

Arjun Ramesh Kaushik

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EDUCATION

University at Buffalo, The State University of New York

PhD in Computer Science

MS in Computer Science

Buffalo, NY

Aug 2024 – Present

Aug 2022 – May 2024

Research focus: Hyperbolic geometry, Diffusion models, Image generation, Video understanding

Birla Institute of Technology And Science, Pilani (BITS Pilani)

B.E in Electronics & Instrumentation

Hyderabad, India

Aug 2017 – May 2021

WORK EXPERIENCE

Magna International

Data Science Intern

Troy, MI

Jun 2024 – Aug 2024

- Contributed to a foundational model for semantic segmentation of defects in car seats.
- Designed, developed, and deployed a multi-modal physical-task assistance system. Generates textual and visual instructions based on user query and additional context from Knowledge DB (through RAG) to help solve industrial tasks. Building blocks – Llama3.1, LLaVA, CLIP, Whisper, Streamlit.

University at Buffalo, The State University of New York

Research Assistant

Buffalo, NY

Nov 2022 – Current

- Data Distillation**
 - Developed a training-free 10-step diffusion model for data distillation.
- Vision-Language Models (Sports Analytics)**
 - Developing a multimodal system for soccer video understanding to perform action spotting, event classification and dense video captioning.
- Brain Decoding**
 - Designed a mixture-of-experts EEG encoder to translate neural signals into natural language, enabling thought-to-text generation.
- Text-to-Image (T2I) Diffusion Models**
 - Addressing catastrophic forgetting in T2I diffusion models by introducing positive inter-concept interactions to preserve learned concepts during continual learning.
- Secure Face Analytics**
 - Built a secure face recognition template using FHE and multivariate polynomial transformations, enabling identity verification while protecting soft-biometric attributes. Extended this work using Matryoksha Representation Learning to compress embeddings before encryption.

Trilogy (Remote)

Software Development Engineer II

Austin, TX

Sep 2021 – May 2022

- Operated as an **independent full-stack developer**, crafted comprehensive solutions using **C#, AngularJS, Java, and SQL**, demonstrating a strong analytical and problem-solving ability, which improved website functionality and user experience.
- Established efficient **CICD** pipelines using tools such as **Jenkins, Docker, and Terraform**, leading to streamlined deployment of company-imported products in **AWS** and **Microsoft Azure**.

University of California Irvine – Zhang Lab (Remote)

Research Intern

Irvine, CA

May 2021 – Jan 2022

- Focused on the development of centralized federated VAE that aggregates using FedAvg algorithm, yielding a silhouette coefficient of **0.855**.
- Concurrently, addressed privacy concerns in the model using Differential Privacy.

RESEARCH PAPERS (* - equal contributions)

- A. R. Kaushik**, N. Devulapally, V. Lokhande, N. Ratha, and V. Govindaraju, "Forget Less by Learning from Parents through Hierarchical Relationships," at the AAAI Conference on Artificial Intelligence 2026, Singapore. ([Accepted](#))

2. **A. R. Kaushik**, N. Devulapally, V. Lokhande, N. Ratha, and V. Govindaraju, "Forget Less by Learning Together through Concept Consolidation," at the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2026. [\(Accepted\)](#)
A novel framework to mitigate catastrophic forgetting through positive inter-concept interactions in text-to-image Diffusion Models.
3. **A. R. Kaushik**, N. Ratha, and V. Govindaraju, "Learning Action Hierarchies via Hybrid Geometric Diffusion," the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2026. [\(Accepted\)](#)
Performs action segmentation by learning action hierarchies using hyperbolic geometry and diffusion models.
4. **A. R. Kaushik**, V. Lokhande, N. Ratha, and V. Govindaraju, "Matching Target Distributions with Optimal Transport for Efficient Synthetic Data Distillation," at an A* conference. [\(Submitted\)](#)
A training-free few-step diffusion model for data distillation.
5. **A. R. Kaushik**, and N. Ratha, "NeuroLLM: Decoding EEG Signals to Text via Multi-expert Feature Fusion," at an A* conference. [\(Submitted\)](#)
A mixture-of-experts style module to generate text from EEG waves, achieving an improvement of 28% in ROUGE scores.
6. **A. R. Kaushik***, B. Yalavarthi*, A. Ross, V. Boddeti and N. Ratha, "Shielding Latent Representations from Privacy Attacks," 2025 IEEE 19th International Conference on Automatic Face and Gesture Recognition (FG), Clearwater, USA. [\(Accepted\)](#)
7. B. Yalavarthi*, **A. R. Kaushik***, A. Ross, V. Boddeti and N. Ratha, "Enhancing Privacy in Face Analytics Using Fully Homomorphic Encryption," 2024 IEEE 18th International Conference on Automatic Face and Gesture Recognition (FG), Istanbul, Turkiye, pp. 1-9, [doi: 10.1109/FG59268.2024.10581983](https://doi.org/10.1109/FG59268.2024.10581983).
A synergistic combination module using Fully Homomorphic Encryption that reduced soft-biometric leakage accuracy to random chance while preserving identity verification performance.
8. T. Sharma, **A.R. Kaushik** and N. Ratha, "PixMus : Video and Text Conditioned Background Music Generation using Latent Diffusion," 2025 IEEE Conference on Artificial Intelligence (CAI), Santa Clara, California, USA. [\(Accepted\)](#)
A video and text-conditioned diffusion model to generate background music, beating SOTA by 27% in CLAP scores.
9. **A. R. Kaushik**, S. Rufus and N. Ratha, "Enhancing Authorship Attribution through Embedding Fusion: A Novel Approach with Masked and Encoder-Decoder Language Models," 2024 27th International Conference on Pattern Recognition (ICPR), Kolkata, India, https://doi.org/10.1007/978-3-031-78495-8_29.
A framework to process fused text embeddings through the lens of an image to discern AI-generated and human-authored text.
10. B. Yalavarthi, **A. R. Kaushik**, T. Sharma, N. Ratha, "Secure Sleep Apnea Detection with FHE and Deep Learning on ECG Signals," 2024 27th International Conference on Pattern Recognition (ICPR), Kolkata, India, https://doi.org/10.1007/978-3-031-78354-8_4.
11. V. Aggarwal*, **A. Kaushik***, C. Jutla and N. Ratha, "Enhancing Privacy and Security of Autonomous UAV Navigation," in 2024 IEEE Conference on Artificial Intelligence (CAI), Singapore, Singapore, pp. 518-523, [doi: 10.1109/CAI59869.2024.00103](https://doi.org/10.1109/CAI59869.2024.00103).
12. **A. Kaushik**, C. Jutla and N. Ratha, "Towards Building Secure UAV Navigation with FHE-aware knowledge Distillation," 2024 27th International Conference on Pattern Recognition (ICPR), Kolkata, India, https://doi.org/10.1007/978-3-031-78456-9_24.
Fully Homomorphic Encryption aware modules that allow inferencing with 100% privacy and security (theoretically).

AWARDS

- Faculty Choice Award 2023-24
Awarded by the Department of Computer Science and Engineering for outstanding research contributions to Dr. Nalini Ratha's lab

TECHNICAL SKILLS

Languages:	C++ Python JavaScript Java Go MySQL SQL
Libraries:	ReactJS OpenCV TensorFlow PyTorch Keras Pandas Numpy Scikit-learn