# Chiao-Yi (Charlene) Wang

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## Summary

Ph.D. (May 2026) specialize in AI for multimodal sensor data, time-series learning, human-centered sensing and computer vision. Lead author in top-tier journals and conferences (ICASSP), with proven experience developing deep learning models, benchmark datasets, and simulation platforms for wearable sensors, multivariate time-series, video, and 2D/3D imaging data. Expertise includes image registration, segmentation, classification, detection and tracking, and pose estimation with proficiency in Python (PyTorch).

## Education

**Ph.D.** in Bioengineering, University of Maryland, College Park 08/2020 – 05/2026

**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:** Python, PyTorch, OpenCV, C/C++, MATLAB, JavaScript, SQL, LaTex, CUDA, DB2, Verilog

**Areas:** Computer Vision, Deep Learning, Transformer, Time-Series Modeling, Self-Supervised Learning, Foundation Models (DINO, CLIP), Representation Learning, Image Registration, Segmentation, Object Detection and Tracking, Human Pose Estimation, Multimodal Data and Sensor Fusion

**Sensors:** IMU, RGB (Video, Image), Hyperspectral, Sonar, Fisheye (Stereo), GPS, OCTA (3D), EMA Video

## Professional Experience

**Graduate Research Assistant**

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

08/2020 – Present | College Park, MD, USA

- Developed EgoFall, a CNN-Transformer model for real-time, privacy-preserving fall risk assessment system using wearable multimodal sensor data (IMU + fisheye cameras), classifying motion instability from egocentric time-series data and achieving >95% accuracy on our newly established benchmark dataset (**ICASSP'24, IEEE TNSRE'25, first author**).
- Developed VDD-Reg, a deep learning-based computer vision framework for automated retinal blood flow quantification from multimodal retinal imaging (EMA & OCTA), integrating vessel segmentation, image registration and video-based time-series cell tracking; established the public MEMO dataset for benchmarking (**BOEx'24, first author**).
- Built the PoseFixCPR benchmark dataset using Unreal Engine and the public BEDLAM dataset to evaluate AutoComPose, a multimodal LLM-based framework for automatic pose-transition annotation and Composed Pose Retrieval (CPR) (**ICCV'25**).
- Developed a path planning framework for autonomous precision shellfish harvesting, improving efficiency and yield, and built a simulator for benchmarking. (IEEE Access'24, first author).
- Developed a machine learning model for non-invasive glucose prediction using hyperspectral imaging (EMBC'21, first author).

**Application Developer (IT Specialist)**

**IBM**

09/2018 – 06/2020 | Hsinchu, Taiwan

- Developed real-time dispatching and production scheduling tools (IBM SiView RTD) to optimize semiconductor manufacturing operations and throughput.
- Built data migration and system integration tools to support large-scale manufacturing execution systems (MES).
- Provided software maintenance, trouble shooting and process automation support for TSMC production

systems in high-volume manufacturing environments.

**Graduate Research Assistant**

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

09/2016 – 08/2018 | Taipei, Taiwan

- Developed a noninvasive bio-optical method to detect oxygen saturation in deep veins (EMBC'17, SPIE Photonics West'18, first author).
- Established a multi-wavelength optical system for real-time detection of dermal collagen concentration changes (Photonics'19, SPIE Photonics West'18, first author).
- Analyzed bio-optical imaging data to quantify skin melanin concentration using noninvasive optical technique (BOEx'20).

**R&D Intern**

**Mediatek**

07/2015 – 08/2015 | Taipei, Taiwan

- Conducted IC design environment testing and compiler integration.

