Shuyue Jia (Bruce)

✉ brucejia@bu.edu ☎ +1 (617)-685-1479 ⚙ GitHub 🤗 Hugging Face 🎓 Google Scholar 🏛 Personal Homepage

RESEARCH STATEMENT

I am an AI researcher with production engineering experience, focusing on both fundamental and applied artificial intelligence. Please visit my Google Scholar profile to explore our team's recent publications.

- **Image/Video Processing, Understanding, and Quality Assessment**
- **Multimodal Foundation Model (FM) & Large Vision-language Model (LVLM)**
- **Large Language Model (LLM)**
- **LLM-based Agent**, **Vision-language Agent (VLA)**, **Multi-agent System (MAS)**
- **Diffusion Probabilistic Model**
- **Retrieval-augmented Generation (RAG)** and **Cross-modal Retrieval**
- **Knowledge Graph** and **Information Retrieval**

I am dedicated to advancing frontier and fundamental AI technologies that effectively and efficiently address real-world challenges. My ultimate goal is to **develop safe, reliable, and extensible Artificial General Intelligence (AGI) systems for Medicine** that **bring value to our society**. As part of my research, I actively contribute to open-source software, develop advanced machine learning toolkits, and create benchmark datasets to drive progress in the field. All source codes from my work will be openly shared on ⚙ GitHub (**with >2K stars**), trained models and datasets will be available on 🤗 Hugging Face, and applied research in Vision and Language will be developed into ♟ **products**. Additionally, I have hands-on experience in **large-scale AI deployment**, **distributed GPU training**, and **million-scale data processing**. **I am dedicated, hardworking, and always striving for excellence.**

AWARDS AND SERVICES

2025 IEEE Boston Section Arthur Winston Student Award, IEEE Boston Section	2025
Wiley Top Cited Article 2023-2024, Wiley Top Cited Papers, WILEY	2025
Doctoral Research Fellowship, Boston University	2024 - 2028
Graduate Fellow, Dept. of ECE, Boston University	2025 - 2026
Doctoral Research Fellow, Dept. of ECE, Boston University	2024 - 2025
Distinguished Computer Engineering Fellowship, Dept. of ECE, 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
2019 Interdisciplinary Contest In Modeling, USA *Honorable Mention*	Apr 2019
2018 Mathematical Contest In Modeling, Jilin, China *First Prize*	Aug 2018
The 32nd Chinese Physics Olympiad (CPhO), China *Third Prize*	Oct 2015
2015 National High School Math League, China *Second Prize*	Sept 2015

Chair, IEEE Boston Section Circuits and Systems (CAS) Society, Boston, MA	2026 - Present
Speaker Program Chair, 2026 IEEE International Conference on AI and Data Analytics (ICAD), Boston, MA	2026
Technical Track Chair, 2025 IEEE MIT Undergraduate Research Technology Conference (URTC), Cambridge, MA	2025
Speaker Program Chair, 2025 IEEE International Conference on AI and Data Analytics (ICAD), Boston, MA	2025
Scientific Program Committee Member, 2025 AMIA Clinical Informatics Conference, Anaheim, CA	2025
Local Conference Committee Member, IEEE Boston Section, Boston, MA	2024 - Present

Academic Appointments

Boston University, MA, USA   **Research Assistant**   May 2024 - Present

- Supervisor: Prof. Vijaya B. Kolachalama
- Projects: AI Grounding, Multimodal Foundation Model, Medical Imaging with AI, and Large Language Model

City University of Hong Kong, Hong Kong, China   **Research Assistant**   Sept 2021 - Apr 2023

- Supervisor: Prof. Shiqi Wang
- Projects: Image Quality Assessment (IQA) and Perceptual Optimization

Education

Boston University, Boston, MA, USA   Sept 2023 - May 2028 (expected)

- Ph.D. Candidate in Computer Engineering, Department of Electrical and Computer Engineering
- **Supervisor**: Prof. Vijaya B. Kolachalama
- **Expertise**: Foundation Model, Generative Model, Vision and Language Multimodal Learning, Medical Imaging

City University of Hong Kong, Hong Kong SAR, China   May 2021 - June 2023

- M.Phil. in Computer Science, Department of Computer Science
- **Supervisor**: Prof. Shiqi Wang
- **Expertise**: Image Quality Assessment, Perceptual Optimization, and Deep Learning
- **Thesis**: No-reference Image Quality Assessment via Non-local Modeling

Northeast Electric Power University, Jilin, Jilin, China   Sept 2016 - June 2020

- B.Eng. in Intelligence Science and Technology, School of Automation Engineering
- **Supervisor**: Prof. Yimin Hou
- **Thesis**: Brain-computer Interface Signals Classification and Its Applications based on Deep Learning Methods

University of California, Irvine, Irvine, CA, USA   Jul - Sept 2017

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

Peer-reviewed Publications

Our LLM-based Agent, Vision-language Agent, and Multi-agent System Work

Expertise: Multimodal Models, Large Vision-language Models (LVLM), Agentic Framework, Multi-agent Systems (MAS), Tool Using (Functional Call), and Automatic Workflow.

