

# Shuyue Jia (Bruce)

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## CONTACT INFORMATION

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**Special Notice:** **United States F-1 CPT Available** & Hong Kong Resident with the IANG Working VISA

## RESEARCH STATEMENT

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I am a Ph.D. candidate working on

- **Multimodal Foundation Models**, *e.g.*, Large Vision-Language Models (VLMs), for Medical Applications
- **Visual and Language Multimodal Learning**
- **Large Language Models (LLMs)** for Medical Applications
- **Retrieval-Augmented Generation (RAG)**
- **Tool Using (Function Calling)** and **Automate Workflows**
- **Generative AI**, *e.g.*, Diffusion Probabilistic Models

My ultimate goal is to **develop safe, reliable, and extensible Artificial General Intelligence (AGI) systems** that can improve human lives. As part of my research, I actively develop open-source software, toolkits, and machine learning libraries. I am also interested in creating new benchmark databases to further advance the field. Source codes of all my works will be shared on 🐙 GitHub, the trained models and datasets will be released on 🤗 Hugging Face, and some of my applied research on Vision and Language will be developed as 🛠️ **products**.

## ACADEMIC APPOINTMENTS

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<b>Boston University</b> , MA, USA	<b>Research Assistant</b>	May 2024 - Present
<ul style="list-style-type: none"><li>• Supervisor: Prof. Vijaya B. Kolachalama</li><li>• Projects: Multimodal Learning, Foundation Models, Generative AI, and Medical Imaging with AI</li></ul>		
<b>City University of Hong Kong</b> , Hong Kong	<b>Research Assistant</b>	Sept 2021 - Apr 2023
<ul style="list-style-type: none"><li>• Supervisor: Prof. Shiqi Wang</li><li>• Projects: Image Quality Assessment (IQA) and Perceptual Optimization</li></ul>		

## EDUCATION

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<b>Boston University</b> , Boston, MA, USA	Sept 2023 - May 2028 (expected)
<ul style="list-style-type: none"><li>• Ph.D. Candidate in Computer Engineering, Department of Electrical and Computer Engineering</li><li>• Supervisor: Prof. Vijaya B. Kolachalama</li><li>• Expertise: Foundation Models, Generative Models, Vision and Language Multimodal Learning, Medical Imaging</li></ul>	
<b>City University of Hong Kong</b> , Hong Kong	May 2021 - June 2023
<ul style="list-style-type: none"><li>• M.Phil. in Computer Science, Department of Computer Science</li><li>• Supervisor: Prof. Shiqi Wang</li><li>• Expertise: Image Quality Assessment, Perceptual Optimization, and Deep Learning</li><li>• Thesis: No-reference Image Quality Assessment via Non-local Modeling</li></ul>	

- Visiting Student, Department of Computer Science
- Selected coursework: Computer Systems and Architecture (A+), University Writing and Communication (PASS)

