ROBIN JEPHTHAH RAJARATHINAM

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EDUCATION

Ph.D. in Educational Technology, GPA: 4.0 *Fall 2021 - Present* [1]
Dept. of Curriculum & Instruction, UIUC, IL, USA

M.A. in Curriculum & Instruction, GPA: 4.0 *Fall 2019 - Spring 2021*
Dept. of Curriculum & Instruction, UIUC, IL, USA

M.S. in Mechanical Engineering, GPA: 3.6 *Fall 2015 - Spring 2018*
Dept. of Mechanical Science & Engineering, UIUC, IL, USA

B.E. in Mechanical Engineering, GPA: 3.9 *Fall 2009 - Spring 2013*
Dept. of Mechanical Engineering, Anna University, India

WORK EXPERIENCE

NSF AI Institute for INclusiVe Intelligent Technologies for Education (INVITE), IL, USA
Advisors: Dr.Chad Lane, Dr. Kristy Boyer
Graduate Research Assistant *Fall 2023 - Present*

Immersive Data Lab, UIUC, IL, USA
Advisor: Dr. Jina Kang
Graduate Research Assistant *Fall 2019 - Present*

CoLearn Lab, UIUC, IL, USA
Advisor: Dr. Emma Mercier
Graduate Research Assistant *Fall 2019 - Present*
Research Fellow *Fall 2018 - Spring 2019*

RELEVANT RESEARCH PROJECT(S)

Collaborative Sketch Tools for Engineering Problem Solving (CSTEPS)
PIs: Dr. Emma Mercier, Dr. Jina Kang, UIUC *Spring 2019 - Present*

- ▷ Applied pyannote speaker segmentation and diarization models on individual audio streams.
- ▷ Speech pattern analysis using K-means clustering, evaluated with silhouette coefficient.
- ▷ Employed Decision Tree, SVM, Random Forest, and AdaBoost classifiers on multimodal data (audio, video, text, log)
- ▷ Developed OpenCV model to track teacher's availability to help students using fisheye camera.

Connections of Earth And Sky with Augmented Reality (CEASAR)
PIs: Dr. Robb Lingdren, Dr. Jina Kang, UIUC *Fall 2022 - Present*

- ▷ Analyzed different types of gestures (diectic, beat, and representational) in AR environment.
- ▷ Applied Ordered Network Analysis (ONA) and Epistemic Network Analysis (ENA) to analyze relationships between joint attention states and collaborative interactions.
- ▷ Employed a cross-attention LSTM-based fusion network with noise-adaptive multimodal fusion (audio & video) for confusion and conflict detection, using a softmax classifier.

[1] Expected to graduate by Fall 2024

HoloOrbits: Astronomy Simulation of Planetary Orbits
PI: Dr. Jina Kang, UIUC *Fall 2023 - Present*

- ▷ UX research on AR using surveys and focus interviews to optimize user experience, improve design, and enhance multi-user interaction.
- ▷ Extracted facial expressions and body posture features using OpenFace and OpenPose.
- ▷ Automatically annotate collaboration behaviors using LLMs: InContext Learning, Auto Chain-of-Thought, and Synthetic prompting. *[In-progress]*
- ▷ Utilize Retrieval Augmented Generation (RAG) to improve contextual learning. *[In-progress]*

AREAS OF INTEREST

- ◦ Computer Vision: Behavior Detection and Tracking
- ◦ Large Language Models (LLMs): Automation of text-based data annotation, RAG applications

TECHNICAL SKILLS

Programming languages:	Python, R
Frameworks:	PyTorch, TensorFlow
Libraries:	OpenCV, OpenSMILE, OpenFace, OpenPose

COURSES @ UIUC

Generative AI in Education, Data Mining Principles, Introductory Text Mining, Educational Data Mining, Hierarchical Linear Modelling, Advanced Statistical Analysis.

SERVICE

- ▷ Co-chair of College of Education Graduate Student Conference, UIUC, 2024
  18 member organizing team: 2-day event with 200+ attendees.
- ▷ Reviewer for LAK, EDM (Data Mining); CSCL, ICLS (Collaborative Learning)

RELATED PUBLICATIONS

- ☐ **R. J. Rajarathinam**, C. Palaguachi, and J. Kang, 'Enhancing Multimodal Learning Analytics: A Comparative Study of Facial Features Captured Using Traditional vs 360-Degree Cameras in Collaborative Learning', *International Conference on Educational Data Mining (EDM)*, 2024.
- ☐ C. M. D'Angelo and **R. J. Rajarathinam**, 'Speech analysis of teaching assistant interventions in small group collaborative problem solving with undergraduate engineering students', *British Journal of Educational Technology (BJET)*, 2024.
- ☐ J. Kang, Y. Zhou, **R. J. Rajarathinam**, Y. Tan, and D. W. Shaffer, 'Unveiling joint attention dynamics: Examining multimodal engagement in an immersive collaborative astronomy simulation', *Computers & Education*, 2024.
- ☐ J. Planey, **R. J. Rajarathinam**, E. Mercier, and R. Lindgren, 'Gesture-mediated collaboration with augmented reality headsets in a problem-based astronomy task', *International Journal of Computer-Supported Collaborative Learning*, 2023.
- ☐ **R. J. Rajarathinam** and C. M. D'Angelo, 'Turn-taking analysis of small group collaboration in an engineering discussion classroom', *International Learning Analytics & Knowledge Conference (LAK)*, 2023.