

Rasel Ahmed Bhuiyan

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SUMMARY

PhD candidate in Computer Science at the University of Notre Dame with expertise in **machine learning, computer vision, and model interpretability**. Experienced in building and evaluating **deep learning models** at scale, analyzing **bias, robustness, and failure modes**, and developing **production-ready training and data pipelines**. Published in **WACV, IEEE T-BIOM, and Journal of Vision**. Proficient in **Python, PyTorch, TensorFlow**, and large-scale experimentation. Seeking an **ML Research/Applied Scientist** role focused on **model design, evaluation, interpretability, and fairness**.

TECHNICAL SKILLS

Programming: Python, MATLAB, Bash

Libraries & Frameworks: PyTorch, TensorFlow, OpenCV, Scikit-learn, HuggingFace, NumPy, Pandas, Matplotlib

Research Expertise: Computer Vision, Deep Learning, Vision-Language Models (VLMs), Object Detection, Facial/Iris Recognition, Generative AI, Explainable AI, Model Interpretability, Optimization, Human-in-the-loop AI

Development Practices: Version Control (Git), Model Evaluation, Experiment Reproducibility, Large-scale Data Processing, Collaborative ML Research

Computing Platforms: Linux, HPC Clusters, Multi-GPU Systems

RESEARCH EXPERIENCE

Graduate Research Assistant

Computer Vision Research Laboratory (CVRL), University of Notre Dame

01/2022 - Present

Notre Dame, IN

- **Multimodal PMI Prediction:** Developed a cross-spectral vision model fusing **RGB and NIR** modalities to **reduce post-mortem interval (PMI) estimation error by 36%** ($77.7 \rightarrow 45.8$ hrs), aiding criminal investigations and demonstrating **robust multimodal learning and domain adaptation**. [GitHub](#)
- **Infant Iris Recognition:** Created an end-to-end universal segmentation model **improving AUC from 77% → 99%**, enabling real-time newborn ID systems to **prevent baby swapping**, reduce **abductions**, and improve **post-natal health monitoring** globally. [GitHub](#)
- **Synthetic Data Generation:** Designed a **PMI-conditioned StyleGAN2 generator**, synthesizing **180K+ forensic iris images**, addressing data scarcity and enabling scalable data augmentation for model robustness. [GitHub](#)
- **Explainable AI for Biometrics:** Built the **largest post-mortem iris dataset (338+ subjects)** and released a forensic iris toolkit with **explainable AI** for human-in-the-loop analysis.
- **Iris Presentation Attack Detection:** Developed a deep-learning based **PAD model** with **>95% accuracy** on unseen attack types, enhancing biometric security. [GitHub](#)

Research Lead (as Lecturer)

Uttara University

10/2018 - 12/2021

Dhaka, Bangladesh

- **Epileptic Seizure Recognition:** Segmented EEG signals into time windows, extracted statistical features, and applied an SVM classifier, achieving **99%+ accuracy** on the Bonn dataset for **automated seizure diagnosis**.
- **Human Activity Recognition:** Designed a window-based frequency-domain model using EPS features with SVM, improving performance from **93% → 99%+** on **DU-MD** and achieving **up to 99%+ class-wise accuracy** on **UCI-HAR**, surpassing state-of-the-art for **wearable health monitoring**.
- **Wearable Patient Monitoring:** Developed an enhanced **BoW features** with DWT and K-means, achieving **98% accuracy**, surpassing **BoW baselines** and **reducing computational cost** vs. state-of-the-art.

Research Assistant

Computer Vision & Pattern Recognition Lab, University of Asia Pacific

03/2016 - 09/2018

Dhaka, Bangladesh

- **Hand Gesture Recognition:** Developed a gesture recognition system **improving accuracy from 61% → 78%** through advanced feature engineering and genetic algorithm-based optimization, enabling **enhanced communication for deaf and dumb users**.
- **ASL Recognition:** Built a low-cost, real-time HCI system using Deep-CNN feature extraction and multi-class SVM, achieving **94.6% accuracy** to support **interactive communication for deaf and dumb users**.
- **Arrhythmia Diagnosis:** Designed a hybrid PCA-ICA pipeline to extract statistical features from ECG signals, achieving **98.67% accuracy** in arrhythmia classification on the MIT-BIH dataset.

