Tianxing Wu

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Education

Harbin Engineering University, College of Automation *Aug. 2015 – Present*

- *Bachelor student* in Automation, expected August 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^{nd} *Prize* of the final robot competition

Research & Projects

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

- *1st Class Scholarship for Outstanding Students* *2016*
- *2nd Prize*, National English Competition for College Students (NECCS) *2016*
- *Outstanding Student Award* *2017*
- *1st Prize & Champion*, 'Shenzhen Cup' Mathematical Modeling Challenge *2017*
- *1st Prize*, Northeast China Mathematical Contest in Modeling *2017*
- *1st 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**)
- **GRE**: **324.5** (Verbal Reasoning **152**, Quantitative Reasoning **169**, Analytical Writing **3.5**)

Miscellaneous

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