Shihab Sarar

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Professional Summary

A dedicated researcher in computer vision and deep learning with over two years of experience at the intersection of artificial intelligence, data-driven modeling, and visual understanding. Experienced in building intelligent systems, developing methods of analysis and interdisciplinary research, with a focus on pushing the field of perception, automation, and real-world understanding using computational methods. Beyond technical practice, I continuously strive to absorb new ideas and understanding and meaningful contributions or expanded knowledge to improve academic and applied efforts.

Education

Ahsanullah University of Science and Technology *December 2021 – December 2025 | Tejgoan, Dhaka*

*BSc in Computer Science and Engineering (CGPA: **3.4/4.00**)*

Thesis: A Private Blockchain and IPFS-Based Secure and Decentralized Framework for People Surveillance via Deep Learning Techniques.

Relevant Coursework: Artificial Intelligence, Pattern Recognition and Machine Learning, Soft Computing and Deep Learning, Digital Image Processing.

Ishwardi Government College *October 2021 | Ishwardi, Pabna*

*GPA: **5.00/5.00***

Experience

Software Engineer – Synex Digital *October 2024 – Present | Dhanmondi, Dhaka*

- Built and deployed the backend architecture for **"LinkAndLevelUp",** a Canadian enterprise training platform, powering Android**,** iOS**,** and web clients for **~1000** of active users by developing a stateless microservice API with JWT/OAuth2 authentication and CI**/**CD pipelines.
- Integrated AWS **S3** object storage for secure and scalable media handling (upload, fetch, delete) reducing latency by **~40%** through presigned URLs and parallel multipart uploads.
- Enabled real time communication between mentors and learners using **Socket.IO**, achieving **sub-200 ms latency** for chat and notification systems through Redis-based scaling.
- Contributed to an Australian **Internet of Things** project to monitor baby health in the womb, developing and optimizing communication between the IoT device and backend and from the backend to the Flutter app to alert parents in real time, with **sub-120 ms** latency to alert the parents in real time.

Assistant Researcher – AUST Satellite Communication Laboratory *July 2024 – July 2025 | Tejgoan, Dhaka*

- Developed a hybrid machine learning framework combining **Random Forest**, **NDVI**, and **NDWI** indices to improve satellite-based mangrove land cover classification accuracy from **75–80% to 98%**, by integrating cloud and shadow masking, spectral scaling, and data normalization.
- Quantified environmental transitions – including a **3%** increase in deep forest and a decline in water bodies from **32.18% to 28.82%** revealing hydrological and ecological impacts of Cyclone Bulbul (2019) and human intervention.

Skills

- **Computer Vision:** Experienced in image classification, object detection, and feature extraction using convolutional and transformer-based architectures using **Pytorch**.
- **Digital Image Processing:** Skilled in image enhancement, filtering, segmentation, and edge detection for visual data interpretation and analysis using **Matlab** and **OpenCV**.
- **Deep Learning:** Proficient in designing, training, and optimizing models using **PyTorch**.
- **Full-Stack Development (MERN):** Proficient in developing and deploying scalable backend and frontend applications using **MySQL, Express.js, React, and Node.js**, with secure API design and cloud integration **(AWS, Docker)**.
- **3D Visualization:** Experienced in creating interactive 3D data visualizations and simulation tools using **Three.js** and **React Three Fiber** integrating computer vision outputs into web-based visual frameworks.

Publications

Hybrid Method for Monitoring Sundarbans Mangrove Forest Using Satellite Images.

