

Chiao-Yi (Charlene) Wang

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SUMMARY

Applied Scientist with a Ph.D. in Bioengineering from the University of Maryland and 7+ years of experience developing computer vision and machine learning systems for 2D/3D imaging, multimodal sensor fusion, time-series modeling, and human-centered sensing. Expertise in image registration, segmentation, object tracking, and pose estimation. Proven track record of leading end-to-end research projects, authoring 10+ first-author publications in peer-reviewed conferences and journals, filing 3 U.S. patent applications, and developing open-source datasets and tools. Extensive experience building machine learning pipelines in Python and PyTorch.

EDUCATION

Ph.D. in Bioengineering, University of Maryland, College Park	05/2026
Research Focus: Computer Vision, Machine Learning, Multimodal Data	
M.S. in Biomedical Electronics and Bioinformatics, National Taiwan University	06/2018
B.S. in Electrical Engineering, National Taiwan University	06/2016

TECHNICAL SKILLS

Programming & Tools: Python, PyTorch, OpenCV, C/C++, MATLAB, CUDA, Git, Linux, JavaScript, SQL, DB2, Unreal

Machine Learning & AI: Deep Learning, Transformer Architectures, Time-Series Modeling, Foundation Models (DINO, CLIP), Self-Supervised Learning, Representation Learning, Monte Carlo Simulation

Computer Vision: Image Registration, Segmentation, Object Detection, Object Tracking, Human Pose Estimation, Egocentric Motion Analysis, Video Analysis, Multimodal Data and Sensor Fusion

Data Modalities: RGB Images/Video, Fisheye/Stereo Cameras, IMU, Hyperspectral, Sonar, GPS, OCTA (3D), EMA Video

RESEARCH & PROFESSIONAL EXPERIENCE

Graduate Research Assistant

Bio-Imaging and Machine Vision Lab, University of Maryland (PI: Prof. Yang Tao)

08/2020 – 05/2026 | College Park, MD, USA

- Developed *EgoFall*, a Transformer-based framework for fall risk assessment using wearable multimodal sensor data (IMU + fisheye cameras), achieving >95% accuracy in real-time motion-instability classification from egocentric time-series data. Established a benchmark dataset (**ICASSP'24, IEEE TNSRE'25, first author**).
- Developed *VDD-Reg*, a semi-supervised deep learning framework integrating vessel segmentation and image registration for multimodal retinal image alignment across large vessel-density variations. Established and released the *MEMO* dataset (OCTA & EMA) for benchmarking (**BOEx'24, first author**).
- Developed *EMTrack*, a DINO-based framework for erythrocyte detection and tracking, integrating flow-context modeling and topology-aware tracking for robust motion analysis. Established the RBF-EMA dataset with detection and tracking annotations for retinal blood-flow quantification (submitted, first author).
- Contributed to *AutoComPose*, a multimodal LLM framework for automatic pose-transition generation and composed pose retrieval. Built PoseFixCPR, a synthetic benchmark dataset using Unreal Engine for evaluation (**ICCV'25**).
- Developed *ShellCollect*, a path-planning and simulation framework for shellfish-harvesting boats, optimizing harvesting routes to improve collection efficiency and enable benchmarking (**IEEE Access'24, first author**).
- Developed machine learning models for glucose prediction from hyperspectral data (EMBC'21, first author).

Application Developer (IT Specialist)

IBM

09/2018 – 06/2020 | Hsinchu, Taiwan

- Developed software components for IBM SiView, a Manufacturing Execution System (MES) used to process and manage large-scale semiconductor manufacturing data, improving production efficiency.
- Developed software solutions in C, Python, JavaScript, and DB2/SQL for data migration, system integration, and customization projects supporting semiconductor manufacturers, including TSMC.
- Collaborated with cross-functional engineering teams to deliver production software following rigorous version-control and software-quality practices.

Graduate Research Assistant

Biomedical Optical Spectroscopy and Imaging Lab, National Taiwan University (PI: Prof. Kung-Bin Sung)

09/2016 – 08/2018 | Taipei, Taiwan

- Developed CUDA-accelerated Monte Carlo simulation software for modeling light transport in biological tissues and optical systems. (Photonics'19, first author)
- Developed and trained artificial neural network (ANN) models using Monte Carlo-generated datasets to predict reflectance spectra from human skin optical models (BOEx'20).
- Developed and maintained bio-optical instrumentation (e.g., near-infrared spectroscopy) for biomedical applications, conducting optical data acquisition, spectral imaging analysis, and system performance evaluation (EMBC'17, SPIE Photonics West'18, Laser Science'18, first author).

