Hao-Tang Tsui

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Education

National Yang Ming Chiao Tung University (NYCU) Hsinchu, Taiwan
Bachelor of Science in Electronics and Electrical Engineering Sep. 2020 – Dec. 2023

- **GPA:** 4.14/4.3 (Overall), 4.22/4.3 (Last 60 credits)
- Completed a standard eight-semester bachelor's program in just five semesters.
- **Top Entrance Scholarship:** Awarded for achieving first place in university admission (10,000 USD)
- **Selected Coursework (Top Score Achieved):** Introduction to Data Science, Introduction to Artificial Intelligence, Deep Learning and Applications, Deep Learning for Autonomous Driving, Computer Vision for UAV Autopilot

Technical University of Munich Munich, Germany
Exchange Student with The School of Computation, Information, and Technology Apr. 2023 – Sep. 2023

- **Exchange Student Scholarship:** Awarded for academic excellence student to study abroad (5,333 USD)
- **Relevant Coursework**: Advanced Natural Language Processing, Software Engineering Lab

Publications

TrajPrompt: Aligning Color Trajectory with Vision-Language Representations ECCV 2024
Li-Wu Tsao, ***Hao-Tang Tsui***, Yu-Rou Tuan, Pei-Chi Chen, Kuan-Lin Wang, Jhih-Ciang Wu, Hong-Han Shuai, Wen-Huang Cheng [Paper] [Page]

YOLO-RD: Introducing Relevant and Compact Explicit Knowledge to YOLO by Retriever-Dictionary Under Review by ML Conference
Hao-Tang Tsui, Chien-Yao Wang, Hong-Yuan Mark Liao [Paper]

Traffic Scene Generation from Natural Language Description for Autonomous Vehicles with Large Language Model Under Review by Robotics Conference
Bo-Kai Ruan, ***Hao-Tang Tsui***, Yung-Hui Li, Hong-Han Shuai [Paper] [Page]

Research Experience

Multimedia Technology Lab – Academia Sinica Taipei, Taiwan
Research Assistant, *Supervised by Prof. Hong-Yuan Mark Liao.* Feb. 2024 – Present

- **YOLOv9 – ECCV 2024**: Presenter at conference; primary code developer of YOLOv9 under MIT License. [Page]
- **YOLO-RD** (Under Review by Machine Learning Conference):
  - Proposed Retriever Dictionary to bring dataset information to YOLO improve real-time detection model with low computation cost and widely improved different detection model, DETR and RCNN, with flexibly designed.
  - Using 1% parameters to achieve the equivalent effect of increasing 100% parameters.

BASIC & AIMM Lab – National Yang Ming Chiao Tung University Hsinchu, Taiwan
Research Student, *Supervised by Prof. Hong-Han Shuai and Prof. Wen-Huang Cheng.* Jun. 2021 – Oct. 2024

- **Trajectory Prediction – ECCV 2024**:
  - Introduced vision and language to trajectory prediction task by designing visual and textual prompts to drive the multimodality model. In the work, I designed the inference stage and implemented the code.
  - Significantly improved 35% accuracy to previous SOTA, and became new SOTA.
- **Scene Generation** (Under Review by Robotics Conference):
  - Develop an autonomous traffic scene generation system that can generate interactive scenarios by transforming textual descriptions, by employing LLM's understanding, generating, and integrating abilities.
  - Increase environmental diversity, and reduce 16% in average vehicle agent collision rates.

Assistive Robotics Group – National Yang Ming Chiao Tung University Hsinchu, Taiwan
Summer Intern, *Supervised by Prof. Hsueh-Cheng Wang.* Jun. 2021 – Oct. 2021

- **Parallel conversion fisheye image**: Designed a parallel processing system to convert the 360 fisheye camera on the Jackal robot into panoramic images, improving speeds by 8 times and increasing accuracy of in-door human tracking.

