Rusab Sarmun

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Skills Summary

- **Programming Languages/Platforms:** Python, SQL, C, MATLAB, LaTeX
- **Machine Learning Libraries/Frameworks:** Tensorflow, Pytorch, Keras, Scikit-learn, Numpy, Pandas
- **Other Skills:** AVR Microcontroller Programming, PCB Designing, SOLIDWORKS

Education

- **University of Dhaka** — Dhaka, Bangladesh
  Bachelors in Electrical and Electronic Engineering; CGPA: 3.55/4.00 — *2017 - 2022*
  ***Major:** Computer, **Minor:** Communication,*
- **Notre Dame College** — Dhaka, Bangladesh
  Higher Secondary Certificate; GPA: 5.00/5.00 — *2016*
- **St. Joseph Higher Secondary School** — Dhaka, Bangladesh
  Secondary School Certificate; GPA: 5.00/5.00; Achieved General Scholarship — *2014*

Professional Experience

- **Qatar University Machine Learning Group**
  Research Assistant, Remote — *2022-Present*
  - **Project Leadership:** Led and contributed to over 10 machine learning and deep learning projects in the biomedical domain.
  - **Research and Data Management:** Conducted comprehensive investigations, developed models and methodologies, annotated and preprocessed training data.
  - **Research Collaboration:** Collaborated with a diverse research community of over 40 researchers and doctors, fostering a multidisciplinary approach to biomedical research.
  - **Publication:** Authored and contributed to research papers, ensuring the dissemination of findings in reputable journals.
- **FabLab DU**
  Undergraduate Research Assistant — *2018-2019*
  - **Development and Prototyping:** Designed and developed basic robotic systems, including manipulator arms, using SolidWorks for CAD modeling and 3D printing for rapid prototyping.
  - **PCB Design and Integration:** Created custom PCBs for robotic applications, focusing on efficient circuit layout and seamless integration with hardware components.
- **BiTechX LLC**
  Chief Admin Officer — *2024-Present*
- **BiTechX LLC**
  Project Manager - Creative Team — *2020-2024*

Publications

- **Sarmun, R.**, Kabir, S., Prithula, J., Alqahtani, A., Zoghoul, S. B., Al-Hashimi, I., Mushtak, A., & Chowdhury, M. E. (2024). Enhancing Intima-Media Complex Segmentation with a Multi-Stage Feature Fusion-based Novel Deep Learning Framework. Engineering Applications of Artificial Intelligence, 133, 108050. https://doi.org/10.1016/j.engappai.2024.108050
- **Sarmun, R.**, Chowdhury, M. E., Murugappan, M., Aqel, A., Ezzuddin, M., Rahman, S. M., ... & Hasan, M. A.(2024).Diabetic Foot Ulcer Detection: Combining Deep Learning Models for Improved Localization. Cognitive Computation, 1-19. https://doi.org/10.1007/s12559-024-10267-3
- Basak, P., **Sarmun, R.**, Kabir, S., Al-Hashimi, I., Bhuiyan, E. H., Hasan, A., ... & Chowdhury, M. E. (2025). Machine-agnostic automated lumbar MRI segmentation using a cascaded model based on generative neurons. Expert Systems with Applications, 264, 125862. https://doi.org/10.1016/j.eswa.2024.125862
- Kabir, S., **Sarmun, R.**, Al Saady, R. M., Vranic, S., Murugappan, M., & Chowdhury, M. E. (2025). Automating Prostate Cancer Grading: A Novel Deep Learning Framework for Automatic Prostate Cancer Grade Assessment using Classification and Segmentation. Journal of Imaging Informatics in Medicine, 1-23. https://doi.org/10.1007/s10278-025-01429-2
- Kabir, S., **Sarmun, R.**, Ramírez-Velázquez, E., Takvani, A., Ali, M., Chowdhury, M. E., & Abbas, T. O. (2025). Automated detection of posterior urethral valves in voiding cystourethrography images: A novel AI-Based pipeline for enhanced diagnosis and classification. Computers in Biology and Medicine, 185, 109509. https://doi.org/10.1016/j.compbiomed.2024.109509