## PEER-REVIEWED PUBLICATIONS

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### Journal Publications

- PodGPT: An Audio-augmented Large Language Model for Research and Education  
**Shuyue Jia**, Subhrangshu Bit, Edward Searls, Meagan Lauber, Lindsey Claus, Pengrui Fan, Varuna Jasodanand, Divya Veerapaneni, William Wang, Rhoda Au, Vijaya B. Kolachalama \*  Product  Paper  
 Source Codes:  PodGPT Library  PodRAG Pipeline
- MedPodGPT: A Multilingual Audio-augmented Large Language Model for Medical Research and Education  
**Shuyue Jia**, Subhrangshu Bit, Edward Searls, Lindsey Claus, Pengrui Fan, Varuna Jasodanand, Meagan Lauber, Divya Veerapaneni, William Wang, Rhoda Au, Vijaya B. Kolachalama \*  Product  Paper  Codes
- MedSyn: Text-guided Anatomy-aware Synthesis of High-Fidelity 3D CT Images  Paper  Codes  
 Yanwu Xu, Li Sun, Wei Peng, **Shuyue Jia**, Katelyn Morrison, Shyam Visweswaran, Motahhare Eslami, Kayhan Batmanghelich \*  
*IEEE Transactions on Medical Imaging (IEEE T-MI, IF in 2024: 8.9)*
- GCNs-Net: A Graph Convolutional Neural Network Approach for Decoding Time-resolved EEG Motor Imagery Signals  Paper  Codes  Slides  Survey  
**Shuyue Jia**, Yimin Hou, Xiangmin Lun, Ziqian Hao, Yan Shi, Yang Li, Rui Zeng, Jinglei Lv \*  
*IEEE Transactions on Neural Networks and Learning Systems (IEEE T-NNLS)*  
*IF in 2022: 14.255, Top 0.1% most cited articles published in Engineering in 2022*  
 GitHub Repo obtained **900+ stars and 200+ forks**
- Deep Feature Mining via Attention-based BiLSTM-GCN for Human Motor Imagery Recognition  
**Shuyue Jia** \*, Yimin Hou, Xiangmin Lun, Shu Zhang, Tao Chen, Fang Wang, Jinglei Lv  Paper  Codes  Slides  
*Frontiers in Bioengineering and Biotechnology*  
*IF in 2021: 6.064, Top 1% most cited articles published in Engineering in 2022*
- A Novel Approach of Decoding EEG Four-Class Motor Imagery Tasks via Scout ESI and CNN  Paper  Codes  
 Yimin Hou, Lu Zhou \*, **Shuyue Jia**, Xiangmin Lun  
*Journal of Neural Engineering*  
*IF in 2020: 5.379, Top 1% most cited articles published in Engineering in 2020*  
 GitHub Repo obtained **200+ stars and 40+ forks**
- PMU Measurements based Short-term Voltage Stability Assessment of Power Systems via Deep Transfer Learning  Paper  
 Yang Li \*, Shitu Zhang, Yuanzheng Li, Jiting Cao, **Shuyue Jia**  
*IEEE Transactions on Instrumentation and Measurement (IEEE T-IM)*  
*IF in 2023: 5.6, Top 1% most cited articles published in Engineering in 2023*

- Learning from Mixed Datasets: A Monotonic Image Quality Assessment Model [📄 Paper] [🔗 Codes]  
Zhaopeng Feng, Keyang Zhang, **Shuyue Jia**, Baoliang Chen, Shiqi Wang \*  
*IET Electronics Letters*  
**Top 10% most cited articles published in Engineering in 2023**
- Improving Performance: A Collaborative Strategy for the Multi-data Fusion of Electronic Nose and Hyperspectral to Track the Quality Difference of Rice [📄 Paper]  
Yan Shi, Hangcheng Yuan, Chenao Xiong, **Shuyue Jia**, Jingjing Liu, Hong Men \*  
*Sensors & Actuators: B. Chemical*  
**IF in 2021: 9.221, Top 10% most cited articles published in Engineering**

## Conference and Workshop Publications

- No-reference Image Quality Assessment via Non-local Dependency Modeling [📄 Paper] [🔗 Codes] [📄 Slides] [📄 Poster]  
**Shuyue Jia**, Baoliang Chen, Dingquan Li, Shiqi Wang \*  
*IEEE 24<sup>th</sup> International Workshop on Multimedia Signal Processing (IEEE MMSP'22)* (**Poster Presentation**)

## Thesis

- No-reference Image Quality Assessment via Non-local Modeling [📄 Permanent Link] [📄 Defense Slides]  
**Shuyue Jia**  
M.Phil. Thesis, City University of Hong Kong, May 2023.
- Brain-computer Interface Signals Classification and Its Applications based on Deep Learning Methods  
**Outstanding Thesis Award** [📄 Related Publication] [📄 Defense Slides]  
**Shuyue Jia**  
B.Eng. Thesis, Northeast Electric Power University, May 2020.

## Note:

1. 📄 Google Scholar Profile
2. \* denotes the Corresponding Author

## RESEARCH EXPERIENCE

### Continual Pre-training of Large Language Models via Podcast Audio Apr - Jul 2024

Mentor: Prof. Vijaya B. Kolachalama, Boston University

- Motivated by improving health outcomes for the most vulnerable and addressing inequalities in access to Science, Technology, Engineering, Mathematics, and Medicine (STEMM) research and educational resources.
- Developed a computational framework designed to enhance **Large Language Models (LLMs)** leveraging the informational content of publicly accessible medical podcast data. [📦 Product] [📄 Paper] [🔗 Codes]
- Introduced and maintained 🔄 **PodRAG**, a **Retrieval-Augmented Generation (RAG)** pipeline featuring retrieval and reranking using PubMed Central and *The New England Journal of Medicine* (NEJM) articles, designed to reduce hallucinations and provide grounding through fact-checking.
- Created and maintained 🔄 **GitHub Library PodGPT**, a whole pipeline that consists of **Continual Pre-training, Low-Rank Adaptation (LoRA) for Efficient Fine-Tuning, Benchmarking, and Real-world Deployment**.
- Collected and processed Creative Commons Attribution (CC BY) licensed and NEJM podcasts **from scratch**.

