

# TIANXING WU

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## 🎓 EDUCATION

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### Harbin Engineering University, College of Automation

*Sept. 2015 – Present*

- Bachelor student in Automation, expected June 2020
- Research Intern at Institute of Intelligent Control
- Average Grade: 90.04 / 100

### Harbin Institute of Technology Robot Group

*July 2019 – Aug. 2019*

- 2019 ROS Summer School in China
- Courses: ROS basics, Industrial robots, ROS2 and RTS, Reinforcement learning, Humanoid robot, UAV simulation, Computer vision, SLAM
- 2<sup>nd</sup> Prize of the final robot competition

## 🔬 RESEARCH & PROJECTS

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### Visual Robots Localization Based on SLAM Method

*June 2016 – Dec. 2016*

*Research Intern, Supervised by Dr. Zhi Zhang*

- Collaborated with the team to build a binocular visual odometry for mobile robot localization in indoor environment based on EKF-SLAM
- Acquired the framework of binocular Vision-SLAM by exploring state-of-art algorithms
- Implemented feature points extracting and matching from binocular images using OpenCV in C++

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

*July 2017 – Present*

*Project Leader, Supervised by Dr. Shujuan Wang*

- 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

### A Gesture Recognition System Based on Capacitive Sensor

*July 2018 – Aug. 2018*

*Sub-team 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

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

*Oct. 2018 – Present*

*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

## 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

## Real-time Driver Fatigue Monitoring System

Dec. 2018 – Apr. 2019

*Algorithm Engineer, Supervised by Prof. Qiang Zhang*

*National Undergraduate Training Programs for Innovation and Entrepreneurship*

- 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

## OpenVHead

Sept. 2019 – Present

*Independent Project, Supervised by Prof. Qidan Zhu*

- Build a vision-based head motion 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; facial expression control using incomplete derivative PD control; eye-blink modeling
- Set up socket communication between C# server and Python client

## ★ SELECTED AWARDS & HONORS

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

## ⚙️ SKILLS

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

## 📖 ENGLISH PROFICIENCY

- **IELTS:** 7.5 (Listening 8.5, Reading 9.0, Writing 6.0, Speaking 6.5)
- **CET-6:** 635 (Listening 218, Reading 229, Writing & Translating 188)

## 🔧 MISCELLANEOUS

- **Research Interests:** Robotics, Computer Vision, Intelligent Systems
- **GitHub:** <https://github.com/TianxingWu>
- **Homepage:** <https://tianxingwu.github.io>