- Nahiduzzaman, M., **Sarmun, R.**, Khandakar, A., Faisal, M. A. A., Islam, M. S., Alam, M. K., ... & Chowdhury, M. E. (2025). Deep learning-based real-time detection and classification of tomato ripeness stages using YOLOv8 on raspberry Pi. Engineering Research Express, 7(1), 015219. https://doi.org/10.1088/2631-8695/ada720

- Bushra, F., Chowdhury, M. E., **Sarmun, R.**, Kabir, S., Said, M., Zoghoul, S. B., ... & Hasan, A. (2024). Deep learning in computed tomography pulmonary angiography imaging: A dual-pronged approach for pulmonary embolism detection. Expert Systems with Applications, 245, 123029.. https://doi.org/10.1016/j.eswa.2023.123029

- Kabir, S., Vranic, S., Al Saady, R. M., Khan, M. S., **Sarmun, R.**, Alqahtani, A., ... & Chowdhury, M. E. (2024). The utility of a deep learning-based approach in Her-2/neu assessment in breast cancer. Expert Systems with Applications, 238, 122051. https://doi.org/10.1016/j.eswa.2023.122051

- Islam, M. S. B., Sumon, M. S. I., **Sarmun, R.**, Bhuiyan, E. H., & Chowdhury, M. E. (2024). Classification and segmentation of kidney MRI images for chronic kidney disease detection. Computers and Electrical Engineering, 119, 109613. https://doi.org/10.1016/j.compeleceng.2024.109613

- Rahman, A., Chowdhury, M. E., Wadud, M. S. I., **Sarmun, R.**, Mushtak, A., Zoghoul, S. B., & Al-Hashimi, I. (2025). Deep learning-driven segmentation of ischemic stroke lesions using multi-channel MRI. Biomedical Signal Processing and Control, 105, 107676. https://doi.org/10.1016/j.bspc.2025.107676

- [Accepted] Kabir, S., Chowdhury, M. E., **Sarmun, R.**, Vranic, S., Al Saady, R. M., Rose, I., & Gatalica, Z. (2023). A novel deep learning framework for automatic scoring of PD-L1 expression in non-small cell lung cancer. Biomolecules and Biomedicine, ISSN: 2831-0896 (Print) — ISSN: 2831-090X (Online)

Projects

- **PulseGuard: ECG Digitization and Myocardial Infarction Detection System**
  Research Project *2025*
  - Developed a **CNN-LSTM** network trained on the **PTB-XL dataset** to classify normal and Myocardial Infarction (MI) from ECG 12-lead signals with high accuracy.
  - Synthetically generated a paired dataset of ECG signal printouts for enhanced model robustness.
  - Utilized a **YOLO**-based model to accurately extract ECG lead signals from printouts, enabling more efficient signal processing.
  - Applied image processing techniques to digitize ECG signals extracted by the YOLO model, improving the model's ability to analyze and detect MI from printed ECG data.
  - Leveraged the CNN-LSTM model to achieve robust detection of MI, significantly enhancing the clinical utility of the system.
  - **Github link:** https://github.com/Rusab/PulseGuard

- **Driver Distraction Notification System Using Raspberry Pi**
  Engineering Project *2025*
  - Designed and developed a **Raspberry Pi**-based driver distraction notification system that utilizes the **YOLO** model for real-time detection of face position and potentially distracting objects (e.g., phone, bottle) during driving.
  - Implemented a severity classification system for distractions, categorizing them into four levels based on the position of detected objects and face orientation.
  - Integrated an audible warning system for each severity category, and programmed an automated email notification feature that alerts authorities if the most severe distraction occurs three times.
  - Enhanced driver safety by offering timely warnings and facilitating intervention through automatic alerts in critical situations.