AWARDS & HONORS

- Fall 2020 International GA Tuition Fellowship 08/2020
- Chang Kuan Liang Scholarship, Taiwanese Society of Biomedical Engineering 03/2018
- College Student Research Scholarship, Ministry of Science and Technology, R.O.C. 07/2015

SELECTED PUBLICATIONS & PATENTS

Journal

1. **Wang, C.Y.**, Sadrieh, F.K., Shen, Y.T., Oppizzi, G., Zhang, L.Q., and Tao, Y., "EgoFall: Real-time Privacy-Preserving Fall Risk Assessment with a Single On-Body Tracking Camera," *IEEE TNSRE*, 2025.
2. **Wang, C.Y.**, Nandhan, A.G., Shen, Y.T., Chen, W.Y., Kumar, S.S.S., Long, A., ..., and Tao, Y., "ShellCollect: A Framework for Smart Precision Shellfish Harvesting Using Data Collection Path Planning," *IEEE Access*, 2024.
3. **Wang, C.Y.**, Sadrieh, F.K., Shen, Y.T., Chen, S.E., Kim, S., Chen, V., Raghavendra, A., Wang, D., Saeedi, O., and Tao, Y., "MEMO: Dataset and methods for robust multimodal retinal image registration with large or small vessel density differences," *BOEx*, 2024.
4. **Wang, C.Y.**, Kao, T.C., Chen, Y.F., Su, W.W., Shen, H.J., and Sung, K.B., "Validation of an inverse fitting method of diffuse reflectance spectroscopy to quantify multi-layered skin optical properties," *Photonics*, 2019.
5. Tsui, S.Y., **Wang, C.Y.**, Huang, T.H., and Sung, K.B., "Modelling spatially-resolved diffuse reflectance spectra of a multi-layered skin model by artificial neural networks trained with Monte Carlo simulations," *BOEx*, 2018.

Conference Proceeding / Preprint

6. **Wang, C.Y.**, Gadde, H., Shen, Y.T., Oechsli, S., Saeedi, O., and Tao, Y., "Automated Erythrocyte Detection and Tracking for Retinal Blood Flow Quantification in Erythrocyte-Mediated Angiography," *arXiv:2606.01006*, 2026.
7. Shen, Y.T., Eum, S., Lee, D., Shete, R., **Wang, C.Y.**, Kwon, H., and Bhattacharyya, S.S., "AutoComPose: Automatic Generation of Pose Transition Descriptions for Composed Pose Retrieval Using Multimodal LLMs," *ICCV*, 2025.
8. **Wang, C.Y.**, Sadrieh, F.K., Shen, Y.T., Oppizzi, G., Zhang, L.Q., and Tao, Y., "Real-Time Privacy-Preserving Fall Risk Assessment with a Single Body-Worn Tracking Camera," *ICASSP*, 2024.
9. **Wang, C.Y.**, Hevaganinge, A., Wang, D., Ali, M., Cattaneo, M., and Tao, Y., "Prediction of aqueous glucose concentration using hyperspectral imaging," *EMBC*, 2021.
10. **Wang, C.Y.**, Lin, T.X., and Sung, K.B., "Improved Inverse Two-Layered Monte Carlo Fitting of In-vivo Skin Diffuse Reflectance Spectra," *Laser Science*, 2018.
11. **Wang, C.Y.**, Yu, T.W., and Sung, K.B., "In vivo measurements of optical properties of human muscles with visible and near infrared reflectance spectroscopy," *SPIE Photonics West*, 2018.
12. **Wang, C.Y.**, Liao, A.Y.C., and Sung, K.B., "Developing visible and near-infrared reflectance spectroscopy to detect changes of the dermal collagen concentration," *SPIE Photonics West*, 2018.
13. **Wang, C.Y.**, Yu, T.W., and Sung, K.B., "Sensitivity Analysis for Detecting Oxygen Saturation of Deep Veins with Non-invasive Near Infrared Spectroscopy," *EMBC*, 2017.

Patent

14. Tao, Y., **Wang, C.Y.**, Hevaganinge, A., Wang, D., and Ali, M., "Systems and methods for compound concentration sensing in fluids," *US Patent No. 12,474,258*. 2025 Nov. 18.
15. Tao, Y., Hevaganinge, A., **Wang, C.Y.**, Wang, D., and Ali, M., "Systems and Methods for pH Sensing in Fluids," *US Patent No. 12,007,324*. 2024 Jun 11.
16. Tao, Y., **Wang, C.Y.**, Zhang, L.Q., and Sadrieh, F.K., "Real-Time Privacy-Preserving Fall Risk Assessment with a Single On-Body Tracking Camera," *US Patent App. (Submitted)*.