Mr. Hanyu Liu

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Education

University of Dundee（UoD） Scotland, UK

Bachelor of Engineering in Biomedical Engineering September, 2024 - July, 2025

Core Modules: *Thermodynamics* (98); *Software Applications in Biomedical Engineering Design* (98);

Northeastern University (NEU) Shenyang, China

Bachelor of Engineering in Biomedical Engineering September 2021 - July, 2025

Specialization: Intelligent Medicine

Core Modules: *Data Structure (98); General Knowledge of Artificial Intelligence (98); IoT of Healthy Body(98); C Language Programming (97); Principles of Database (Bilingual) (95); Operating System(95); C&C++ (95); Intelligent Medicine (94);*

GPA: 85/100

Publications

Zhi Q. W.[1], **Liu H. Y.[1]**, Zhao B. Y., Qi S., Ming Z. L., Ning F. Q., Yan M. K., Xin J. C.* (2024.4). *Multi-scale Context-aware networks based on fragment association for Human Activity Recognition.* **International Joint Conference on Artificial Intelligence (CCF A)**, Accepted now.

Liu H.Y.[1], Zhao B. Y.[1], Dai C. B., Sun B. X., Ang L., and Wang Z. Q.* (2023.11). *MAG-Res2Net: a novel deep learning network for human activity recognition*. **Physiological Measurement (Q2, IF 3.2)**, Volume 44, Page 11.

Liu H. Y.[1], Yan M. K., Shen Q., Zhao B. Y., Cao W. X., Xin J. C., and Wang Z. Q.***** (2024.5). *Redundant feature screening method for human activity recognition based on attention purification mechanism***.** Submitted to **Conference on Neural Information Processing Systems (CCF A),** Under review.

Yu Y.[1], Wang H. R., Wang J. W., Yan M. K., Han X. R., Wu D. C., Zhao X., **Liu H. Y.*** (2024.5). *Process optimization and deployment for Sensor-based human activity recognition based on deep learning*. IEEE Internet of Things Journal **(Q1, IF 10.6)** , Submitted now.

Research Experience

Clinical Diagnosis based on Deep Learning with Dr Chao Li

University of Cambridge, Faculty of Mathematics

April., 2024 - Present

Design the research methods, implement code, and write the thesis

- Responsible for developing the paper "Multi-task Learning of Histology and Molecular Markers for Classifying Diffuse Glioma" that won the *MICCAI2023 Best Paper Honorable Mention*;
- Based on the DeepMO-Glioma framework, a method is designed to disentangle effective features at different levels through the interaction of multi-level resolution WSI;
- Task interaction algorithms for histology and molecular markers in an optimization framework;
- Responsible for promoting cell segmentation tasks in large medical model projects.

Achievements:

- Plan to submit the research result to *IEEE Transactions on Medical Imaging* or *Medical Image Analysis*.
- Plan to submit the graduation research results to *MICCAI 2025*.

Intelligent chemical anomaly detection and fault diagnosis

Northeastern University Cooperative project with College of Information Science and Engineering

Nov., 2023 - Present

Design the research methods and implement code

- Lead the cooperative team to carry out preliminary exploration of this research field and formulate cooperation matters;
- A set of neural network methods are proposed to reduce complex noise and network redundant features, and the team is guided to complete corresponding experiments.

Achievements:

- Plan to contribute a research paper to SCI Q2 and above as the second author followed by the contribution of about three academic theses of the same level as a co-author.

Research on the Common Problems in Low-quality Mutimodel Physiological Signal Data Analysis by Spatial-temporal Correlative Fusion Nov., 2023 - Present

Worked on self-adaptive noise tolerance learning for low-quality multimodal physiological signals and took charge of method implementation and content drafting

- Collected human behaviour information on campus as a basis for building the HAR dataset;
- Learn to deploy HAR models via Raspberry Pi;
- Participated in the review tasks of related studies *(AAAI2024, TKDE, TII, EAAI, JNE, ERX, etc.)*;
- Completed about one third of the writing of the method section and the preliminary experiments of the project in the *NSFC 2024 general program* application.

Achievements:

- Completed a HAR private data collection task and sorted the data out as a dataset, named *NEU-HAR*, which has been in use in research;
- An embedded HAR system that can be deployed in real time was built, and the practical usability of the related SOTA model was extensively verified;
- Submitted a research paper to the top academic conference *NeurIPS2024* as the first author;
- Accomplished the application task in the *NSFC 2024 general program*.

Research on Human Activity Recognition based on Multi-scale Metric Learning of Neural Networks
(*National Undergraduate Training Programs for Innovation and Entrepreneurship*) Oct., 2022 - April., 2024

Implemented the project, wrote the thesis, and managed the team

- Proposed a set of comprehensive deep learning methods based on multi-scale and metric learning applicable for optimizing HAR process;
- Proposed a set of pre-processing methods for HAR data by exploring the essential features of the data to improve the model's ability to extract the correlation features among time-series fragments;
- Introduced the residual shrinkage method to construct a set of neural network methods for reducing complex noise caused by multi-sensor cooperation and the network redundancy features, and tested these methods on embedded devices.

Achievements:

- Contributed a research paper to the top academic conference IJCAI2024 with my supervisor as the co-first author and the thesis has been accepted;
- Published a research paper on *Physiological Measurement (Q2)* as the first author;
- Have applied for a patent of invention, which is accepted by Intellectual Property Administration;
- Have applied for a software copyright titled "*An Action Recognition System based on Multi-scale Neural Network*", which is accepted by the National Copyright Administration of China;
- Invited by *IEEE Transactions on Industrial Informatics* as a reviewer.
- The project has been rated as a national-level excellent project in the *National Undergraduate Training Programs for Innovation and Entrepreneurship*, ranking first in the major.

Contests and Awards

2023 National Undergraduate Biomedical Engineering Innovation Design Competition July., 2023
Project title: *Recognition of ST Segment Changes in Wearable Electrocardiograms*

- Implemented code, drafted the research report and did the final oral defense;
- Won Second Prize at national level.

2023 "JJ World" Chinese College Students' Computer Games Competition - The 17th Chinese Computer Games Championship Aug., 2023
Project Title: *Shao Guang Dot and Boxes*

- Implemented code, drafted the research report, and operated the program in field game;
- Won Second Prize at national level.

Scholarship

Third-class Scholarship of Northeastern University for the second semester of 2022-2023 Academic Year

Professional Skills

Computer Skills:
Proficient skills with Python, Tensorflow, Pytorch, Latex, C&C++, and JAVA