Fan-Yu (Ivy) Yen

EDUCATION

Northeastern University, PhD of Bioengineering — Massachusetts, USA

09/2022 – present

National Cheng Kung University, Master of Biomedical Engineering — Tainan, Taiwan

09/2019 – 06/2021

- Overall GPA 4.0/4.0 (4.07/4.3)
- Thesis title: Development of Novel Methods to Assess Cerebral Autoregulation Using Diffuse Correlation Spectroscopy and Pulse Transit Time

National Cheng Kung University, Bachelor of Biomedical Engineering — Tainan, Taiwan

09/2015 – 06/2019

- Overall GPA 3.94/4.0 (4.07/4.3)

RESEARCH EXPERIENCE

PhD student, Computational Optics and Translational Imaging Lab
Northeastern University — Massachusetts, USA

09/2022 – present

Supervisor: Dr. Qianqian Fang

- Developed PMCX – Python bindings for MCX (Monte Carlo eXtreme) photon transport simulator
- Developed augmented reality tool for functional near-infrared spectroscopy (fNIRS) optodes or EEG electrodes placement using deep learning
- Developed a natural language interface using a large language model to create structured output for performing light simulations
- Developing curvature information included MMC (Mesh-based Monte Carlo) for improving the photon transport simulation in curved surfaces

Research Assistant, Biosignal and Neural Engineering Lab
National Cheng Kung University — Tainan, Taiwan

06/2021 – 07/2022

Supervisor: Dr. Jia-Jin Chen

- Developed modular NIRS and diffuse correlation spectroscopy (DCS) cerebral monitoring system integrated with transcranial stimulator

Graduate Student Intern, Fetal-Neonatal Neuroimaging Developmental Science Center
Boston Children's Hospital, Harvard Medical School Teaching Hospital — Boston, USA

02/2020 – 01/2021

Supervisors: Dr. Pei-Yi (Ivy) Lin, Dr. Jason Sutin

- Developed algorithms for pulse transit time calculation using patient monitor data
- Analyzed cerebral autoregulation function among patients with neurological disorder and healthy controls
- Conducted photoacoustic simulation and phantom testing experiments

Graduate Student, Biosignal and Neural Engineering Lab
National Cheng Kung University — Tainan, Taiwan

09/2019 – 06/2021

Supervisor: Dr. Jia-Jin Chen
- Developed multi-channel high density transcranial electrical stimulator for facilitating the rehabilitation of patients with stroke
- Developed and designed control panel for transcranial electrical stimulator

Student Intern, Commonwealth Scientific and Industrial Research Organisation — Brisbane, AU
07/2018 – 09/2018

Supervisor: Dr. Amir Fazlollahi
- Validated the capability of CSIRO arterial spin labeling toolbox to distinguish patients with Alzheimer's dementia and healthy controls using brain MRI images
- Learned MRI imaging processing skills

Undergraduate Student, Biosignal and Neural Engineering Lab
National Cheng Kung University — Tainan, Taiwan
09/2016 – 08/2019

Supervisor: Dr. Jia-Jin Chen
- Developed multi-channel high density transcranial electrical stimulator for facilitating the rehabilitation of patients with stroke
- Developed and designed control panel for transcranial electrical stimulator

TEACHING EXPERIENCE

Teaching Assistant, Introduction to Computer
National Cheng Kung University — Tainan, Taiwan
09/2019 – 01/2020

- Designed and led the experiments of the course. The experiments included computer component introduction and assembly, MATLAB introduction, self-collected ECG signal preprocessing and heartbeat variation calculation, and wireless brain wave controlled robotic car

Session Leader, The 5th International MCX Training Workshop
Northeastern University — Boston, USA
06/2024

- Conducted the PMCX Training session of the workshop. Presented MCX's Python binding toolbox with photon simulation examples, specifically time-resolved simulation, partial pathlength calculation, and photon replay simulation

PUBLICATIONS

Yen FY, Lin YA, Fang QQ. Improving neuroimaging headgear placement robustness using facial-landmark-guided augmented reality. *Neurophotonics*. 2025 Oct;12(4):045005. doi:10.1117/1.NPh.12.4.045005. Epub 2025 Oct 23. PMID: 41142407; PMCID: PMC12546995.

McCann A, Xu E, **Yen FY**, Joseph N, Fang QQ. Creating anatomically derived, standardized, customizable, and three-dimensional printable head caps for functional neuroimaging. *Neurophotonics*. 2025 Jan;12(1):015016. doi: 10.1117/1.NPh.12.1.015016. Epub 2025 Mar 18. PMID: 40104430; PMCID: PMC11915464.

