

Rasel Ahmed Bhuiyan

(574) 993-4750 | Notre Dame, IN | rbhuiyan@nd.edu | [linkedin.com/in/rabhuiyan/](https://www.linkedin.com/in/rabhuiyan/) | [Google Scholar](https://scholar.google.com/citations?user=8YUW8wYAAAAJ)

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

01/2022 - Present

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

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% \rightarrow 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)

10/2018 - 12/2021

Uttara University

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% \rightarrow 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

03/2016 - 09/2018

Computer Vision & Pattern Recognition Lab, University of Asia Pacific

Dhaka, Bangladesh

- **Hand Gesture Recognition:** Developed a gesture recognition system **improving accuracy from 61% \rightarrow 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 <i>Bangladeshi Student Association, University of Notre Dame</i> <ul style="list-style-type: none">Organized meetings, took meeting minutes, and published announcements to coordinate academic and social activities.	2023/2024 <i>Notre Dame, IN</i>
President <i>CSE Student Association, University of Asia Pacific</i> <ul style="list-style-type: none">Advocated for student welfare by identifying issues, proposing solutions to the administration, and organizing student events.	2016/2017 <i>Dhaka, Bangladesh</i>

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 Focus: Iris Recognition at Life Extremes Advisor: Adam Czajka	12/2026
M.Sc. Computer Science – University of Notre Dame, Notre Dame, IN Focus: Forensic Iris Recognition CGPA: 3.83/4.00	05/2024
B.Sc. Computer Science & Engineering – University of Asia Pacific, Dhaka, BD Graduated with highest distinction CGPA: 3.94/4.00	03/2018

SELECTED PUBLICATIONS

- 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.
- 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
- 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.
- 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**]
- 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.
- 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.
- 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.
- 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**]