

# Sheng-Chieh (Leon) Chiu

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## EDUCATION BACKGROUND

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**The University of Alabama at Birmingham (UAB), Alabama, USA**

**Sep 2020 – Aug 2025**

Ph.D. in Biomedical Engineering

GPA: 3.85/4

"Optimizing Quantification in Alzheimer's Disease with PET Imaging through Advanced Imaging and Deep Learning Techniques"

**National Cheng Kung University (NCKU), Tainan, Taiwan**

**Sep 2016 - Jun 2020**

B.S. in Biomedical Engineering

GPA: 3.76/4.30

Upper Division GPA: 3.86/4.30

## RESEARCH EXPERIENCE

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**Postdoctoral Researcher**

**Feb 2026 – Present**

Digital Medicine and Smart Healthcare Research Center

National Yang Ming Chiao Tung University (NYCU), Taipei, Taiwan

- Focus on sovereign AI and digital twin technologies for healthcare, contributing to the development of trustworthy, locally governed AI systems for neurological and surgical applications.
- Design a cross-modality generative AI pipeline to synthesize amyloid PET images from structural MRI, aiming to enable amyloid burden estimation for patients without access to PET scanning while ensuring safety against false-positive generation in healthy populations.
- Develop a foundation model-based framework for resting-state fMRI to learn healthy brain dynamics through self-supervised learning, establishing a validated baseline representation before extending to clinical perturbation modeling and digital twin applications.
- Build a real-time computer vision system for DaVinci robotic-assisted gynecologic surgery, integrating object detection and promptable segmentation models for intraoperative anatomical structure identification, with a focus on visibility-aware tracking and surgical safety under occlusion.

**Graduate Research Assistant**

**Sep 2020 – Aug 2025**

Department of Biomedical Engineering

The University of Alabama at Birmingham (UAB), Birmingham, AL, USA

- Developed and validated a series of novel image processing and deep learning methods to improve the accuracy, efficiency, and accessibility of amyloid PET quantification for Alzheimer's disease.
- Designed deep learning segmentation models for both MRI-assisted and MRI-less amyloid PET quantification, demonstrating quantitative equivalence to the conventional FreeSurfer standard and robust diagnostic performance across large-scale multi-site neuroimaging cohorts.
- Proposed a tracer characteristic-based co-registration method for simultaneous PET/MRI motion correction and contributed to the development of a novel PET biomarker for predicting MCI-to-AD progression, both leveraging domain-specific knowledge of tracer binding and brain anatomy to enhance PET quantification.
- Performed large-scale statistical analyses including Centiloid calibration, equivalence testing, ROC analysis, and bootstrap methods, and collaborated across nuclear medicine, radiology, neurology, and computer science in a multidisciplinary research environment.

## PUBLICATIONS

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**Deep learning MR-based segmentation approach for amyloid PET quantification**

**Mar 2026**

**Chiu SC, Lin YC, McConathy J, Lin SY, Fang YHD**

Developed and validated a MR-based deep learning segmentation model, the Label Extraction of Neuroimaging (LEON), for MR-assisted amyloid PET quantification, demonstrating superior diagnostic accuracy and statistical equivalence to the conventional FreeSurfer method in large-scale neuroimaging cohorts.

- In preparation for EJNMMI physics.

**Amyloid PET quantification with deep learning segmentation models without MRI**

**Mar 2026**

**Chiu SC, Lin YC, McConathy J, Lin SY, Fang YHD**

Developed and validated deep learning models for MRI-less amyloid PET quantification by leveraging synthetic CT data for training, achieving statistical equivalence to the MRI-based standard and demonstrating robust diagnostic performance on external PET/CT cohorts.

- EJNMMI physics. 2026 Mar 11; <https://doi.org/10.1186/s40658-026-00854-8>

**Motion correction of simultaneous brain PET/MR images based on tracer uptake characteristics** Jul 2025  
**Chiu SC, Perucho JA, Fang YHD**

Developed a novel tracer characteristic-based co-registration (TCBC) method that outperforms conventional approaches by reducing PET/MR misalignment, improving quantification accuracy, and enhancing the detectability of investigational task using PET quantification.

- EJNMMI physics. 2025 Jul 30;12(1):75. <https://doi.org/10.1186/s40658-025-00789-6>

**Prediction of MCI-to-AD progression with atrophy-weighted standard uptake value ratios of <sup>18</sup>F-Florbetapir PET** Mar 2023

Fang YHD, Perucho JA, **Chiu SC**, Lin YC, McConathy JE

Proposed and validated a novel PET quantitative parameter, the atrophy-weighted SUVR (awSUVR), combining <sup>18</sup>F-Florbetapir amyloid PET uptake with MR-measured hippocampal volume to predict MCI-to-AD progression, achieving over 90% accuracy across 3-, 5-, and 7-year prediction criteria in large ADNI cohorts and outperforming conventional SUVR-based approaches.

- medRxiv. 2023 Mar 14; <https://doi.org/10.1101/2023.03.09.23287059>

**POSTER PRESENTATION**

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**Society of Nuclear Medicine and Molecular Imaging** Jun 2024

- Chiu SC & Fang YH (2024). Evaluation of Deep Learning Models for Brain Parcellation in Neuroimaging of Alzheimer's Disease. [https://jnm.snmjournals.org/content/65/supplement\\_2/242449.abstract](https://jnm.snmjournals.org/content/65/supplement_2/242449.abstract)

**Society of Nuclear Medicine and Molecular Imaging** Jun 2023

- Chiu SC (2023). Correction for Involuntary Motion of Simultaneous PET/MR Brain Scans Based on the Regional Tracer Characteristics. [https://jnm.snmjournals.org/content/64/supplement\\_1/P1340.abstract](https://jnm.snmjournals.org/content/64/supplement_1/P1340.abstract)

**World Molecular Imaging Congress** Oct 2021

- Chiu SC (2021). Development of an Extension Framework to Enable Deep Learning-Based Image Processing and Analysis with Cloud Computing for Open-Source Imaging Software. <https://www.xcdsystem.com/wmis/program/QSb7b5D/index.cfm?pgid=2585&sid=23773&abid=84541>
- <https://github.com/IQMLatUAB/IQMLServer>

**TEAM PROJECT EXPERIENCE**

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**Face Mask Detection Based on Deep Learning and Transfer Learning** Feb 2021 - Apr 2021

- Created modified VGG model for face mask detection
- Used 4 different face detector to detect potential faces
- Calculated rates of face mask wearing in certain area
- <https://github.com/chocolatetoast-chiu/CS665-765-Deep-Learning>

**EmoSpace: A Mobile Game for Emotion Recognition Training in Children with Autism Spectrum Disorder** Oct 2018 - Dec 2019

- Customized characters to enhance emotion recognition abilities in children with ASD
- Used Applied Behavior Analysis to train children with ASD
- Created a demo APP using modeling software and Unity
- Awarded to the third place in RehabWeek 2019 Student Design Challenge, powered by RESNA

**TECHNICAL SKILLS**

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- Deep Learning: Python, TensorFlow, PyTorch
- Medical Imaging Processing: PET, MRI, Co-Registration, Segmentation, Quantification
- Medical Imaging Tools: MATLAB, 3D Slicer, SPM, FSL, FreeSurfer, MRICroGL