## Non-local Modeling for Image Quality Assessment

May 2021 - Feb 2023

Mentor: Prof. Shiqi Wang, City University of Hong Kong

- Built a **Superpixel-based Graph Neural Network** model to explore the non-local interactions in quality prediction. [📄 Paper] [🔗 Codes]
- Presented the definitions of **Global Distortions** and **Local Distortions** for IQA. [📄 Thesis] [📄 Slides]

## Graph Representation Learning for EEG-based BCI Classification

Oct 2018 - Feb 2020

Mentor: Prof. Yimin Hou, Northeast Electric Power University and Prof. Jinglei Lv, The University of Sydney

- Implemented a **Convolutional Neural Network** architecture for Morlet wavelet joint time-frequency analysis of EEG time series. [📄 Paper] [🔗 Codes] (**obtained 200+ stars and 40+ forks**)
- Introduced **Graph Modeling** and **Graph Representation Learning** to decode raw EEG signals by cooperating with the functional topological relationship of electrodes. [📄 Paper] [🔗 Codes]
- Proposed a remarkably accurate and responsive recognition framework via **Bidirectional Long short-term Memory (BiLSTM)** with the **Attention Mechanism** and **Graph Neural Networks**. [📄 Paper] [🔗 Codes]
- Created and maintained 🏠 GitHub Library **EEG-DL** (**obtained 900+ stars and 200+ forks**), a Deep Learning library written by TensorFlow for EEG tasks classification.

## Statistical Measures for Sonar Image Segmentation

June - Sept 2018

Mentor: Prof. Shengxi Jiao, Northeast Electric Power University

- Engineered a framework to enhance the contrast between the ship and the reverberation area, which consists of **Image Filtering** by discrete cosine transform (DCT) → **Edge Detection** by the Roberts cross operator → **Object Localization** by thresholding 1D histogram → **Morphological Local Enhancement** by an expansion operator.
- Significantly improved the segmentation accuracy (86%) compared with that without the pre-processed stage (80%).
- A patent is issued based on the project and 🏠 Codes.

## INDUSTRY EXPERIENCE

Philips Research, Shanghai, China

Natural Language Processing Intern

Jul - Oct 2020

Mentor: Dr. Shuang Zhou, Precision Diagnosis & Image Guided Therapy (PD&IGT) Department.

- **Medical Concept Mapping**: three levels to map a query to the standard term → **Byte-pair Encoding** and **FMM & BMM Algorithms** for sub-words generation and matching (syntax-level), **Word2vec Cosine Similarity** (semantics-level), and **Knowledge Graph** (pragmatics-level).
- **Medical Named Entity Recognition**: compared the performances of different models → CRF++, Character-level BiLSTM + CRF, Character-level BiLSTM + Word-level BiLSTM / CNNs + CRF, and deployed the models using Python Flask and Docker as a web app.
- **Dynamic Webs Crawling**: crawled 620K pages from the NSTL library via Python threading.



## OPEN-SOURCE PROJECTS

**Software** - PodGPT [🏠 Product] [📄 Paper] [🔗 Codes]


- An online platform for deploying our latest multimodal foundation models for medical and clinical applications.
- The success of the PodGPT project is a result of **collaborative teamwork** by a group of members of the Kolachalama Laboratory. The PodGPT Library is maintained by the Kolachalama Laboratory at Boston University.

**Library** - PodGPT Library [📄 Paper] [🔗 Codes]

- A library for benchmarking multilingual medical Large Language Models (LLMs).

**Library** - **EEG Deep Learning Library** (**900+ stars and 200+ forks**) [ Paper] [ Codes]


- A Deep Learning (DL) library written by TensorFlow for EEG tasks (signals) classification.

**Toolkit** - **PromptCraft** [ Codes] [PyPI Package]

- A prompt perturbation toolkit from the character, word, and sentence levels for prompt robustness analysis.

**Paper Survey** - **Awesome LLM Self-Consistency** [ Repo]

- A curated list of self-consistency in Large Language Models (LLMs).

**Paper Survey** - **Awesome Mixture of Experts (MoE)** [ Repo]

- A curated list of Mixture of Experts (MoE) and Mixture of Multimodal Experts (MoME).

**Paper Survey** - **Awesome Large Vision-Language Model** [ Repo]

- A curated list of Large Vision-Language Models (VLMs).



