# Rugved M. Zarkar

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## Education

University of Maryland, College Park, Bachelor's of Science, Computer Science & Finance — Expected: May 2027
**Relevant Coursework:** Data Structures, Algorithms, OOP, Computer Architecture, Discrete Structures — GPA: 3.83

## Experience

**Research Fellow** — April 2025 - Present
*National Institute of Standards and Technology* — *Gaithersburg, MD*

- Contributing to CHIPS Act efforts by developing AI-enhanced methods for measuring IC line widths and edge roughness from atomic-scale SEM images, reducing the need for costly scan points through compressed sensing and supervised inpainting.
- Designed Python tools to process 1,000+ SEM images, segment features, and estimate measurement uncertainty; trained a Denoising Diffusion Probabilistic Model that reduced uncertainty by over 50%.
- Performed experimental tradeoff analysis across sampling strategies (Latin Hypercube, patented masks) to optimize image quality, measurement confidence, and scanning efficiency for semiconductor metrology.

**Founder & Lead Developer** — January 2025 - Present
*RAGent LLC* — *Ellicott City, MD*

- Developing Retrieval-Augmented Generation agents for business-specific use cases; leveraging Llama-Index, OpenAI, Weaviate, and modular vector database systems to build scalable, personalized knowledge-retrieval pipelines for clients across multiple industries.
- Contracted by sustainED, a McKinsey-backed company, to build custom RAG solutions enabling translation and simplification of 7000+ restricted research documents for Southern African countries into local languages.

**Research Assistant** — August 2024 - Present
*University of Maryland Department of Computer Science* — *College Park, MD*

- Developed an interactive touchscreen and drag-and-drop programming UI for Calico, a miniature wearable robot, enabling students to program on-body routes and functions resulting in a 3.7x increase in successful deployments during pilot workshops.

**Software Engineering Intern** — May 2023 - May 2024
*Aspire Johns Hopkins Applied Physics Laboratory* — *Columbia, MD*

- Utilized Matlab, Python, and Github to develop a production-level application, SAILS, to track 300+ items in AMDS inventory.
- Presented findings to APL Air Missile Defense Sector Administration, and surveyed employees for user preferences on SAILS app.

## Projects

**BiasGPT Project**

- Developed an automated bias detection system that uses GPT-3.5 and DistilBERT to analyze tone shifts across demographically-swapped prompts, retraining nightly to improve detection accuracy.
- Built an end-to-end pipeline with a React and FastAPI interface, spaCy-based prompt swapping, and PyTorch model training; automated nightly dataset growth and model retraining using cron and bash scripts.

**Neuromaker International Bioengineering Competition**

- Built a prosthetic hand to convert speech to American Sign Language using Google API, Python, RaspberryOS.

**McMaster National CAD Designation League**

- Tasked with identifying a problem with current transportation services; designed new effective train service.

**MESA Monarch Butterfly Project**

- Built 3 Monarch Butterfly gardens in local schools with experts from the Monarch Sister Schools to implement into the 5th-grade curriculum; developed an app to track health and migration.
- Interviewed 4 underrepresented schools to assess needs for STEM growth; raised $5000+ through fundraisers with Blue Cross Blue Shield, Johns Hopkins, Tantus Technologies, and Rotary clubs.

**TANA Google Nest AI Project**

- Trained interactive chatbot on historic Indian documents to educate 10,000+ conference attendees using Google Dialog Flow CX, Python, Cloud Natural Language and Translation APIs.

## Skills

**Certifications:** AWS Cloud Practitioner, AWS Solutions Architect, Autodesk Fusion Certified User
**Languages:** Python, Java, JS, HTML, MATLAB
**Frameworks and Tools:** Pinecone, FAISS, Ollama, Llama-Index, REST APIs, Git, Docker, React, Tailwind