- Agentic Memory-augmented Retrieval and Evidence Grounding for Medical Question-Answering Tasks [📄 Paper]
  Shuyue Jia, Subhrangshu Bit, Varuna Jasodanand, Yi Liu, Vijaya B. Kolachalama *
  Under review

- DocAgent: An Agentic Framework for Multi-Modal Long-Context Document Understanding [📄 Paper] [⌘ **Codes**]
  Li Sun, Liu He, **Shuyue Jia**, Yangfan He, Chenyu You *
  The 2025 Conference on Empirical Methods in Natural Language Processing (EMNLP 2025 Main Conference)

Our Generative AI, Language Model, and Vision-language Foundation Model Work

Expertise: Generative Models, Large Language Models (LLMs), Continual Pre-training, Instruction Tuning (Supervised Fine-tuning), Reinforcement Learning from Human Feedback (RLHF), Reinforcement Learning on Chain-of-Thought (CoT) Reasoning, and Retrieval-augmented Generation (Retrieval, Reranking, and Generation).

- 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**]
  Nature npj Biomedical Innovations

- 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**)*

Our Computer Vision Work

Expertise: Image Quality Assessment (IQA) and general Image and Video Processing, including but not limited to image enhancement (super-resolution, denoising, deblurring), and image segmentation.

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

- 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
  Awarded Wiley Top Cited Article 2023-2024

Our Brain-computer Interface Work

Expertise: EEG Signal Processing and general time-series signal processing.

- 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 **1K+ 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**

Our Intelligent Technology Work

- 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

- 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

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. ᵍ Google Scholar Profile
2. * denotes the Corresponding Author

RESEARCH EXPERIENCE

Continual Pre-training of Large Language Models via Podcast Audio   2024 - 2025

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**.
- April 2025 Update: We extended this work to a unified, open-source LLM-based agentic system, integrating document retrieval, re-ranking, evidence grounding, and diagnosis generation to support dynamic, multi-step medical reasoning. [▉ Paper]

Non-local Modeling for Image Quality Assessment
2021 - 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
2018 - 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 1K+ stars and 200+ forks**), a Deep Learning library written by TensorFlow for EEG tasks classification.

Statistical Measures for Sonar Image Segmentation
2018 - 2019

Mentor: Prof. Shengxi Jiao, Northeast Electric Power University

- Engineered a framework to enhance the contract 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.

Teaching Appointments

EC327: Introduction to Software Engineering, Boston University, MA, USA   Spring 2025

- Introduction: This course aims to introduce students to software design, object-oriented programming techniques, elementary data structures and algorithmic analysis, and software engineering principles.
- Responsibility: Prepared lab session materials, led lab sessions for students, and designed homework assignments with automated grading.

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** (**1K+ 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.
- Usage: `pip install promptcraft`

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).

Invited Reviewer

Conducted over 150 technical and multidisciplinary paper reviews for top-tier journals and computer science conferences, contributing to the advancement of research and maintaining high publication standards.

IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)

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 (T-MI)

IEEE Transactions on Industrial Informatics (T-II)

IEEE Transactions on Biomedical Engineering (T-BME)

IEEE Transactions on Human-Machine Systems (T-HMS)

IEEE Transactions on Affective Computing (T-AFFC)

IEEE Transactions on Cognitive and Developmental Systems (T-CDS)

IEEE Transactions on Emerging Topics in Computational Intelligence (T-ETCI)

IEEE Journal of Biomedical and Health Informatics (J-BHI)

IEEE Journal of Selected Topics in Signal Processing (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

Computer Vision and Image Understanding (CVIU)

Journal of Medical Internet Research (JMIR)

The International Conference on Learning Representations (ICLR) 2025, 2026

Conference Planning and Preparation (Steering Committee Member)

2026 IEEE International Conference on AI and Data Analytics (IEEE ICAD)   June 2026
Venue: Boston College, 140 Commonwealth Ave., Chestnut Hill, MA, USA

2025 IEEE International Conference on AI and Data Analytics (IEEE ICAD)   June 2025
Venue: Joyce Cummings Center, Tufts University, 177 College Ave., Medford, MA, USA

Professional Skills

Coding: Vibe 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, LaTeX, Docker, K8s

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

Blogs: Personal writings and blogs

Photography: Bruce S. JIA Photography, Boston - Hong Kong - Beijing