

Kuan-Wei Tseng

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DOMAIN EXPERTISE Computer Vision (3D Computer Vision, View Synthesis, Object Tracking), Image and Video Processing (Style Transfer, Video Stabilization), SLAM (Sensor Fusion, Visual Odometry, LiDAR Odometry), Augmented/Virtual Reality (Education, Entertainment, Multisensory Experience)

EDUCATION **M.S.**, Department of Computer Science, Tokyo Institute of Technology 2022 – 2024/03

- Advisors: Prof. Ikuro Sato and Prof. Rei Kawakami.
- Lab: Recognition and Learning Algorithm Laboratory (a.k.a. Sato Lab)
- Courses: Advanced Topics in Computer Vision, Advanced Topics in Artificial Intelligence, Sparse Signal Processing & Optimization, Robot Audition and Scene Analysis

B.S., Department of Mechanical Engineering, National Taiwan University 2016 – 2020

- Advisor: Prof. Yi-Ping Hung (Department of Computer Science and Information Engineering)
- Lab: Image and Vision Lab (imLab)
- Courses: Digital Image Processing, Computer Vision, Advanced Computer Vision, Robotics, Video Communications, Wireless Networking–Fundamentals and Applications, Numerical Methods, Data Visualization with Modern Data Science

WORK & RESEARCH EXPERIENCE **Robotics and Automation Intern**, Apple, Japan 2023/03 – Present

- Implemented a robust context-aware 3D LiDAR Odometry based on Point Cloud Library (PCL) and ROS for robot navigation in large-scale (>100m) outdoor environments.
- Developed a simulation testing framework consists of environment setup, automatic testing, and result analysis for efficient CI/CD. Reduced setup time from 30 minutes to just 1 minute.

Research Intern, Denso IT Laboratory, Japan 2022/11 – 2023/02

- Developed transformer-based interactive object segmentation model that takes only 4 extreme points as input for fast data annotation.

Graduate Research Assistant, National Taiwan University 2022/02–2022/09

Research Associate (Full-Time), National Taiwan University 2021/02–2022/01

Research Assistant (Full-Time), National Taiwan University 2020/08–2021/01

Undergraduate Research Assistant, National Taiwan University 2019/09–2020/07

- **Object Tracking.** Led a team to work on visual object tracking. Devised a transformer-based one stream object tracking model with adaptive template update strategies that achieves can at 65fps with AUC 71.7 on LaSOT, a long-term object tracking benchmark.
- **Sensor Fusion.** Contributed to indoor UAV localization projects using deep selective fusion of vision, IMU, and UWB sensors. Refined loss functions to increase global localization accuracy. Recruited and trained a team to collect data with visual-inertial sensor and motion capture system.
- **Image Processing.** Designed and implemented ArtNV, a stylized novel view synthesis pipeline that generate spatially consistent novel views for 3D displays. Integrated ArtNV into VR as an alternative to modeling or 360 images for the unreachable areas in the virtual environment.
- **3D Perception.** Contributed to GCVD, a globally consistent video depth and pose estimator that improves state-of-the-art methods by 19% , and Deep3D, an learning-based video stabilizer that first leveraged self-supervised learning of depth and pose to smooth camera motion.
- **Virtual Reality.** Developed an olfactory display system that exhausts scented gases by subwoofers to enhance immersive VR experience. Analyzed user experience on multisensory feedback and integrated multisensory experience into VR for relaxation.
- **Augmented Reality.** Explored practical applications of optical see-through head-mounted display and designed a mixed reality navigation (image-based localization) and guidance (3D animation manual) system for outdoor facility maintenance with Microsoft HoloLens 2.