- **3D Electronic Organ Model Generation from Abdominal CT Scans**
  Research Project *2024*
  - Developed a **Multiclass 3D U-Net** with **DenseNet121** encoder to segment abdominal organs from CT scans using the **AMOS dataset**, ensuring accurate organ delineation.
  - Generated iso-surfaces from the model's multiclass predictions, converting volumetric masks into mesh representations to create detailed 3D organ models.
  - Implemented 3D organ modeling techniques to enhance the understanding of organ structures, with potential applications in surgical planning and diagnosis.

- **Neuropathy Biomarker Identification from Corneal Confocal Microscopy Images**
  Research Project *2024*
  - Developed a deep learning-based system using **DenseNet121MA-Net** for multiclass segmentation of main and branch nerves from Corneal Confocal Microscopy (CCM) images, aiding in the identification of diabetic neuropathy biomarkers.
  - Calculated important clinical biomarkers for diabetic neuropathy, including nerve **number**, **length**, **tortuosity**, and **branch points**, directly correlating them with neuropathy severity.

- Achieved high-quality segmentation performance, contributing to improved diagnostic accuracy and providing valuable insights into the pathophysiology of diabetic neuropathy.

- **Coronary Artery Segmentation from X-Ray Angiogram Images using Deep Learning**
  Research Project *2023*
  - Developed a precise coronary artery segmentation pipeline to aid early diagnosis of coronary artery disease.
  - Proposed a segmentation pipeline consisting of three blocks: angiographic image pre-processing for better contrast, coronary artery segmentation using the novel **Self-ONN-based** (Operational Neural Network) architecture, and outcome refinement for clearer results, named Coronary Artery Segmentation and Refinement Network (**CASR-Net**).
  - Utilized **UNet** with **DenseNet121** encoder and a modified **Self-ONN-based** decoder for coronary artery segmentation, facilitating context capture and precise localization.
  - Conducted extensive investigations to optimize each block and compared our approach with state-of-the-art segmentation networks such as **UNet**, **UNetPlusPlus**, **MAnet**, and **LinkNet** on a combined dataset of stenotic and healthy coronary arteries.
  - Investigated various refinement techniques, including contour filtering, deep learning-based refinement, and path line generation, to identify and remove false positive contours and discontinuities for more accurate representation of coronary arteries.
  - Achieved significant improvements in segmentation performance, with our proposed network and refinement techniques outperforming conventional segmentation networks, achieving 61.43% intersection of union **(IoU)** and 76.10% dice score coefficient **(DSC)**.

- **Computer Vision Based Batch-Billing System for Supermarket Products using YOLO**
  Undergraduate Thesis *2020-2022*
  - Utilized the **PyTorch** Framework and **OpenCV** library to detect products via a table-mounted webcam. Multiple products can be detected and billed simultaneously in real-time.
  - Created and annotated a custom dataset of 3056 images of 26 distinct products, then trained the **YOLOv5** models using a transfer learning approach.
  - Improved model performance through data augmentation with synthetic images and the application of ensembling techniques.
  - Incorporated a multiple **ArUco Marker** system to bill items based on weight.
  - Developed a GUI-based interface using the **PyQt5** framework for enhanced user convenience.
  - **Github link:** https://github.com/Rusab/Supermall-Checkout-system-yolov5

Awards

- **AI Hackathon 2025** — Champion
  AI Hackathon, The Daily Star Headquarter — *February 2025*
- **Robi Datathon 3.0** — Top 7 Finalist
  AI Hackathon, Robi Axiata Headquarter — *June 2024*
- **Eighth QU Health Sector Annual Research Symposium** — 2nd Place
  Research Poster Presentation, Qatar University — *April 2024*
- **GPH Esho Robot Banai** — 2nd Runner-Up
  Maze Solver Segment, Channel-i Studio — *January 2019*
- **BUET Robofiesta** — 2nd Runner-Up
  Line follower Segment, Bangladesh University of Engineering and Technology — *July 2018*
- **NSU Technovation** — Champion
  Line follower Segment, North South University — *February 2018*
- **DRMC Science Festival** — Champion
  Line follower Segment, Dhaka Residential Model College — *February 2018*
- **DUSS Science Festival** — Champion
  Line follower Segment, University of Dhaka. — *August 2017*