Competitions

Competitive Programming

- **Silver Award** – ICPC Asia Taipei-Hsinchu Site Programming Contest 2021, Taiwan
- **Silver Award** – ICPC Asia Taipei-Hsinchu Site Programming Contest 2020, Taiwan
- **Silver Award** – National Collegiate Programming Contest 2020, Taiwan

TSMC Hackathon of AI Image Intelligence 2023, Taiwan

- **1st Place** / 50+ Teams
- Developed a tracking model and designed specialized data augmentation to solve bird's-eye-view traffic statistics. Optimized the model with customized TensorRT for high-speed inference.

World Competition

- **Third Place** – International Regions Mathematics League, Team Leader 2019, American
- **First Place** – World Adolescent Robot Contest, Team Leader 2018, China
- **Silver Award** – World Mathematics Team Championship, Team Leader 2018, Bulgaria

Service and Teaching Experience

Reviewer, IEEE International Conference on Robotics and Automation Oct. 2024

Teaching Assistant of Data Structures, Course of Data Structures - NYCU Sep. 2021 – Jun. 2022

League Advisor, Computer Software Design Club - Hsinchu Chien-Kung High school Sep. 2020 – Jun. 2022

Tutor, AlgoSeacow - Algorithm/competition program cram school Apr. 2021 – Sep. 2021

Projects

YOLO - MIT License, Primary code writer [Code]

- Developed a new version of YOLO under the MIT License, making it more accessible for real-time object detection users and ensuring compliance with strict software engineering practices.
- Implement over 95% of the code, including configuration, training, inference, multi-GPU support, hardware acceleration, CI/CD, and package management, without referencing any existing code.
- Used by at least two companies, 220+ users, 700+ Github stars.

Pose Estimation for Virtual Sync Exhibit System [Code] [Paper]

- Leverage pose estimation to project users into a real-time virtual environment using only an edge device.
- Improved the efficiency of the synchronization system using the differential properties to reduce the latency.
- Received Chih-Tung Yin Electronic Experiment Scholarship.

Denoising Diffusion Probabilistic Models (DDPM) for Inverse Kinematics [Paper]

- Designed DDPM optimizes the Markov chain solution of Inverse Kinematics to accurately calculate the optimal angle of the multi-joint arm robot between two points, improving accuracy by 16%.
- Received Chih-Tung Yin Electronic Experiment Scholarship.

Medical Entrepreneurship Team, Co-founder& Developer

- Developed a federated learning and time series model to safeguard medical data privacy to predict acute sepsis, collaborating with the NYCU Digital Medicine& Smart Healthcare Research Center and Veterans General Hospital.
- Improved the traditional medical consultation system by cooperating with hospital doctors to improve user usage; optimize the internal structure of the system and reduce the burden of data collection on the computer system.
- Secured more than NTD $4.6 million in funding for research and entrepreneurship.

WhenToEat, Frontend Developer

- Developed a comprehensive web and mobile application to facilitate dinner appointments with netizens.
- Addressed the practical issue of finding dining companions during late-night coding sessions with college classmates.

Extracurricular

Exhibitor, AutoTronics Taipei 2021 – Taipei, Taiwan Apr. 2022
Designed and showcased a pedestrian trajectory prediction system for autonomous vehicles at AutoTronics exhibition.

IT Committee Member, Electrical Engineering Student Association – NYCU Sep. 2021 – Jun. 2022
Contributed to developing and managing IT resources to support student learning and academic activities.

Certified UAV Pilot (A1/A3), European Union Aviation Safety Agency - Switzerland and Germany Dec. 2023
Obtained internationally recognized drone certifications for A1/A3 categories, enabling UAV piloting in both countries.

Technologies

Programming Languages: Python, C/C++, C#, Bash, HTML, LaTeX, MATLAB

Technologies: Machine Learning, Deep Learning, Computer Vision, Data Structures, Algorithms

Frameworks & Libraries & Tools: PyTorch, TensorFlow, Keras, ROS, OpenCV, NumPy, SciPy, Pandas, Git, Docker