

# HONGHAO LIU

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## Education

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- Hong Kong University of Science and Technology** **Sep. 2020 – Sep. 2022**  
*Master of Philosophy in Data Science and Analytics GPA: 3.656/4* *Hong Kong*
- Wuhan University of Technology** **Sep. 2016 – Jun. 2020**  
*Bachelor of Engineering in Computer Science GPA: 88.6/100* *Wuhan, Hubei*

## Research Experience

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- Speech and Text Reconstruction from Neural Activity** **Feb. 2023 - present**  
*Research Assistant, The City University of Hong Kong* *Hong Kong*

- Collected the electroencephalography (EEG) data from 51 native Mandarin speakers with extended high-frequency hearing loss and 51 controls.
- Designed EEG masked autoencoder for neural encoder pretraining, Fine-tuning the encoders by contrastive learning to get multimodal latent embeddings containing extract features of neural and auditory data.
- Designed downstream tasks based on the extracted feature for the text and speech reconstruction with generative models.

- Reading Comprehension in Functional Neuroimaging** **Feb. 2023 - present**  
*Research Assistant, The City University of Hong Kong* *Hong Kong*

- Collecting the fMRI and eye movement data using the 3T MRI and the Eyelink eyetracker as MRI secondary user, designed and implemented the reading comprehension stimuli by psychopy.

- Efficient Radio Interferometric Imaging on the GPU** **Oct. 2020 – Sep. 2022**  
*Hong Kong University of Science and Technology* *Hong Kong*

- Implemented and designed the non-uniform Fourier transform (NUFFT) which is one of the methods of wide field imaging algorithm in CUDA, parallelized the gridding and degridding which transform information between spatial domain and temporal domain on GPU, and provided python interfaces.
- Optimized the convolution/spreading procedure by removing the locks, increasing the cache hit and speeding up kernel/mask function evaluation by Taylor series approximation.
- Accelerated the NUFFT 2-6 times compared to the fastest parallel algorithms -finufft/cufinufft and speeded 2-5 times up than the interferometric imaging algorithm - W-gridder/ducc.

- Nameplate Detection and Text Recognition** **Jul. 2019 – Aug. 2020**  
*Shenzhen Institute of Technology, Chinese Academy of Sciences* *Shenzhen, Guangdong*

- Established nameplate dataset by collecting nameplates provided by China Southern Power Grid Company Limited and annotated words and text regions with rectangle bounding boxes in the nameplate images.
- Tested the performance regarding the accuracy of the text region detection and word extraction, designed a metric for overall performance and analyzed the reasons for error outputs.
- Provided a friendly human-computer interface service for the power grid company.

## Work Experience

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- Accelerating Perception Algorithm for Vehicles** **Jul. 2022 – Sep. 2022**  
*Software Engineer, DJI* *Shenzhen, Guangdong*

- Implemented the perception algorithms for aerial vehicles and utility functions on the GPUs using CUDA C and refactored the code.

## Publications

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- **H. Liu, Q. Luo and F. Wang, *Efficient Radio Interferometric Imaging on the GPU*, 2022 IEEE 18th International Conference on e-Science, Salt Lake City, UT, USA, 2022, pp. 95-104, doi: 10.1109/eScience55777.2022.00024.**

## Awards & Prizes

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- Hong Kong University of Science and Technology Scholarship
- Wuhan University of Technology Scholarship
- Wuhan University of Technology Merit Student Award

## Course Project

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### Privacy Preserving Donation Chain Based on Ethereum Sep. 2021 – Jan. 2022

- Analyzed current necessities of decentralized donation procedure and implemented the smart contract by solidity.
- Implementing the Ethereum private network and adopting the clique consensus protocol for creating new blocks.
- Preserving information of detonators by the homomorphic encryption algorithm in the private network.

### Spectral Clustering Algorithms Reimplementation and Analysis Sep. 2020 – Dec. 2020

- Re-implemented Ultra-Scalable Spectral Clustering and Scalable Spectral Clustering Using Random Binning Features with a different programming language - python.
- Compared the execution time with the original implementation based on five real world datasets and five synthetic datasets, and compared those two methods with the basic K-means clustering regarding time consumption and memory footprint based on 5 real world datasets.
- Visualized the experiment results with two different methods - principal component analysis and heat map.

## Coursework

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- Parallel Programming (Teaching assistant)
- Advanced Algorithmic Techniques
- Computational Neuroscience (Summer school)
- Machine Learning

## Additional Information

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**Skills:** python, CUDA C, C++, MPI, L<sup>A</sup>T<sub>E</sub>X, Git, solidity

**Interests:** Alternative rock music and volunteering (homeless dogs caring)

**Language:** Mandarin (native), English (good)