Tianxing Wu

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Education & Experience

Nanyang Technological University (NTU) Singapore

Master of Science in Computer Control & Automation *Jan. 2021 – Jan. 2022 (Expected)*

- Deferred erollment to January 2021 due to COVID-19

SenseTime (商汤科技) Beijing, China

Computer Vision Research Intern *Aug. 2020 – Dec. 2020*

- OCR, Image Quality Assessment and Human Action Retrieval

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
- Average Grade: 90.04 / 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^{nd} *Prize* of the final robot competition

Research & Projects

Image Quality Assessment for ID-card OCR *Oct. 2020 – Dec. 2020*

Project at SenseTime Research, Supervised by Yudong Wu

- Implemented CNN based no-reference image quality assessment (NR-IQA) and distortion type classification
- Trained Siamese Network as pretrained model which learn from ranked synthetic image pairs
- Constructed huge non-public authentically distorted image dataset for fine-tuning

Human Action Video Retrieval *Oct. 2020 – Oct. 2020*

Hackathon Project at SenseTime, Supervised by Zhipeng Yu, collaborated with Jingbo Wang & Yu Guo

- Achieved acceptable accuracy with ensemble of 3 models: skeleton-based model, video-based model and keypoint-based model (my part)

General Table Structure Recognition *Sept. 2020 – Oct. 2020*

Project at SenseTime Research, Supervised by Yudong Wu, collaborated with Mengyu Wang

- Trained deep learning based ruled-line detection model and developed algorithms for table structure recognition and refinement
- Achieved robust key-value extraction for complicated table (spanning cells, text out of table, etc.)

Rate My Taichi *Aug. 2020 – Sept. 2020*

Project at SenseTime Research, Supervised by Yudong Wu

- Implemented pose estimation with normalization and filtering for better robustness
- Introduced DTW algorithm for motion alignment
- Built model between cosine distance and subjective score

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 (Python): Face landmarks tracking using Kalman filter and mean filter; Pose estimation with PnP algorithm; Robust facial expression measure construction
- Back-end (Unity + C#): Smooth pose control with Kalman filter; Robust facial expression control using incomplete derivative PID with deadzone; Eye-blink modeling; Socket communication

From QoS to QoE: A Data-Driven Model for Mobile Video Services *July 2017 – Present*

Project Leader, 'Shenzhen Cup' Mathematical Modeling Challenge, Supervised by Prof. 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 the data, significantly enhancing the prediction accuracy

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

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

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

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

- *Honorable Mention*, Mathematical Contest in Modeling (MCM) *2018*
- *Outstanding Undergraduate Student in HEU* *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*
- *1st Class Scholarship for Outstanding Students* *2016*

Skills

- **Programming Language**: Python, MATLAB, C
- **Software**: OpenCV, PyTorch, ROS, Simulink, Unity, 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**)