Sajeeb Kumar Ray

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Overview

AI for Agriculture & Healthcare Researcher — Specialist @ Codeforces — Student of the Year Awardee

Research Interests: Computer Vision, Deep Learning, Machine Learning, AI for Agriculture, AI for Healthcare, Embedded Systems, and IoT.

Education

B.Sc. (2023) (Held in 2025) — **B.Sc. (Engg.) in Information and Communication Engineering**, Dept. of ICE, Pabna University of Science and Technology, Bangladesh.
CGPA: 3.91/4.00 (First Position; Honours) [Dean's List]
[Prospective Gold Medalist].

HSC (2019) — **Higher Secondary Certificate**, Collectorate School and College Rangpur, Bangladesh.
Group: Science, Board: Dinajpur. GPA: 5.00/5.00.

SSC (2017) — **Secondary School Certificate**, Jaldhaka Govt. Model Pailot High School, Bangladesh.
Group: Science, Board: Dinajpur. GPA: 5.00/5.00.

Research Experience

Research Assistant, Dept. of ICE, PUST May 2024 – Jun 2025 (Part Time)

- Jointly developed RViT-FusionNet, a hybrid CNN–Transformer model with Local Cross-Attention for brain tumor classification via MRI, achieved 99.66% accuracy Grad-CAM interpretability.
- Developed a Dual-Head CNN (DH-CNN) for plant leaf classification and disease detection. Achieved 99.71% accuracy in classification and 99.26% in disease identification.
- Built XR-U-Net for lung image segmentation, achieving 95.7% accuracy on chest X-rays.
- Constructed a CNN-RNN framework for Bangla image captioning using EfficientNetB4 + ResNet-50, achieving BLEU score of 0.54.
- Implemented a Multi-Task CNN (MTL-CNN) with ResNet-50 for freshness detection of fruits and vegetables, achieving 98.63% accuracy.
- Jointly developed YOLOv8-based vehicle detection system tailored for Bangladeshi highways.
- Jointly built a microcontroller + RTC-powered AC device controller for scheduled automation.
- Jointly designed a CNN model for traffic sign recognition, achieving 99.68% accuracy on GTSRB dataset.

Other Research

- Evaluated classical, learning-based, and foundation models for 3D ultrasound image registration.
- Developed a dual-encoder dual-classifier ViT–CNN model with Local Cross-Attention for leaf analysis, achieving 99.98% accuracy in 30-species identification and 99.46% accuracy in 125-disease detection.
- Designed a multi-layer perceptron (MLP) model for Human Activity Recognition (HAR) using UCI-HAR dataset, reaching 97% accuracy.

Publications

1. **S. K. Ray**, M. A. Hossain, N. Islam, and M. A.F.M. R. Hasan, "Enhanced plant health monitoring with dual head CNN for leaf classification and disease identification," *Journal of Agriculture and Food Research*, Vol. 21, 2025. [Elsevier-Q1] [Cite Score: 7.5] [IF: 6.2]

2. M. A. Hossain, **S. K. Ray**, N. Islam et al., "Enhanced human activity recognition through deep multi-layer perceptron on the UCI-HAR dataset," *International Journal of Advances in Applied Sciences*, Vol. 13, pp. 429–438, 2024. [Scopus Indexed]

3. **S. K. Ray**, A. Islam, M.C. Chanda et al., "Deep Learning Based Lung Image Segmentation Using XR-U-Net," In *27th International Conference on Computer and Information Technology (ICCIT)*, Cox's Bazar, Bangladesh, 2024. [Scopus Indexed]

4. M. A. Hossain, M. A. R. Hasan, **S. K. Ray**, and N. Islam, "Generating Bangla Image Captions with Deep Learning Techniques," In *6th International Conference on Sustainable Technologies for Industry 5.0 (STI)*, Narayanganj, Bangladesh, 2024. [Scopus Indexed]

5. N. Islam, **S. K. Ray**, M. A. Hossain et al., "Vehicle Classification and Detection Using YOLOv8: A Study on Highway Traffic Analysis," In *International Conference on Recent Progresses in Science, Engineering and Technology (ICRPSET)*, Rajshahi, Bangladesh, 2024. [Scopus Indexed]

6. Alamin, **S. K. Ray**, M. A. Hossain et al., "Embedded Systems-Based AC Device Controller," In *International Conference on Recent Progresses in Science, Engineering and Technology (ICRPSET)*, Rajshahi, Bangladesh, 2024. [Scopus Indexed]

Manuscripts Under Review

1. N. Islam[•], **S. K. Ray**[•], M. A. Hossain et al., "RViT-FusionNet: A Local Cross-Attention Feature Fusion-based Hybrid Framework for Brain Tumor Classification," *Neural Computing and Applications. [Springer-Q1; Cite Score: 11.7].*
   [•] These authors contributed equally to this work.