TEACHING EXPERIENCE	<p>Teaching Assistant, Tokyo Institute of Technology Fall 2022</p> <ul style="list-style-type: none"> • LAS.I121/LAS.I122 Computer Science I/II (Python programming for undergraduate students.) <p>Teaching Assistant, National Taiwan University</p> <ul style="list-style-type: none"> • CSIE 5079 Pattern Classification and Analysis Spring 2021 • CSIE 5429 3D Computer Vision with Deep Learning Applications Spring 2021, 2022
SELECTED PUBLICATIONS	<p>[1] Peng-Yuan Kao, Hsiu-Jui Chang, Kuan-Wei Tseng, Timothy Chen, He-Lin Luo, Yi-Ping Hung, "VIUNet: Deep Visual–Inertial–UWB Fusion for Indoor UAV Localization", in <i>IEEE Access</i>, 2023. 🔗</p> <p>[2] Kuan-Wei Tseng*, Jing-Yuan Huang*, Yang-Shen Chen, Chu-Song Chen, Yi-Ping Hung, "Pseudo-3D Scene Modeling for Virtual Reality Using Stylized Novel View Synthesis", in <i>ACM SIGGRAPH Posters</i>, 2022. (*Co-first authors) 🔗</p> <p>[3] Jing-Yuan Huang, Grace Theodore, You-Shin Tsai, Jerry Chin-Han Goh, Mu-Hang Lin, Kuan-Wei Tseng, Yi-Ping Hung, "Exploring Multisensory Feedback for Virtual Reality Relaxation", in <i>Proceedings of the IEEE International Conference on Multimedia and Expo Workshops (ICMEW)</i>, 2022. (Best Demo Paper) 🔗</p> <p>[4] Kuan-Wei Tseng, Yao-Chih Lee, Chu-Song Chen, "Artistic Style Novel View Synthesis Based on A Single Image", in <i>Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops</i>, 2022. 🔗</p> <p>[5] You-Yang Hu, Yao-Fu Jan, Kuan-Wei Tseng, You-Shin Tsai, Hung-Ming Sung, Jin-Yao Lin, Yi-Ping Hung, "aBio: Active Bi-Olfactory Display Using Subwoofers for Virtual Reality", in <i>Proceedings of the 29th ACM International Conference on Multimedia (MM)</i>, 2021. (Oral Paper; Best Student Paper) 🔗</p> <p>[6] Yao-Chih Lee, Kuan-Wei Tseng, Yu-Ta Chen, Chien-Cheng Chen, Chu-Song Chen, Yi-Ping Hung, "3D Video Stabilization with Depth Estimation by CNN-based Optimization", in <i>Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)</i>, 2021. 🔗</p> <p>[7] Yu-Ta Chen, Kuan-Wei Tseng, Yao-Chih Lee, Chun-Yu Chen, Yi-Ping Hung, "PixStabNet: Fast Multi-Scale Deep Online Video Stabilization with Pixel-Based Warping", in <i>Proceedings of the IEEE International Conference on Image Processing (ICIP)</i>, 2021. 🔗</p> <p>[8] Yao-Fu Juan, Kuan-Wei Tseng, Peng-Yuan Kao and Yi-Ping Hung, "Augmented Tai-Chi Chuan Practice Tool with Pose Evaluation", in <i>Proceedings of the IEEE International Conference on Multimedia Information Processing and Retrieval (MIPR)</i>, 2021. (Oral Paper) 🔗</p> <p>[9] Peng-Yuan Kao, Kuan-Wei Tseng, Tian-Yi Shen, Yan-Bin Song, Kuan-Wen Chen, Shih-Wei Hu, Sheng-Wen Shih, and Yi-Ping Hung, "Camera Ego-Positioning Using Sensor Fusion and Complementary Method", in <i>Pattern Recognition. ICPR International Workshops and Challenges</i>, 2021. 🔗</p> <p>[10] Kuan-Wei Tseng, Meng-Wei Hsu, Peng-Yuan Kao and Yi-Ping Hung, "Influence of IMU Quality on Optimization-Based Visual Inertial Odometry", in <i>IPPR Conference on Computer Vision, Graphics, and Image Processing (CVGIP)</i>, 2020. (Presentation) 🔗</p>
SERVICES & HONORS	<p>Reviewer of CVPR Workshop 2023, WACV 2023, IEEE Signal Process. Lett. 2022</p> <p>Best Demo Paper Award, IEEE International Conference on Multimedia & Expo (ICME) 2022</p> <p>Best Student Paper Award, ACM International Conference on Multimedia (MM) 2021</p> <p>Best Paper Award, IPPR Conference on Computer Vision, Graphics, and Image Processing 2020</p> <p>Kobe University Funds, Summer Program in Japanese Language and Culture 2019</p> <p>JASSO Scholarship, Nagoya University Short-Term Japanese Language Program 2018</p>
COMPETENCES	<p>Languages. Mandarin Chinese (<i>native</i>), English (<i>fluent</i>, TOEFL 104), Japanese (<i>fluent</i>, JLPT N1)</p> <p>Programming Languages. Python, C++, MATLAB, C#</p> <p>Library, Software, and Tools. PyTorch, OpenCV, ROS, Gazebo, Unity, Git, LaTeX</p>