- Authored by Md. Abdullah Al Naim, **Shihab Sarar**, Mahdi Hasan, Md. Maruf Hossain Tasin, and Omar Farrok.
- Presented at 2024 2nd International Conference on Information and Communication Technology **(ICICT)** 2024**,** Dhaka, Bangladesh.
- DOI: **10.1109/ICICT64387.2024.10839745**

A Private Blockchain and IPFS-Based Secure and Decentralized Framework for People Surveillance via Deep Learning Techniques

- Authored by **Shihab Sarar,** Ali Imran Mehedi, Fabbiha Tahsin Prova, Saha Reno
- **IET Software, John Wiley and Sons Ltd,** United Kingdom. (Impact Factor: **1.3**, Acceptance Rate: **15%**)
- Journal Rank: **Q2**
- Status: **Under Revision**

ChainFusion: Resolving the Blockchain Trilemma via Federated Sharding and Proof-of-Integrity Consensus

- Authored by Saha Reno, Koushik Roy, G M Abdullah Al Kafi, Sadia Nasrin Tuly, **Shihab Sarar,** Md. Rakib Hasan
- Presented at 2025 3rd International Conference on Big Data, IoT and Machine Learning **(BIM)** 2025**,** Dhaka, Bangladesh, awaiting publication in **Springer Lecture Notes in Networks and Systems or Taylor and Francis Books**. (Acceptance Rate: **25%**)
- Status: **Accepted for Publication.**

Ongoing Projects

Spatio-Temporal Traffic Congestion Prediction and Signal Optimization Using Lighthill-Whitham-Richards and Graph-Based Physics-Informed Neural Networks.

- Creating an adaptable urban traffic control system that uses learning-based models and physics-informed constraints to produce reliable congestion forecasts. The framework employs these forecasts to steer real-time signal timing adjustments to facilitate traffic flow and elevate mobility across complicated road systems.
- Status: **Submitted** to 28th International Conference on Computer and Information Technology **(ICCIT)** 2025

From Vision to Language: A Hilbert Curve-Based Encoding Framework for Generating Natural Descriptions for the Visually Impaired.

- The goal is to create a vision-to-language framework that encodes visual scenes by means of a Hilbert-curve–based representation, which preserves the spatial layout in the scene while being processed. The framework produces the encoded scene as natural but accessible descriptions designed to facilitate and enhance real-world navigation for visually impaired users.

3D Spatial U-Net and Marching Cubes-Based Framework for Brain Tumor Segmentation and Dimensional Visualization.

- Creating a three-dimensional medical imaging framework employing a spatial U-Net to segment brain tumors with high structural accuracy. The segmentation's volumes are reconstructed utilizing the Marching Cubes process, resulting in dimensional visualizations that are enhanced, clearer, and more detailed that allow for better clinical interpretation.

Next Generation Neuromorphic CBRAM systems for Real time detection and treatment for Parkinsons disease.

- Developing a neuromorphic framework for Parkinson's disease that utilizes CBRAM-based spiking computation in tandem with SVM classification to accurately characterize and interpret the pathological neural patterns of interest with high sensitivity. The important feature of the system is the capability to translate these neural patterns into closed loop therapeutic responses, which is an energy efficient approach towards future implanted therapeutic systems.
- Training Accuracy: **89.10256%**
- Testing Accuracy: **84.61538%**

Extra-curricular Activities or Leadership

Head of Programming – AUST Satellite Communication Laboratory *July 2025 – Present | Tejgoan, Dhaka*

- Leading the software development and data visualization team of **4** engineers for a **3U nanosatellite project**, focusing on building onboard systems and ground software for data interpretation and telemetry analysis.

Champion, Capture the Flag (CTF) – AUST CSE Carnival 6.0, powered by Cyber Bangla

- Earned recognition among **47** teams in cybersecurity problem-solving, Open-Source Intelligence, Reverse Engineering, Steganography, Cryptography and Ethical hacking.

Champion, Software Exhibition – AUST CSE Carnival 4.0

- Received award for developing an innovative software solution for a defense training academy, impacting **~500** trainees and demonstrating technical depth, creativity and practical impact.

1st Runners up, Badminton Competition – AUST CSE Carnival 5.0

2nd Runners up, UI/UX Competition – AUST CSE Carnival 4.0

References

- **Mr. Saha Reno**
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  Department of Computer Science and Engineering
  Ahsanullah University of Science and Technology
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  Supervisor