ROKUNUZJAHAN RUDRO

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RESEARCH INTEREST

My research develops efficient hyperspectral microscopy systems for clinical pathology, combining focus map algorithms for image acquisition optimization with fine-tuned pathology AI foundation models adapted to hyperspectral imaging histopathology data. Current applications target leukemia and head & neck cancer diagnosis.

EDUCATION

PhD in Biomedical Engineering, University of Texas at Dallas — **May 2025 – May 2029**
MS in Computer Science, University of Kansas — **Aug. 2023 - May 2025**
BS in Computer Science, University of Kansas — **May 2019 - May 2023**
Scholarships: Academic Excellence Scholarship, Kendall Rear Admiral Gene and Sandra award

SKILLS

Database & Programming Languages	Python, SQL, R, JavaScript, C, C++, HTML, CSS
Developer Tools	Git, GitHub, Claude/ Codex, AWS Bedrock, Azure OpenAI, Docker
Libraries	PyTorch, TF Lite, Pandas, NumPy, Scikit-learn, NLTK, Streamlit
Instrumentation	Olympus IX83 microscope, Hyperspectral camera, Raspberry Pi-5

EXPERIENCE

Graduate Research Assistant - Funded on NIH,CPRIT research grants — **May 2025 - Present**
University of Texas at Dallas - Prof. Baowei Fei — Richardson, Texas

- Developed custom Python plugin to control liquid crystal variable retarder (LCVR) voltages using vendor APIs to enhance data acquisition for hyperspectral imaging systems for clinical diagnostics.
- Deployed a lightweight hyperspectral imaging and TinyML pipeline enabling tissue classification on the Raspberry Pi-5.
- Built an automated Python-based hyperspectral digital pathology imaging platform for Olympus IX83 and IMEC SnapScan acquisition using SDK-level camera and microscope control.

Graduate Research Assistant - Machine Learning — **Aug. 2023 - May 2025**
University of Kansas - Prof. Sumaiya Shomaji — Lawrence, Kansas

- Applied KMeans **clustering** to segment drivers based on psychological behavior, achieving a silhouette score of 0.54, and used **LightGBM** for classification with vehicular features achieving 70% accuracy. Co-authored reseach publication: **Using Machine Learning to Classify Driver Behavior from Psychological Features: An Exploratory Study**.
- Researched GPT's performance on the MIMIC-III dataset using prompt engineering techniques for prescription recommendation and mortality prediction. Code: MIMIC-III prompting

Machine Learning Intern — **Feb. 2024 - Sept. 2024**
AssetWORKS Inc. — Remote

- Contributed to the development of a conversational AI tool, focusing on testing, bug resolution, and feature enhancement to improve user experience.
- Designed and developed a proof-of-concept digital data analytics agentic Streamlit web application utilizing Azure OpenAI API to provide data-driven insights.

Graduate Teaching Assistant — **Aug. 2023 - May 2025**
University of Kansas — Lawrence, Kansas

- Offered guidance and clarification on assignments, projects, and coursework, contributing to students' success in Programming Paradigm class.
- Delivered comprehensive lectures in Intermediate Algebra, focusing on key mathematical concepts such as linear equations, inequalities, polynomials, and quadratic functions.

PUBLICATION(S)

- **Rudro, R.**, Ma, L., Pruitt, K., & Fei, B. (2026). TinyScope: Lightweight hyperspectral tissue classification using TinyML inference on a single-board computer. SPIE Medical Imaging 2026. Peer-reviewed and **20,000+** attendees annually.
- Ma, L., Chaverra, I., Patwardhan, C., **Rudro, R.**, Ha, A., Swain, S., & Fei, B. (2026). A handheld polarized hyperspectral imaging probe for tissue differentiation using spectral and polarization characteristics. SPIE Photonics West 2026. Peer-reviewed and **20,000+** attendees annually.
- Shishir, F. S., **Rudro, R.**, Sarker, B., Zhong, C., & Somaji, S. (2026). NbBayesLM: Bayesian prediction of nanobody thermostability using protein language models. Frontiers in Bioinformatics, Protein Bioinformatics. Peer-reviewed Q1 journal with H-index of 24.
- **Rudro, R.**, Masud, S. S. B., Rizvee, M. M., Wang, S., Kummetha, V. C., Kondyli, A., Ramey, C. H., Shomaji, S., & Chrysikou, E. G. .Using machine learning to classify driver behavior from psychological features: An exploratory study. TRB 2025 Annual Meeting.

PROJECTS

FARMWISE— An AI-powered farming assistant that helps farmers optimize crop management, diagnose plant diseases, and receive weather-based recommendations. Integrated Claude 3.5 Sonnet through AWS Bedrock to enable real-time disease diagnosis and provide context-aware advice based on geographical location and weather conditions. Won the first place for best in show at HackMidwest 2024 (500+ participants). (skills: **AWS Bedrock)**

ParkKU — Collaboratively developed a mobile app using React Native to display real-time parking availability. Applied a custom **YOLOv5** object detection model (**Roboflow**) to assist in parking space availability. Leveraged **Flask** to create **REST API** for seamless backend integration. (skills: **Object Detection, Mobile App Development)**

Phonemic Analysis — NLP Research Project (ACL BLP 2023 Workshop Submission): Analyzed Bangla music lyrics (2000s-present) using phonemic analysis to explore linguistic changes and genre correlations. (skills: **Natural Language Processing, Data Preprocessing (NLTK), Research)**

LEADERSHIP/ PEER REVIEW

- **Engineering Applications of Artificial Intelligence**, Elsevier **2026**
  Q1 Journal (CiteScore: 10.3) · Reviewed manuscript on transformer-based deep learning for hyperspectral image super-resolution
- **Reviews on Advanced Materials Science**, De Gruyter **2026**
  Q1 Journal · Reviewed manuscript on snapshot hyperspectral imaging and deep learning for food quality detection
- Volunteered as the Local Chapter Lead for the Omdena Kansas, USA Local chapter in analyzing crime rates in Kansas, driving community engagement and collaboration in the field of data science. **2022-2025**

REFERENCES

- Baowei Fei, Professor of Bioengineering, University of Texas at Dallas, bfei@utdallas.edu
- Sumaiya Shomaji, Assistant Professor, Electrical Engr & Comp Science, University of Kansas, shomaji@ku.edu
- Zijun Yao, Assistant Professor, Electrical Engr & Comp Science, University of Kansas, zyao@ku.edu
- Ling Ma, Research Associate, Bioengineering, University of Texas at Dallas, Ling.Ma@UTDallas.edu