2. **S. K. Ray**, A. Kumar, N. Islam et al., "Freshness Detection of Fruits and Vegetables Using Multi-Task CNN and ResNet-50," *Bulletin of Electrical Engineering and Informatics [Cite Score: 3.9].*

3. N. Islam, **S. K. Ray**, M. A. Hossain et al., "Understanding the Traffic Sign through a Deep CNN Architecture for Enhanced Traffic Safety," *Annals of Emerging Technologies in Computing [Cite Score: 3.7].*

4. M.A. Hossain, M. A.F.M. R. Hasan, **S. K. Ray** et al., "Attn-CapBN: An Attention-based Bangla Image Captioning using the Bangla View Dataset," *Expert Systems With Applications [Elsevier-Q1; Cite Score: 15.0; IF: 7.5].*

Research, Programming & Computer Skills

Research	CNN, RNN, LSTM, ViT, PyTorch, TensorFlow, Pandas, NumPy.
Competitive Programming (May 2020 – Mar 2023)	Top rating **4-star (1816) on CodeChef**; **Specialist (1492) on CodeForces**. Solved 750+ problems across Codeforces, HackerRank, Beecrowd. Problem Setter: Intra-University Programming Contest 2025.
Operating Systems	Windows, Linux.
Languages	Python, C, C++, R, MATLAB.
Others	Proteus, XAMPP, mikroC, PICkit, SQL Server, PCB Design, Circuit Design, Clean Coding.

Embedded Systems & Robotics Projects

Jan 2024 – Mar 2024 **AI Baby Nursing Robot** – An automated baby rocker capable of classifying baby cry to understand baby's needs. It can provide some necessary information such as Gas leakage, Smoke detection, and Temperature, Humidity, and CO level of the home environment. (Partial Contribution)

Aug 2023 – Oct 2023 **Infant Monitoring System** – A low-cost, mobile-based system was proposed to monitor infants in the workplace. The system uses IoT devices and real-time video transfer to monitor infants and detect safety hazards.

Jul 2023 – Aug 2023 **Hardware Trial Security Circuit** – Industrial hardware trial-run device with password-based security. Designed with PIC16F877A microcontroller. PCB and circuit design.

May 2023 – Jun 2023 **RC Plane** – Radio-controlled surveillance aircraft. Role: debugging errors and supporting teammates (with Alamin & Gulam Mustofa). Hardware: transmitter, receiver, servo motor, BLDC motor, etc.

Achievements

- **Student of the Year Award – 2025** for academic excellence, research contributions, innovation achievements, and leadership in multiple university organizations.
- **Finalist, Disaster Hackathon 2.0** – Designed a real-time cyclone alert system for coastal regions facing power and network outages. Secured a top 5 finalist position and refined the solution through intensive mentoring, with potential for real-world implementation.
- **Champion, Innovation Showcasing 2024** – Presented a cost-effective smart room concept. to assist physically challenged individuals, especially those from middle-income families.
- **Champion**, ICE Fiesta Programming Contest 2023 & **Runner-Up**, ICE Fiesta Programming Contest 2024.
- **University Merit Scholarships** (2020, 2021, 2022, and 2023).
- Competitive Programming Ranks: Codeforces Round 857 Div.2 (3rd in Bangladesh), CodeChef Starters 79 Div.2 (5th in Bangladesh), CodeChef Starters 49 Div.4 (4th in Bangladesh).

Talks & Presentations

Mar 2025 Research talk on "Autonomous Plant Health Monitoring using DH-CNN" in the Workshop on "From Ideas to Impact: Collaborative Research Opportunities between PUST and the University of Yamanashi, Japan".

Feb 2025 Seminar on "Fresher's Guide to Research" – an introductory session designed for undergraduate students with no prior experience in research, organized by Solver Green.

Dec 2024 International Conference talks: (1) "Deep Learning Based Lung Image Segmentation Using XR-U-Net", ICCIT 2024, Cox's Bazar. (2) "Generating Bangla Image Captions with Deep Learning Techniques", STI 2024, Narayanganj. (3) "Vehicle Classification and Detection Using YOLOv8", ICRPSET 2024, Rajshahi.

Oct 2024 Finalist presentation as team lead at Disaster Hackathon - 2.0; Presented a solution to deliver real-time cyclone forecasts from BMD to remote coastal regions without electricity, internet, or cellular network access.

May 2024 Innovation Showcasing 2024 – Presented "Smart Bedroom Technology" concept aimed at supporting physically challenged individuals from middle-income families, in Innovation Showcasing-2024, PUST.

Certifications

- Advanced Learning Algorithms (Coursera).
- Supervised Machine Learning: Regression and Classification (Coursera).
- Problem Solving (Intermediate) – HackerRank.
- Problem Solving (Basic) – HackerRank.

Volunteering

- Vice President – ICE Association (Jan 2024 – Sep 2025). Led student governance by launching three departmental clubs, supporting research initiatives, securing scholarships, and organizing the 1st Alumni Reunion & Fiesta 2025 along with cultural and sports events.
- Vice President – Solver Green (Sep 2024 – Nov 2025). Led initiatives to expand research opportunities by organizing seminars, workshops, and launching new courses. Advocated for early student involvement in research, ensuring that junior students gained valuable experience alongside final-year students to foster a stronger research culture.
- Class Representative – Dept. of ICE, PUST (Feb 2022 – July 2025). Managed class schedules, facilitated teacher-student communication, and supported peer well-being.
- Founding Member & Joint Organizing Secretary – PUST Career & Entrepreneurship Club (Nov 2024 – Present). Bridging the industry-academia gap.

Languages

- Bangla — Native Language
- English — Medium of instruction during B.Sc. (Engineering)

References

Dr. Md. Anwar Hossain
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I hereby declare that all the information provided here is authentic.

Signed
(Sajeeb Kumar Ray)