PUJA SAHA

Website | Google Scholar | LinkedIn | GitHub | Blog
psaha03@uoguelph.ca | Guelph, ON, Canada.

EDUCATION

University of Guelph, Canada   [Sept 2023 - Present]
M.A.Sc. in Computer Engineering, CGPA: **3.93**/4.00

Bangladesh University of Professionals, Bangladesh   [Feb 2016 - Jan 2020]
B.Sc. in Biomedical Engineering, CGPA: **3.68**/4.00

RESEARCH INTERESTS

Distributed Learning, Multimodal AI, Model Architecture, Machine Learning Systems and Optimization, Computer Aided Diagnosis, Computer Vision, and Robotics.

TECHNICAL SKILLS

- **Frameworks and Tools**: PyTorch, Flower, PySpark, OpenCV, TensorFlow, LangChain, Ragas, Scikit-learn, Pandas, NumPy, Matplotlib, Seaborn, NiBabel, Keras.
- **Programming Languages**: Python, MATLAB, C. **OS:** Linux, Mac, Windows.
- **Design and Simulation:** SOLIDWORKS, Ansys, OrCAD PSpice.
- **Technologies:** Cloud Computing (AWS, Compute Canada), Federated Learning, Git.

PROJECTS

Multiclass Semantic Segmentation | *Tech Stack: PyTorch, Torchvision, OpenCV, NumPy, matplotlib, tqdm, etc.*

A PyTorch-based solution for multiclass semantic segmentation on the KiTS19 dataset, specifically targeting kidney and tumor regions in abdominal CT scans. After thorough data analysis and preparation, advanced image preprocessing techniques and optimized training and testing workflows were applied, resulting in strong quantitative performance metrics: a Dice score of 91.03% for kidney segmentation and 62.82% for tumor segmentation. *GitHub Link*

Medical Chatbot | *Tech Stack: Pinecone, LangChain, Ragas, PyTorch, NumPy, Seaborn, tqdm etc.*

Employing language model with retrieval-augmented generation, trained on a reliable dataset from PubMed, our chatbot achieved 96.7% context precision, 95% context recall, 85% faithfulness, 73% answer relevancy, and 69.4% answer correctness in its responses. *GitHub Link*

Job Market Analysis and Salary Prediction | *Tech Stack: Apache Spark, Pandas, NumPy, Scikit-learn, Seaborn, etc.*

This big data-driven project involves exploratory data analysis and salary prediction for the global job market from 2021 to 2023, encompassing over 1.6 million records. Using PySpark for EDA, the project uncovered exciting insights and achieved salary predictions with an RMSE error of approximately $10K. *GitHub Link*

Human Pose Estimation | *Tech Stack: PyTorch, NumPy, Scikit-learn, TensorBoard, tqdm, Matplotlib, etc.*

Using a CNN-based regression technique to track human body posture by identifying 14 key joint coordinates, we achieved an impressive mean squared error (MSE) of 0.0878. GitHub Link

Predictive Modeling of Property Prices | *Tech Stack: Pandas, Scikit-learn, NumPy, Matplotlib etc.*

In this project, we performed regression using spectrum of machine learning models and ensemble techniques (e.g., Bagging and Boosting) to predict house prices. The Random Forest model achieved an impressive mean squared error (MSE) of 0.0012. GitHub Link

CONFERENCE PROCEEDINGS

1. *Saha P.,* Jhalak S.C., Mehrab A., Alam J. (2022) *Convolutional Neural Network to Classify Medical Images of Rare Brain Disorders.* International Conference on Healthcare Engineering (ICHE'22) in Malaysia, 23-25 Sept, 2022

2. *Saha P.,* Tasnim A., Omi O.A., Rahman T., Ashrafuzzaman M. (2020) *Photosweep: An Engineering Approach to Develop Cost Effective Sterilization System for Hospitals.* Advances in Decision Sciences, Image Processing, Security and Computer Vision. Learning and Analytics in Intelligent Systems, vol 3. Springer, Cham. International Conference on Emerging Trends in Engineering (ICETE 2019) in Hyderabad, India, 22-23 March, 2019.
3. *Saha P.,* Tuba M.A., Ahmed K.A., Ashrafuzzaman M. (2020) *Development of an Inexpensive Proficient Smart Walking Stick for Visually Impaired People.* Advances in Decision Sciences, Image Processing, Security and Computer Vision. Learning and Analytics in Intelligent Systems, vol 3. Springer, Cham. International Conference on Emerging Trends in Engineering (ICETE 2019) in Hyderabad, India, 22-23 March, 2019

PROFESSIONAL DEVELOPMENT

Graduate Research Assistant [Sept 23 - Present]
AI-Enabled Medical Image Analysis Lab, University of Guelph, Canada

Graduate Teaching Assistant [Jan 24 - Present]
School of Engineering, University of Guelph, Canada
Courses: Medical Imaging Modalities (Fall-2024), Engineering Design (Winter-2024, Winter-2025).

Intern Engineer [Dec 2018]
Radiotherapy Department, Ahsania Mission Cancer and General Hospital, BD

Certified Courses:
- 'MRI Fundamentals' offered by KAIST in Coursera.
- 'SOLIDWORKS Application in Biomedical Engineering' offered by MIST.
- 'Microcontroller [PIC-16F877A] and Robotics' offered by MIST.

CO-CURRICULAR ACTIVITIES

- Judge: Senior and Junior Project Competitions at the University of Guelph
- Oral Presentations: ICHE-2022 in Malaysia, ICETE-2019 in India.
- Poster Presentations: BME Festival-2018, ICMPROI-2018, Dhaka
- Project Presentations: Microcontroller-Based Project Fair, BME Festival-2018, Dhaka
- Club Memberships: Active Member of BME Einthoven Club, Robotics Club, MIST

AWARDS & ACHIEVEMENTS

- Queen Elizabeth-II Graduate Scholarship in Science and Technology ($15k). [May 2024- Apr 2025]
- Graduate Tuition Scholarships at the University of Guelph ($16k). [Sept 2023- Aug 2025]
- Research Fellowship at the University of Guelph ($12k). [Sept 2023- Aug 2025]
- Internal Growth Scholarship at the University of Guelph ($11k). [Sept 2023- Aug 2025]
- 5th Best Paper Award at IEEE International Conference on Healthcare Engineering-2022. [Sept 2022]
- MIST Silver Coin (Research). [Feb 2020]
- MIST Dean's List and Merit Scholarships. [2017-2019]
- Top Project Award and Best Informative Poster Award at BME Fest in MIST. [Oct 2018]
- 2nd Runners up: Inter-Department 'Microcontroller Based Project Fair' at MIST. [Jan 2018]
- 2nd Runners up: HULTPRIZE@MIST; Selected in Shanghai Regional Final. [Dec 2017]
- Bangladesh Education Board Merit Scholarships. [2010, 2013]