

# Guanghao Zhu

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## EDUCATION

### University of Electronic Science and Technology of China

Master of Electronic Information

GPA: 4.00/4.00 (Honored with a National Scholarship)

Chengdu, China

September 2022 – Present

Grade Ranking: 5/247

### University of Electronic Science and Technology of China

Bachelor of Optoelectronic Information Science and Engineering

GPA: 3.83/4.00

Chengdu, China

September 2018 – June 2022

## PREPRINTS & MANUSCRIPTS

- Title: AstMatch: Adversarial Self-training Consistency Framework for Semi-Supervised Medical Image Segmentation**  
**Authors:** G. Zhu, J. Zhang, J. Liu, X. Du, R. Hao, Y. Liu, L. Liu\*  
**Status:** Under review at *Neurocomputing*  
**arXiv:** arXiv: 2406.19649(<https://arxiv.org/abs/2406.19649>)  
**Highlights:**
  - We focus on high-level consistency regularization and pseudo-label quality.
  - Discriminator scores are used to reflect the quality of segmentation predictions.
  - AstMatch achieves the new SOTA performance on three publicly available datasets.
- Title: SKD-TSTSAN: Three-Stream Temporal-Shift Attention Network Based on Self-Knowledge Distillation for Micro-Expression Recognition**  
**Authors:** G. Zhu, L. Liu, Y. Hu, H. Sun, F. Liu, X. Du, R. Hao, J. Liu, Y. Liu, H. Deng, J. Zhang\*  
**Status:** Submitted to *Neural Networks*  
**arXiv:** arXiv:2406.17538(<https://arxiv.org/abs/2406.17538>)  
**Highlights:**
  - Temporal shift modules are used for temporal modeling without additional parameters.
  - We explore the effect of self-knowledge distillation on micro-expression recognition.
  - SKD-TSTSAN achieves the new SOTA performance on four public datasets.
- Title: UADSN: Uncertainty-Aware Dual-Stream Network for Facial Nerve Segmentation**  
**Authors:** G. Zhu, L. Liu, J. Zhang, X. Du, R. Hao, J. Liu\*  
**Status:** Submitted to *The IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*  
**arXiv:** arXiv:2407.00297(<https://arxiv.org/abs/2407.00297>)  
**Highlights:**
  - Predictions of 2D segmentation stream and 3D segmentation stream are used to identify uncertain regions.
  - Channel squeeze & spatial excitation modules are introduced into the skip connections of networks.
  - A cDice loss is introduced into the supervised loss to enable topology preservation.
- Title: CAP-rPPG: Channel Attention Pyramid Network for Remote Physiological Measurement**  
**Authors:** J. Zhang, H. Sun, Y. Hu, G. Zhu, F. Liu, B. Yan, J. Pu, X. Du\*, J. Liu, L. Liu, R. Hao, X. Wang, Y. Liu  
**Status:** Under review at *Scientific Reports*  
**Highlights:**
  - Gaussian pyramid enables the network to focus on macroscopic changes in skin color.
  - Our hybrid loss function considers both short-term and long-term characteristics of the signal.
- Title: Real-time Monitoring of Respiratory Rate, Apnea, and Breathing Intensity Utilizing a Refined Optical Flow Algorithm**  
**Authors:** J. Zhang, Y. Hu, H. Sun, G. Zhu, B. Yan, Y. Xin, F. Liu, J. Pu, R. Hao, J. Liu, L. Liu, Y. Liu, X. Du\*  
**Status:** Submitted to *IEEE Transactions on Instrumentation and Measurement*  
**Highlights:**
  - An attenuation mechanism is proposed to address the cumulative error issue and segmentation issue.
  - An adaptive apnea threshold based on the varying respiratory intensities is designed to detect apnea events.
  - Our method achieves an RMSE of 0.15 and a MAE of 0.1 for respiratory rate monitoring in 12 scenarios.

## RESEARCH PROJECTS & RESEARCH EXPERIENCES

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- **MOEMIL Lab | Non-Contact Physical and Mental Health Monitoring System** June 2023 – Present  
**Project Introduction:** This project has been selected for the “Wise Eye Action” in 2022, aiming to achieve non-contact monitoring of physiological parameters such as heart rate, blood pressure, and micro-expressions. I am responsible for research on micro-expression algorithms and C++ interface development.
  - Use MediaPipe to detect faces and facial key points and use SOFTNet for micro-expression spotting.
  - Design a three-stream temporal-shift attention network based on self-knowledge distillation (SKD-TSTSAN) for emotion classification of predicted micro-expression sequences.
  - Use C++ to implement pre-processing, model inference, and post-processing operations for all physiological parameter monitoring modules.
- **MOEMIL Lab | Non-Contact Sleep Quality Intelligent Monitoring System** June 2023 – Present  
**Project Introduction:** The system extracts five physiological parameters from patient sleep video data, including heart rate, respiratory rate, and sleep posture. I am responsible for data collection and the development of sleep posture recognition method.
  - Collect images of ten different sleep postures with and without cover, and annotate 18 key points in each image, such as left shoulder, right hip, etc.
  - YOLOv8s is trained to detect the key points. Rules are then formulated based on their positions to determine sleep posture, achieving an accuracy of 97.75% on the validation set.
  - Using the sleep posture recognition method, the roll-over movements can be detected from sleep videos to assist in the judgment of sleep quality.
- **MOEMIL Lab | Vessel Counting System Based on YOLOv7 and DeepSORT** December 2022 – April 2023  
**Project Introduction:** This project involves installing cameras along the Yangtze River to collect video data, as well as detecting, tracking, and counting vessels.
  - Annotate vessels in the images to build a vessel detection dataset, and use YOLOv7-E6E for vessel detection.
  - Use the DeepSORT method to track vessels, and add vessels that cross the centerline by 40% to the database.
  - Rewrite vessel detection, tracking, and counting in a C++ environment to facilitate cross-platform portability.

## SELECTED AWARDS & HONORS

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- **National Scholarship** for Postgraduates 2023
- Won the title of “**Excellent Graduate Student**” 2023
- **First Class Academic Scholarship** for Postgraduates 2022 & 2023
- **Third Prize of Southwest Division** in the BOE Campus Innovation Challenge 2023 2023
- **Second Prize** in the 18th “Challenge Cup” Academic Science and Technology Competition, Inter-School Championship 2023
- **Second Prize** in the 6th Sichuan Province College Student Optoelectronic Design Competition 2022
- **First Place** in the 2022 Graduate Entrance Examination 2022
- **Outstanding Student Second Class Scholarship** 2021

## PATENTS

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- L. Liu, **G. Zhu**, H. Zhang, J. Zhang, J. Li, R. Hao, X. Wang, X. Du, J. Liu, J. Zhang, Y. Liu. A Method for Tank and Armored Vehicle Traffic Detection Based on Object Detection Model and DeepSort, CN202310041041.4, filed January 13, 2023.

## SKILLS

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- Familiar with Python, understand C/C++, familiar with OpenCV, Numpy and other image processing libraries.
- Experience in deep learning, proficient in PyTorch and TensorFlow deep learning frameworks.
- Familiar with common Git commands, familiar with ITK-SNAP and 3D Slicer software.

## ENGLISH PROFICIENCY

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- CET-6 (502)
- Good English literature reading and writing skills.