematical model of the relation between network capability and video experience for network planning and assessment, successfully solving the problem proposed by Huawei Technologies
- Constructed a nonlinear function based on both TCP mechanism and a dataset with 89,266 samples
- Introduced unsupervised anomaly detection algorithm to remove noise data for regression analysis
- Proposed and implemented a probabilistic method to solve the heteroscedasticity of video stalling data, significantly enhancing the prediction accuracy for video stalling ratio

## **Real-time Driver Fatigue Monitoring System**

*Dec. 2018 – Apr. 2019*

*Algorithm Engineer, National Undergraduate Training Programs, Supervised by Prof. Qiang Zhang*

- Developed a vision-based fatigue monitoring module for the system
- Extracted geometry features by face alignment using Dlib
- Designed a robust indicator to classify the eye state of the driver
- Eliminated disturbance of eye blink from video sequence using queue data structure

## **Face Detection and Tracking Using Pan-Tilt Camera**

*Sept. 2018 – Nov. 2018*

*Independent Project, Supervised by Prof. Haihong Chi*

- Designed a pan-tilt system consisting of two servos and a USB camera
- Implemented face detection pipeline using image processing and Haar Cascades with OpenCV
- Achieved face tracking with reasonable speed and precision by adding and tuning two separate independent PD control loops on the MCU

## **Flocking Algorithm for Swarm Robots Inspired by Foam Dynamics**

*Oct. 2018 – Jan. 2019*

*Independent Project, Supervised by Prof. Haihong Chi*

- Proposed a distributed control scheme for multi-agent systems inspired by the physics of liquid foams
- Implemented a convincing simulation of 3D flocking behaviour with obstacle avoidance in MATLAB based on an ODE system derived from the dynamic behavior of the foam
- Greatly enhanced the computing efficiency by introducing graph data structure and optimizing the algorithm to a vectorized version, enabling for simulation of massive multi-agent systems

## **A Gesture Recognition System Based on Capacitive Sensor**

*July 2018 – Aug. 2018*

*Software Group Leader, Supervised by Dr. Yuan Liu*

- Led a 5-person software team to develop the overall software architecture of the system
- Designed the key algorithm and training method for recognizing different gestures through capacitance data given by FDC2214 sensor, using median filter to reduce impulsive noises
- Added Palm Rejection function by implementing real-time statistical analysis on the microcontroller for time series data

## **★ SELECTED AWARDS & HONORS**

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| • <i>Honorable Mention</i> , Mathematical Contest in Modeling (MCM)  | 2018 |
| • <i>Outstanding Undergraduate Student in HEU</i>  | 2017 |
| • <i>1<sup>st</sup> Prize &amp; Champion</i> , ‘Shenzhen Cup’ Mathematical Modeling Challenge                | 2017 |
| • <i>1<sup>st</sup> Prize</i> , Northeast China Mathematical Contest in Modeling                             | 2017 |
| • <i>1<sup>st</sup> Prize</i> , China Undergraduate Mathematical Contest in Modeling (Heilongjiang Division) | 2017 |
| • <i>1<sup>st</sup> Class Scholarship for Outstanding Students</i>   | 2016 |
| • <i>2<sup>nd</sup> Prize</i> , National English Competition for College Students (NECCS)                    | 2016 |

## **⚙️ SKILLS**

- **Programming Language:** Python, MATLAB, C/C++, C#, Verilog
- **Software:** OpenCV, ROS, Simulink, Unity, SOLIDWORKS, Multisim, Quartus, Linux, Git
- **Hardware:** STM32, 89C51, Arduino microcontrollers

## **📖 ENGLISH PROFICIENCY**

- **IELTS:** 7.5 (Listening 8.5, Reading 9.0, Writing 6.0, Speaking 6.5)
- **GRE:** 324.5 (Verbal Reasoning 152, Quantitative Reasoning 169, Analytical Writing 3.5)