

Al Shafayet Haque Silvy

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Research interests

I am an ML engineer at UHV Technologies. Currently my research focuses on specializing in interpretable and explainable ML models for industrial automation. I have developed intelligent machines capable of sorting and collecting diverse materials including solid waste, food products, and batteries through transparent AI systems. In my masters I studied deep learning architectures for medical diagnostics, explored convolutional neural networks for cardiac arrhythmia and prostate cancer detection, emphasizing model interpretability and resilience under real world variability. I am passionate about pursuing foundational questions in neural architecture design while addressing real medical challenges in multi-modal data analysis.

Education

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| 2023 – 2024 | Purdue University – Fort Wayne, IN
Masters in Computer Engineering
Advisor: Dr. Bin Chen <i>GPA: 3.63.</i> |
| 2017 – 2021 | United International University – Dhaka, Bangladesh
Bachelors in Computer Science and Engineering
<i>GPA: 3.62.</i> |

Teaching experience

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| Fall 2021 | East West University, Lecturer <ul style="list-style-type: none">• Engineering Programming I (CSI 121): Covered core concepts such as control structures, functions, pointers, and memory management through lectures and hands-on lab sessions focused on problem solving• Machine Learning (CSE 489): Covered supervised and unsupervised learning with Python (scikit-learn, pandas), covered model training, validation, regularization, and guiding students through classification and clustering projects |
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Research experience

Jan 2023 – May 2024

Purdue University, Graduate Research Assistant

- **Artificial Intelligence Maritime Maneuver Indiana Collegiate Challenge (NAVSEA-funded):** Led five-person team developing computer vision algorithms for autonomous underwater vehicle navigation using Deep Q-Network (DQN) reinforcement learning. Coordinated data collection protocols and analysis pipelines across interdisciplinary team members
- **Medical AI:** Developed cardiac arrhythmia detection system using CNNs, achieving 94% classification accuracy across multiple arrhythmia types on MIT-BIH dataset. Built prostate cancer detection pipeline using transfer learning on MRI imaging data, implementing robustness testing against real-world variability. Evaluated model interpretability using Grad-CAM visualizations to identify diagnostically relevant image regions for clinical validation
- **Additional Responsibilities:** Proctored and graded exams. Coordinated Computer Science Summer Camp for high school students

Industry experience

UHV Technologies – Fort Wayne, IN

Jan 2025 – Present

Machine Learning Engineer

Delivered ML solutions for U.S Department of Energy and Qatar Airways funded automation projects with measurable commercial and research impact.

- **EcoSorter (DOE-funded):** Developed interpretable ML model for municipal solid waste sorting achieving 91% accuracy across 10 material types, with commercial deployment processing 200 samples/hour at \$30/ton; a 10x cost improvement over manual sorting
- **Supply Chain Automation (Qatar Airways):** Developed predictive models for early food spoilage detection using supervised learning on multi-modal sensor and image data, implementing automated quality control systems to optimize resource utilization across airline food supply chain
- **MV Battery De-integration (DOE-funded):** Developed end-to-end automation pipeline integrating ML-based robotic perception with mechanical disassembly systems, designing SolidWorks machinery components and implementing computer vision algorithms for real-time MV battery component detection, localization, and classification

May 2024 – Dec 2024

Research and Development Engineer

- Curated and preprocessed 45k municipal solid waste dataset using Pandas, NumPy, and OpenCV, building scalable ML pipeline infrastructure for industrial deployment
- Analyzed and visualized data using Matplotlib and Scikit-learn to identify trends, outliers, and class imbalances, improving dataset quality by 75% through systematic cleaning and balancing
- Applied data augmentation and normalization techniques with Torchvision to optimize training performance and reduce model overfitting on deformed samples
- Fine-tuned multi-class classification and object detection models, improving accuracy from 85% to 91% through iterative architecture refinement and hyperparameter optimization
- Evaluated model interpretability using Grad-CAM, t-SNE visualizations, and confidence thresholds to guide feature learning and identify misclassification patterns
- Documented technical methodologies and findings to ensure reproducibility and support future scalability across similar industrial applications

Publications

- 2025 **Development of an Economically Viable AI-Enabled Sorting Technology for Complex Plastic Waste Streams**
Kanishka Tyagi, Isha K Maun, Nalin Kumar, **Al Shafayet Haque Silvy**, Bin Chen, Lorenzo J. Vega Montoto, Keerthan Raghavendra Rao, Sambandh Bhusan Dhal
2025 REMADE Circular Economy Tech Summit and Conference. [\[Paper\]](#)
- 2024 **Deep Learning in the Wild for Industrial Scale Plastic Waste Sorting**
Al Shafayet Haque Silvy, Kanishka Tyagi, Isha K. Maun, Bin Chen and Nalin Kumar
NeurIPS 2024. [\[Paper\]](#)
- 2024 **Industrial-Grade AI System For Automated Plastic Sorter in**
Al Shafayet Haque Silvy
Masters Thesis at Purdue. [\[Thesis\]](#)

Awards and scholarships

- 2025 Research Engineer at Qatar Airways
Acquired professional award from Qatar Airways on Food waste supply management
- 2024 [Runners Up at AIMM ICC](#)
- 2017–2021 Merit Scholarship from United International University

Industrial and Social Impacts

- 2025 *Revolutionizing Re-X Supply Chain* Food Waste, Material Sorting, MV Battery De-integration
- 2024 *Municipal Solid Waste Recycling in Fort Wayne* PFW, Fox 55 FW

Technical skills

Programming languages

Python, C, React Native, Java, JavaScript

Data Science & Machine Learning

LaTeX, Git, PyTorch, Scikit-learn, OpenCV, Pandas, NumPy, Torchvision, Grad-CAM

Other Tools & Technologies

SolidWorks, LaTeX, Excel, Matlab

Research Skills

Data Curation and Analysis, Experimental Design, Technical Documentation, Proposal Writing, Visualization, Model Evaluation, Literature Review

References

- Supervisor **Kanishka Tyagi, Director of Artificial Intelligence at UHV Technologies Inc**
Email: kanishkaugae@gmail.com, Phone: +1-424-346-2323
- Masters Advisor **Bin Chen, Assistant Professor of ECE at Purdue University**
Email: chenb@pfw.edu, Phone: +1-260-206-0862
- Past Supervisor **Guoping Wang, Chair of ECE at Purdue University**
Email: wang@pfw.edu, Phone: +1-260-445-0531
- Past Supervisor **Ayesha Murshid, Director at Acrivon Therapeutics**
Email: ayesha.murshid@gmail.com