

# Mr. Xiaoyang Huang

Tel: +86 137 1867 1014 | Email: xiaoyanghuang@mail.ustc.edu.cn | Web: <https://xyh0118.github.io/>  
No. 96 Jinzhai Road, Hefei, Anhui, China (230026)

## OVERVIEW

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As a motivated, collaborative, and innovative engineering student, I have a strong passion for medical information processing and artificial intelligence. Throughout my undergraduate studies, I gained valuable experience in neurobiology, medical imaging, and machine learning. My achievements include publishing a scientific paper and winning awards in several competitions. During my master's studies, I focused on EEG signal noise reduction, authored three scientific papers, and submitted them for publication, with one already receiving a positive response.

## EDUCATION

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**University of Science and Technology of China (USTC)**, Hefei, China *Sep. 2022 — Present*  
Master of Engineering in Information and Communication Engineering GPA: 3.65/4.30  
**Scholarship:** First-Class Scholarship

**Hefei University of Technology (HFUT)**, Hefei, China *Sep. 2018 — Jul. 2022*  
Bachelor of Engineering in Biomedical Engineering GPA: 3.47/4.30  
**GPA Ranking:** 5/81

## RESEARCH EXPERIENCE

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**EEGDFus: A Conditional Diffusion Model for Fine-Grained EEG Denoising** *Feb. 2024 — Present*  
*Advisor: Prof. Xun Chen, Professor, Deputy Dean, School of Information Science and Technology, USTC*

**Major Contribution:**

- First application of the diffusion model to the field of EEG denoising, achieving high-precision EEG denoising.
- To adapt the diffusion model specifically for EEG denoising, this work developed a novel dual-branch structure based on a combination of CNN and Transformer, replacing the conventional denoising model used in traditional diffusion models.

**Achievement:**

- Submitted the manuscript as the first author to the IEEE Journal of Biomedical and Health Informatics (J-BHI). The first round of review received a major revision request with positive feedback, and the revised manuscript has been resubmitted.

**Unpaired EEG Denoising Via Contrastive Learning-Guided GAN** *Jul. 2023 — Jan. 2024*  
*Advisor: Prof. Xun Chen, Professor, Deputy Dean, School of Information Science and Technology, USTC*

**Major Contribution:**

- Proposed for the first time an unpaired EEG denoising algorithm, enabling deep models to eliminate reliance on simulated data, thereby enhancing performance in real-world EEG denoising tasks.
- Utilized contrastive learning to guide the Generative Adversarial Network (GAN), leading the model to generate more realistic noisy EEG signals.

**Achievement:**

- Submitted the manuscript as the first author to the IEEE Transactions on Neural Networks and Learning Systems (TNNLS). Currently under review.

**A Bidirectional Denoising Framework for Real EEG Signals based on the KAN** *Oct. 2022 — Jun. 2023*  
*Advisor: Prof. Xun Chen, Professor, Deputy Dean, School of Information Science and Technology, USTC*

**Major Contribution:**

- This work proposes a Transformer-guided CNN framework for EEG-based epilepsy prediction, aiming to leverage the complementary advantages of both CNN and Transformer models.
- This work introduces a new Transformer module consisting of a Local Information Layer, a Squeezed Multi-Head Self-Attention Layer, and a Residual Feed-Forward Network.

**Achievement:**

- Published this work as the first author in the journal Measurement.

**EEG-based Seizure Prediction via Transformer Guided CNN** *Feb. 2022 — Sep. 2022*  
*Advisor: Prof. Chang Li, Associate Professor, Department of Biomedical Engineering, HFUT*

**Major Contribution:**

- This work proposes a Transformer-guided CNN framework for EEG-based epilepsy prediction, aiming to leverage the complementary advantages of both CNN and Transformer models.

- This work introduces a new Transformer module consisting of a Local Information Layer, a Squeezed Multi-Head Self-Attention Layer, and a Residual Feed-Forward Network.

**Achievement:**

- Published this work as the first author in the journal *Measurement*.

**PROJECTS**

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**EEG Denoising Toolbox**

Developed in Python

*Project Design and Program Development*

- Developed in Python with a GUI interface, supporting multiple denoising Smodels and visualizing denoising results.
- Based on deep learning methods, supporting both GPU and CPU environments.
- For details of the toolbox, please refer to my personal homepage.

**An Automatic Diagnosis Application for COVID-19 Based on CT Images**

Developed in Python

*Project Design and Program Development*

- Developed in Python with a user-friendly GUI, it provides high identification accuracy, rapid inference speed, and substantial clinical application value.
- It achieved a test accuracy of up to 96% on public datasets and includes real-time analytics capabilities.
- For details of the toolbox, please refer to my personal homepage.

**Foreground Object Segmentation Algorithm for Non-Specific Categories**

Developed in Python

*Project Design and Program Development*

- Dual-layer Nested UNet Based on Attention Mechanism. Convolutional Block Attention Module (CBAM).
- Model Compression: Knowledge Distillation. Lightweight Deployment Based on Libtorch. (C++)
- For details of the toolbox, please refer to my personal homepage.

**A Single-Camera Pedestrian Tracking System Based on PaddlePaddle**

Developed in Python

*Project Design and Program Development*

- Explore the new deep learning framework, PaddlePaddle, to build and train deep models.
- Successfully completed the single-camera multi-target pedestrian detection task with high identification accuracy.
- For details of the toolbox, please refer to my personal homepage.

**PUBLICATIONS**

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- [1] C. Li, **X. Huang**, R. Song, R. Qian, X. Liu, X. Chen, “EEG-based seizure prediction via Transformer guided CNN.” *Measurement*, 2022, 203: 111948. Published.
- [2] **X. Huang**, C. Li, A. Liu, R. Qian, and X. Chen, “EEGDFus: A Conditional Diffusion Model for Fine-Grained EEG Denoising.” *IEEE Journal of Biomedical and Health Informatics*, Under the second round of review, 2024.
- [3] **X. Huang**, C. Li, A. Liu, R. Qian, and X. Chen, “Unpaired EEG Denoising Via Contrastive Learning-Guided Generative Adversarial Network.” *IEEE Transactions on Neural Networks and Learning Systems*, Under Review, 2024.
- [4] **X. Huang**, C. Li, A. Liu, R. Qian, and X. Chen, “EEGKDNet: A Novel Bidirectional Denoising Framework for Real EEG Signals based on the Kolmogorov-Arnold Network.” *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, Under Review, 2023.

**AWARDS & HONOURS**

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**China College Students Service Outsourcing Innovation and Entrepreneurship Competition**

Aug. 2021

- **Award:** National Third Prize
- **Award-winning work:** “Foreground Object Segmentation Algorithm for Non-Specific Categories”

**Anhui Provincial College Students Statistical Modeling Competition**

Dec. 2020

- **Award:** Provincial Second Prize
- **Award-winning work:** “EEG-Based Emotion Recognition Method Using Convolutional Recurrent Neural Networks with Attention Mechanism”

**SKILLS**

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- **Language Skills:** English (Fluent), Mandarin (Native)
- **Programming:** Python, MATLAB, Java, C++, HTML, CSS, JavaScript, LaTeX
- **Software:** Origin, AI, PS, PR
- **Hobby:** Hiking (multiple 100-kilometer hikes completed)