Yao-Chih Lee

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Research Interests

3D Computer Vision, Scene Understanding, Image/Video Processing, View Synthesis, Structure-from-Motion/SLAM, Interactive Vision Techniques

Education

University of Maryland, College Park — Maryland, US
Ph.D. in Computer Science — Sep. 2022–present

- Advisor: Jia-Bin Huang

National Taiwan University — Taipei, Taiwan
Master of Science in Computer Science and Information Engineering — Sep. 2018–Jun. 2020

- Thesis: "3D Video Stabilization with Depth Estimation by CNN-based Optimization" **[CVPR2021]**
  Committee: Yi-Ping Hung (advisor), Yung-Yu Chuang, Yu-Chiang Frank Wang, Chu-Song Chen, Kuan-Wen Chen
- Cumulative GPA: 4.24/4.3 (rank 7th/132)

National Chiao Tung University (now National Yang Ming Chiao Tung University) — Hsinchu, Taiwan
Bachelor of Science in Computer Science (Network and Multimedia Engineering Program) — Sep. 2014–Jun. 2018

- Cumulative GPA: 4.14/4.3 (rank 1st/50)
- Academic Achievement Award: 4 times (top 5% ranking in 4 semesters)

Publications

1. **Yao-Chih Lee**, Kuan-Wei Tseng, Guan-Sheng Chen, Chu-Song Chen, "Globally Consistent Video Depth and Pose Estimation with Efficiency," *arXiv:2208.02709*, 2022. [arxiv]

2. Kuan-Wei Tseng, **Yao-Chih Lee**, Chu-Song Chen, "Artistic Style Novel View Synthesis Based on A Single Image," *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)* Workshops, 2022. [pdf]

3. **Yao-Chih Lee**, Kuan-Wei Tseng, Yu-Ta Chen, Chien-Cheng Chen, Chu-Song Chen and Yi-Ping Hung, "3D Video Stabilization with Depth Estimation by CNN-based Optimization," **IEEE Conference on Computer Vision and Pattern Recognition (CVPR)**, 2021. [webpage, pdf]

4. 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," **IEEE International Conference on Image Processing (ICIP)**, 2021. [pdf]

5. Hau Chu, Jia-Hong Lee, **Yao-Chih Lee**, Ching-Hsien Hsu, Jia-Da Li, Chu-Song Chen, "Part-aware Measurement for Robust Multi-View Multi-Human 3D Pose Estimation and Tracking," **IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)**, 2021. [pdf]

6. Ping-Jung Duh, Yu-Cheng Sung, **Yao-Chih Lee**, Kuan-Wen Chen, Liang-Yu Fan Chiang, "A Design of Vision-based Navigation System for the Visually Impaired," **the Conference of Taiwan Computer-Human Interaction (TAICHI)**, 2018.

7. Yu-Cheng Sung, **Yao-Chih Lee**, Sarah Wang, Wei-Ting Hu, Kuan-Wen Chen, "An UAV Autopilot System for Sports Player Tracking," **the Conference of Taiwan Computer-Human Interaction (TAICHI)**, 2017.

Research Experiences

Research Assistant   Taipei, Taiwan
AI Application and Integration Lab at Academia Sinica advised by Prof. Chu-Song Chen   Sep. 2020–Mar. 2022

- 3D Vision
  - **[arXiv 2022]** Developed globally consistent video dense depth and camera pose estimation, which outperformed the state-of-the-art by 19% improvement with strong efficiency.
  - **[CVPRW 2022]** Led a research team to develop stylized video view synthesis with 3D geometric constraints.
  - **[CVPRW 2021]** Contributed in a multi-view multi-human 3D pose estimation and tracking system with 100 fps.
- Image Processing
  - Solved CT metal artifact reduction in CT-MRI paired images with conditional GAN and contrastive loss.
- Recognition
  - Led a team of Traditional Chinese scene text detection and recognition in self-supervised learning manners; and developing scene text synthesis algorithms with depth estimation and scene text replacement.

Research Assistant   Taipei, Taiwan
Interdisciplinary Human-AI Interaction Research Project   Jul. 2020–Aug. 2020

- Human-AI Interaction
  - Advised by Prof. Yihsiu Chen (Communication, NCCU, Taiwan), Prof. Gary Hsieh (Human Centered Design & Engineering, UW, Seattle). and Prof. Chien-Wen Tina Yuan (Library & Information Studies, NTNU, Taiwan).
  - Developed experimental platforms of human-AI collaboration to serve over 700 participants.

Graduate Research Assistant   Taipei, Taiwan
Image and Vision Lab at NTU with MediaTek, Inc. advised by Prof. Yi-Ping Hung   Sep. 2018–Jun. 2020

- Video Processing
  - **[CVPR2021]** Proposed the first 3D learning-based video stabilization algorithm with self-supervised depth and pose estimation. The method outperforms the state-of-the-art methods, especially in challenging videos.
  - **[ICIP2021]** Contributed an online video stabilization algorithm with a coarse-to-fine approach, which achieved 54.6 fps and surpassed the state-of-the-art by 29% with robust shape preservation.
- 3D Vision
  - Developed self-supervised monocular depth and camera ego-motion estimation for wild videos.
  - Conducted thorough evaluations on the performance of local feature algorithms for visual SLAM systems.

Undergraduate Research Assistant   Hsinchu, Taiwan
Collaborative Vision Lab at NCTU advised by Prof. Kuan-Wen Chen   Aug. 2016–Jun. 2018

- Interactive Vision Technique
  - **[TAICHI2017]** Developed UAV autopilot and visual tracking system with OCR and human detection.
  - **[TAICHI2018]** Contributed in a navigation system for visually impaired with streaming semantic segmentation.
- 3D Vision
  - Constructed a semi-automatic feature correspondence annotation system to construct a real-world dataset of matching patches for a learning-based viewpoint- and illumination-invariant local feature extraction.
  - Developed semantic segmentation and SLAM system with 3D reconstruction for virtual reality environments.

Teaching

- **Teaching Assistant**, 3D Computer Vision with Deep Learning Applications (CSIE5429), NTU   Spring 2021

- **Teaching Assistant**, Digital Image Processing (CSIE5612), NTU   Fall 2019

- **Teaching Assistant**, Probability (CSIE2121), NTU   Spring 2019

- **Teaching Assistant**, Computer Vision for UAV Autopilot (DCP1249), NCTU   Spring 2018

Awards and Achievements

- **Reviewer**, Pattern Recognition

- **Academic Achievement Award** $\times$ **4**, (Top 5% ranking)
  Fall 2014, Spring 2016, Fall 2016, and Spring 2017

- **Excellence Award**, Undergraduate Project Competition
  An UAV autopilot system for sports player tracking

- **Departmental Core Course Scholarship**
  Top 3 ranking in the course of Operating System

Skills

- **Programming Languages:**
  Python, C/C++, LaTeX, MatLab, Bash, Javascript, PHP, SQL, C#, Swift
- **Development Tools:**
  Unix, PyTorch, OpenCV, Open3D, COLMAP, OpenGL, TensorFlow, Git, Unity
- **Languages:**
  Chinese (native), English (fluent, TOEFL MyBest: 105)