## 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

## Mentorship Experience

- Mentored M.S. students (Sandip Sharan Senthil Kumar, Guru Nandhan ADP, Wei-Yu Chen, Vijay Dev Reddy Chevireddi) and undergraduate students (Alex Long, Faranguisse Sadrieh, Ravidu Hevaganinge)

## Publications

***Journal***

1. **Wang, C.Y.**, Sadrieh, F.K., Shen, Y.T., Oppizzi, G., Zhang, L.Q. and Tao, Y., (2025). EgoFall: Real-time Privacy-Preserving Fall Risk Assessment with a Single On-Body Tracking Camera. *IEEE Transactions on Neural Systems and Rehabilitation Engineering (IEEE TNSRE)*.
2. **Wang, C. Y.**, Nandhan, A. G., Shen, Y. T., Chen, W. Y., Kumar, S. S. S., Long, A., ... & Tao, Y. (2024). ShellCollect: A Framework for Smart Precision Shellfish Harvesting Using Data Collection Path Planning. *IEEE Access*.
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., 2024. MEMO: dataset and methods for robust multimodal retinal image registration with large or small vessel density differences. *Biomedical Optics Express*, *15*(5), pp.3457-3479.
4. **Wang, C.Y.**, Kao, T.C., Chen, Y.F., Su, W.W., Shen, H.J. and Sung, K.B., 2019, May. Validation of an inverse fitting method of diffuse reflectance spectroscopy to quantify multi-layered skin optical properties. In *Photonics* (Vol. 6, No. 2, p. 61). MDPI.
5. Tsui, S.Y., **Wang, C.Y.**, Huang, T.H. and Sung, K.B., 2018. Modelling spatially-resolved diffuse reflectance spectra of a multi-layered skin model by artificial neural networks trained with Monte Carlo simulations. *Biomedical optics express*, 9(4), pp.1531-1544.

***Conference Proceeding (All peer-reviewed)***

6. Shen, Y. T.*, Eum, S.*, Lee, D., Shete, R., **Wang, C. Y.**, Kwon, H., & Bhattacharyya, S. S. (2025). AutoComPose: Automatic Generation of Pose Transition Descriptions for Composed Pose Retrieval Using Multimodal LLMs. *The IEEE/CVF International Conference on Computer Vision (**ICCV**),* 2025

7. **Wang, C.Y.**, Sadrieh, F.K., Shen, Y.T., Oppizzi, G., Zhang, L.Q. and Tao, Y., 2024, April. Real-Time Privacy-Preserving Fall Risk Assessment with a Single Body-Worn Tracking Camera. *The ICASSP 2024-2024 IEEE International Conference on Acoustics, Speech and Signal Processing* (**ICASSP**) (pp. 1866-1870). IEEE.
8. **Wang, C.Y.**, Hevaganinge, A., Wang, D., Ali, M., Cattaneo, M. and Tao, Y., 2021, November. Prediction of aqueous glucose concentration using hyperspectral imaging. *The 2021 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) (pp. 3237-3240). IEEE*.
9. **Wang, C.Y.**, Lin, T.X. and Sung, K.B., 2018, September. Improved Inverse Two-Layered Monte Carlo Fitting of In-vivo Skin Diffuse Reflectance Spectra. In Laser Science (pp. JW3A-121). Optica Publishing Group.
10. **Wang, C.Y.**, Yu, T.W. and Sung, K.B., 2018, February. In vivo measurements of optical properties of human muscles with visible and near infrared reflectance spectroscopy. In Optical Biopsy XVI: Toward Real-Time Spectroscopic Imaging and Diagnosis (Vol. 10489, pp. 58-63). SPIE.
11. **Wang, C.Y.**, Liao, A.Y.C. and Sung, K.B., 2018, February. Developing visible and near-infrared reflectance spectroscopy to detect changes of the dermal collagen concentration. In Optical Biopsy XVI: Toward Real-Time Spectroscopic Imaging and Diagnosis (Vol. 10489, pp. 124-131). SPIE.
12. **Wang, C.Y.**, Yu, T.W., Sung, K.B., "Sensitivity Analysis for Detecting Oxygen Saturation of Deep Veins with Non-invasive Near Infrared Spectroscopy," IEEE EMBC 2017