Yen FY, Fang QQ. MCX-LLM: an experiment in bridging natural language problem descriptions with quantitative scientific simulations (In preparation)

Lin CH, **Yen FY**, Fang QQ. 3D head mesh virtual guided system for neuroimaging probe placement (In preparation)

Krbec B, **Yen FY**, Lin PY, Sutin J, Grant PE. Validation and Evaluation of the Finapres® Non-Invasive Continuous Blood Pressure Monitoring Device in High-Risk Neonatal Intensive Care Patients (In preparation)

CONFERENCE PRESENTATION

Oral Presentation

Yen FY, Lin YA, Fang QQ (2024, Apr). Real-time guidance for fNIRS headgear placement using augmented reality. Selected for oral presentation at Optica Biophotonics Congress: Biomedical Optics 2024, Fort Lauderdale, FL, USA

Yen FY, Fang QQ (2024, Apr). MCX-LLM: an experiment in bridging natural language problem descriptions with quantitative scientific simulations. Selected for oral presentation at Optica Biophotonics Congress: Biomedical Optics 2024, Fort Lauderdale, FL, USA

Yen FY, Lin YA, Fang QQ (2023, June). Facial-landmark guided augmented reality (AR) system for real-time neuroimaging optode or electrode placement guidance. Selected for oral presentation at Northeastern University's Department of Bioengineering Research Symposium, Boston, MA, USA

Yen FY, Lin PY, Sutin J, Chen JJ (2021, Nov). Development of Novel Methods to Assess Cerebral Autoregulation Using Diffuse Correlation Spectroscopy and Pulse Transit Time. Selected for oral presentation at Annual Meeting of Taiwanese Society of Biomedical Engineering, Taichung, Taiwan

Conference Posters & Abstracts

Yen FY, Fang QQ (2024, Sep). AI-driven large-scale and automated neuroimaging and fNIRS data analysis pipeline using mega-datasets on NeuroJSON.io. 2024 fNIRS, Birmingham, UK

Lin CH, **Yen FY**, Fang QQ (2024, Apr). Evaluating a machine-learning based fast 3-D head shape acquisition method from a single camera image. Optica Biophotonics Congress: Biomedical Optics 2024, Fort Lauderdale, FL, USA

Fang QQ, **Yen FY**, Lin YA, Xu E (2024, Apr). NeuroJSON.io – a community portal for sharing neuroimaging and biophotonics data. Optica Biophotonics Congress: Biomedical Optics 2024, Fort Lauderdale, FL, USA

McCann A, Xu E, **Yen FY**, Fang QQ (2024, Apr). Designing Anatomically Derived, 3-D Printable Head Caps for Functional Neuroimaging. Optica Biophotonics Congress: Biomedical Optics 2024, Fort Lauderdale, FL, USA

Yen FY, Lin YA, Fang QQ (2023, Aug). Augmented reality system for real-time neuroimaging optode or electrode placement guidance. Neuroscience of the Everyday World conference, Boston, MA, USA

Yen FY, Lin YA, Fang QQ (2023, June). Facial-landmark guided augmented reality (AR) system for real-time neuroimaging optode or electrode placement guidance. The BRAIN Initiative Meeting, Rockville, MD, USA

McCann A, Xu E, **Yen FY**, Fang QQ (2023, June). NeuroCaptain - open-source design pipeline for standardized, 3-D printable and reusable head caps for quantitative neuroimaging studies. The BRAIN Initiative Meeting, Rockville, MD, USA

Yen FY, Chen JJ, Landi R, Grant PE, Lin PY, Sutin J (2022, Apr). Noninvasive cuffless blood pressure estimation using pulse transit time- ECG monitor with photoplethysmography in pediatric patients. The Pediatric Academic Societies Meeting, Denver, CO, USA

Krbec B, **Yen FY**, Vadset T, Lippman R, Woglom M, Hsiao CH, Grant PE, Sutin J, Lin PY (2022, Apr). Validation of noninvasive arterial pressure measurement by Finapres® in critically-ill infants in the neonatal intensive care unit. The Pediatric Academic Societies Meeting, Denver, CO, USA

Vyas R, Feldman HA, **Yen FY**, Hsiao CH, Rajaram A, Vadset T, Hay S, Warf BC, Grant PE, Sutin J, Lin PY (2022, Feb). Precision of cerebral tissue oxygenation and blood flow measured by frequency-domain near-infrared and diffuse correlation spectroscopies in NICU neonates. The 13th International Newborn Brain Conference, FL, USA

HONORS AND AWARDS

PhD Network Travel Funding Award x2
— Northeastern University, USA 2024

Bioengineering Conference Travel Award x2
— Department of Bioengineering, Northeastern University, USA 2024

Prof. You-li Zhou Inspiration and Dr. Buo-Xi Zhou Nianci Scholarship
— Biomedical Engineering Department, National Cheng Kung University, Taiwan 2021

The Scholarship of Overseas Research and Study Students
— National Cheng Kung University, Taiwan 02/2020 – 07/2020

The Scholarship of Master Admission by Recommendation and Screening Test (enrolled as the top candidate)
— Biomedical Engineering Department, National Cheng Kung University, Taiwan 09/2019 – 06/2020

Oversea Internship Program
— Ministry of Education, Taiwan 07/2018 – 09/2018

Presidential Award x2 (Academic Excellence Award)
— National Cheng Kung University, Taiwan 2015, 2016

LEADERSHIP ROLES

Director of National Cheng Kung University Martial Arts Club 06/2017 – 06/2018
Vice Event General Coordinator of NCKU BME Summer Camp 09/2016 – 06/2017

SKILLS

Programming: Python, MATLAB, C, R
Professional skills: medical image processing, signal analysis, embedded systems, data mining, deep learning
Software packages: Solidworks, Altium