## AWARDS AND SERVICES

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### Fellowships and Scholarships

Doctoral Research Fellowship, Boston University	2024 - 2028
Distinguished Computer Engineering Fellowship, Boston University	2023 - 2024
Research Assistantship, City University of Hong Kong	2021 - 2023
Innovation Scholarship, Northeast Electric Power University	2017 - 2019
Excellent Student Scholarship, Northeast Electric Power University	2016 - 2020

### Mathematics and Physics Competition Awards

2019 Interdisciplinary Contest In Modeling, USA	<i>Honorable Mention Award</i>	[  Thesis (English)] Apr 2019
2018 Mathematical Contest In Modeling, China	<i>First Prize</i>	[  Thesis (Chinese)] Aug 2018
The 32 <sup>nd</sup> Chinese Physics Olympiad (CPhO), China	<i>Third Prize</i>	Oct 2015
2015 National High School Math League, China	<i>Second Prize</i>	Sept 2015

### Sports Competition Awards

CityU Top 5 Runner, City University of Hong Kong	<i>The 1<sup>st</sup> Place</i>	Oct 2021
Outstanding Athlete, Northeast Electric Power University		May 2017
3000-meter Steeplechase, The 45 <sup>th</sup> NEEPU Games	<i>The 7<sup>th</sup> Place</i>	May 2017

### Academic Services

Speaker Program Chair (Keynotes & Panel Sessions),	
2025 IEEE International Conference on AI and Data Analytics (ICAD), Boston	2025
Local Conference Committee Members, IEEE Boston Section, Boston	2024

### Invited Reviewer

**Conducted over 100 technical paper reviews for top-tier IEEE journals and conferences, contributing to the advancement of research and maintaining high publication standards.**

IEEE Transactions on Multimedia (T-MM)

IEEE Transactions on Circuits and Systems for Video Technology (T-CSVT)


IEEE Transactions on Neural Networks and Learning Systems (T-NNLS)

IEEE Transactions on Medical Imaging (IEEE T-MI)  
 IEEE Transactions on Industrial Informatics (T-II)  
 IEEE Journal of Biomedical and Health Informatics (JBHI)  
 IEEE Journal of Selected Topics in Signal Processing (IEEE J-STSP)  
 IEEE Open Journal of the Industrial Electronics Society (OJ-IES)  
 IEEE Open Journal of the Computer Society (OJ-CS)  
 IEEE MultiMedia (MM)  
 IEEE Sensors Journal  
 Journal of Medical Internet Research  
 The International Conference on Learning Representations (ICLR) 2025

## Membership

Institute of Electrical and Electronics Engineers (IEEE)	Since 2019
Association for Computing Machinery (ACM)	Since 2019
Association for the Advancement of Artificial Intelligence (AAAI)	Since 2022
Association for Computational Linguistics (ACL)	Since 2023
American Medical Informatics Association (AMIA)	Since 2024

## INVITED TALKS

1. <i>AI In the 2020s And Beyond</i>	 Presentation] Sept 2023
Invited Talk at The Construction of the Management Disciplines (CoME), Tianjin University	

## CONFERENCE PLANNING AND PREPARATION

The 1 <sup>st</sup> IEEE International Conference on AI and Data Analytics (ICAD), Boston	<b>Organizer</b>	2024 - 2025
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## CONFERENCE AND WORKSHOP ATTENDANCE

Grant Writing Workshop with Dr. Betty Lai, Boston University	<b><i>In-person Attendance</i></b>	May 2024
IEEE 24 <sup>th</sup> International Workshop on Multimedia Signal Processing	<b><i>Poster Presentation</i></b>	Sept 2022

## ENTREPRENEURSHIP ENGAGEMENT

IEEE Global Tech Forum on AI, Microsoft Research New England	<b><i>In-person Attendance</i></b>	Nov 2024
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## PROFESSIONAL SKILLS

**Coding:** Python, MATLAB, R, C/C++, HTML, CSS

**Library:** TensorFlow, PyTorch, Scikit-learn, Hugging Face (Transformers, PEFT, Datasets, etc.), vLLM

**Tools:** Git, SVN, Unix Shell, Vim, Markdown, L<sup>A</sup>T<sub>E</sub>X, Docker, K8s

**Hardware:** NVIDIA Jetson Nano (Ubuntu), Raspberry Pi (Raspbian OS), 80C52 Microcontroller (Embedded C)

**Photography:** Bruce JIA Photography, Boston - Hong Kong - Beijing