LEADERSHIP EXPERIENCE

Social Chair

Bangladeshi Student Association, University of Notre Dame

2023/2024

Notre Dame, IN

- Organized meetings, took meeting minutes, and published announcements to coordinate academic and social activities.

President

CSE Student Association, University of Asia Pacific

2016/2017

Dhaka, Bangladesh

- Advocated for student welfare by identifying issues, proposing solutions to the administration, and organizing student events.

AWARDS & HONORS

- **Best Paper Award – CV4Smalls - WACV 2025:** *Iris Recognition for Infants*, for developing a robust and accurate iris recognition system for small and challenging infant/toddler datasets.
- Fully Funded Graduate Assistantship, University of Notre Dame.

EDUCATION

Ph.D. Computer Science – University of Notre Dame, Notre Dame, IN

12/2026

Focus: Iris Recognition at Life Extremes | Advisor: [Adam Czajka](#)

M.Sc. Computer Science – University of Notre Dame, Notre Dame, IN

05/2024

Focus: Forensic Iris Recognition | CGPA: 3.83/4.00

B.Sc. Computer Science & Engineering – University of Asia Pacific, Dhaka, BD

03/2018

Graduated with **highest distinction** | CGPA: 3.94/4.00

SELECTED PUBLICATIONS

- 1 **Rasel Ahmed Bhuiyan**, Parisa Farmanifard, Renu Sharma, Andrey Kuehlkamp, Aidan Boyd, Patrick J Flynn, Kevin W Bowyer, Arun Ross, Dennis Chute, and Adam Czajka, “Beyond Mortality: Advancements in Post-Mortem Iris Recognition through Data Collection and Computer-Aided Forensic Examination,” IEEE Transactions on Biometrics, Behavior, and Identity Science (T-BIOM), 2025.
- 2 Elia Shahbazi, Drew Nguyen, **Rasel Ahmed Bhuiyan**, Adam Czajka, Arash Afraz, “Visualizing the Unseen: Perceptographer, an AI Engine for Visualizing Brain-Stimulation-Induced Perceptual Events,” Journal of Vision, 2025
- 3 **Rasel Ahmed Bhuiyan** and Adam Czajka, “Forensic Iris Image-Based Post-Mortem Interval Estimation”, Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), Tucson, Arizona, 2025.
- 4 **Rasel Ahmed Bhuiyan** and Adam Czajka, “Iris Recognition for Infants”, Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), Tucson, Arizona, 2025. **[Received Best Paper Award]**
- 5 **Rasel Ahmed Bhuiyan** and Adam Czajka, “Forensic Iris Image Synthesis”, Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), Waikoloa, Hawaii, 2024.
- 6 **Rasel Ahmed Bhuiyan**, Shams Tarek, and Hongda Tian, “Enhanced Bag-of-Words Representation for Human Activity Recognition using Mobile Sensor Data”, Signal, Image and Video Processing (SIViP), Springer Nature, 1–8, 2021.
- 7 **Rasel Ahmed Bhuiyan**, N Ahmed, Md Amiruzzaman, and MR Islam, “A Robust Feature Extraction Model for Human Activity Characterization using 3-Axis Accelerometer and Gyroscope Data”, Sensors, MDPI, 20(23):6990, 2020.
- 8 A Matin, **Rasel Ahmed Bhuiyan**, SR Shafi, AK Kundu, and MU Islam, “A Hybrid Scheme Using PCA and ICA Based Statistical Feature for Epileptic Seizure Recognition from EEG Signal”, Joint 2019 IEEE 8th International Conference on Informatics, Electronics, and Vision (ICIEV) and 3rd International Conference on Imaging, Vision, and Pattern Recognition (IVPR), Eastern Washington University, USA, 2019. **[Nominated for the best paper award]**