Moh Sabbir Saadat

Ph.D. - Computer Engineering
University of South Carolina

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HIGHLIGHTS

- Develop, implement, and publish novel research ideas in **Sensing** and **Imaging**
- Implement **multi-modal** system prototypes with **hardware-software synchronization**
- Execute large-scale, distributed **data processing** and **model training/testing** on CUDA-based GPU server
- Advanced skills in applied **Machine Learning**, **Signal Processing** *(Image, Audio, Wireless)*, and **Coding**

EXPERIENCE

Graduate Research/Teaching Assistant   **January, 2019 — Present**
SyReX Lab - University of South Carolina   *Columbia, SC, USA*

- Explored the potential of wireless signal to achieve fine-grained perception and imaging *(9 publications, 1 patent)*
- Collaborative research, presentation, and visualization of outcomes, planning, and team-building
- Assisted a 400+ level class on computer networks with 100+ students *(Socket programming with Java, Python, and C)*

Executive Engineer   **October, 2016 — November, 2018**
Siemens Healthcare Limited   *Dhaka, Bangladesh*

- Oversaw the technical requirements of potential clients
- Built liaison between engineering department and existing clientele

EDUCATION

Ph.D. in Computer Engineering, *University of South Carolina*   **December, 2024** (tentative)
Master's in Computer Engineering, *University of South Carolina*   **August, 2024**
B.Sc. in Electrical & Electronic Engineering, *Bangladesh University of Engineering & Technology*   **March, 2016**

SKILLS

Programming languages	Python, Java, C, C++, Matlab, HTML
Software libraries	PyTorch, TensorFlow, Keras, OpenCV, Robot Operating System (ROS), Scikit-learn, Pandas, Ray, Ffmpeg
Deep learning models	Graph Networks, Vision Transformer, Generative Adversarial Network (GAN), ResNet, Auto-encoder, LSTM
Computational skill	Signal and Image processing, Visualization, Data analysis, Data structures & Algorithms
Tools	Git version control, Shell scripting, LaTeX, Gnuplot, Inkscape, Onshape CAD
Operating System	Linux, Windows
Soft skills	Excellent verbal and written communication, Team player, Fast learner

PROJECTS

❒ **Automated NIH stroke scale segmentation from multiple sensors**

- Processing **3D skeletal structure, 2D images, audio signal, wireless reflections**
- Used **Audio Speech Recognition (ASR)** model, OpenAI's **whisper**
- Used **Large Language Models (LLM)**, **BERT** and **Sentence-BERT** to map transcript to instruction
- Used Google's joint tracking model, **Mediapipe** to generate **3D skeletal joints**

❒ **Multi-sensor fusion for contactless posture asymmetry scoring**

- Multi-sensor prototype based on **MATLAB** and **Python** *(4k camera, depth sensor, audio, wireless signal)*
- Use **Machine learning** and **Signal processing** to map multi-sensory intelligence to meaningful **posture asymmetry** score
- Utilize established methods in **Computer Vision, Audio Processing**, and **Large Language Models** to process data

❒ **Co-existence of human-activity sensing on indoor networking system**

- **Graph neural network** pipeline to overcome low-rate sensing signal due to co-existing networking
- **Graph** and **Recurrent neural network (LSTM)** to estimate **3D posture** sequence of human body
- Exploring **Vision Transformer** to develop an end-to-end system

❒ **Imaging hidden objects with hand-held millimeter-wave devices**

- Overcome sparse sampling and motion non-linearity with a set of **signal processing** methods *(compressed sensing, unsupervised clustering etc.)*
- Improve imaging quality through **cGAN-based image super-resolution**

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RECENT PUBLICATIONS

- **Moh Sabbir Saadat**, Sanjib Sur. "Enabling Coexistence of Indoor Millimeter-Wave Networking and Human Activity Sensing." *2024 IEEE/ACM International Conference on Connected Health: Applications, Systems, and Technologies (June 2024)* [**CHASE 2024**]

- **Moh Sabbir Saadat**, Sanjib Sur. "Poster: Human Activity Sensing from Low-rate Samples under Integrated Networking." *2024 IEEE/ACM International Conference on Connected Health: Applications, Systems, and Technologies (June 2024)* [**CHASE 2024**]

- **Moh Sabbir Saadat**, Sanjib Sur, Srihari Nelakuditi. "Aquilo: Temperature-Aware Scheduler for Millimeter-Wave Devices and Networks." *The Elsevier High Confidence Computing journal* [**Elsevier HCC 2024**]

- Edward Sitar, **Moh Sabbir Saadat**, Sanjib Sur. "A Millimeter-Wave Wireless Sensing Approach for At-Home Exercise Recognition." *Proceedings of the ACM International Conference on Mobile Systems, Applications, and Services (June 2022)* [**MobiSys 2022**]

- Hem Regmi, **Moh Sabbir Saadat**, Sanjib Sur, Srihari Nelakuditi. "SquiggleMilli: Approximating SAR Imaging on Mobile Millimeter-Wave Devices." *Proceedings of the ACM on Interactive, Mobile, Wearable, and Ubiquitious Technologies (September 2021)* [**IMWUT 2021**]

- Hem Regmi, **Moh Sabbir Saadat**, Sanjib Sur, Srihari Nelakuditi. "ZigZagCam: Pushing the Limits of Hand-held Millimeter-Wave Imaging." *ACM International Workshop on Mobile Computing Systems and Applications (February 2021)* [**HotMobile 2021**] (**Best Poster Runner-up Award**)

- **Moh Sabbir Saadat**, Sanjib Sur, Srihari Nelakuditi. "A Case for Temperature-Aware Scheduler for Millimeter-Wave Devices and Networks." *The 28th IEEE International Conference on Network Protocols (October 2020)* [**ICNP 2020**]

- **Moh Sabbir Saadat**, Sanjib Sur, Srihari Nelakuditi. "Bringing Temperature-Awareness to Millimeter-Wave Networks." *ACM International Conference Mobile Computing and Networking (September 2020)* [**MobiCom 2020**]

- **Moh Sabbir Saadat**, Sanjib Sur, Srihari Nelakuditi, Parmesh Ramanathan. "MilliCam: Hand-held Millimeter-Wave Imaging." *The 29th IEEE Conference on Computer Communications and Networks (August 2020)* [**ICCCN 2020**]

PUBLICATIONS UNDER REVIEW

- **Moh Sabbir Saadat**, Sanjib Sur. "Enabling Human Activity Sensing on a Co-existing Millimeter-Wave Networking System." *ACM Transactions on Internet of Things* [**TIOT**]

PATENT

Sanjib Sur, Moh Sabbir Saadat, Srihari Nelakuditi, *"Heat Dissipation for Millimeter-wave Devices with Antenna Switching"* (Granted: February 2023)

AWARDS

- **Student travel grant, CHASE'24**: *Presenting work on enabling sensing on integrated networking system*

- **Best poster runner-up at ACM HotMobile'21**: *For early work on hand-held millimeter-wave imaging*

- **Saluting the Nation Builders of Tomorrow 2008/2010, The Daily Star** : *For outstanding achievement in GCE O/A level*

PROFESSIONAL SERVICES

- **External Reviewer** → IEEE Transactions on Mobile Computing 2022 → IEEE/ACM Transactions on Networking 2023 → IEEE International Conference on Mobility, Sensing, and Networking (MSN'23) → IEEE/ACM International Conference on Internet of Things Design and Implementation (IoTDI'23) → EAI Mobiquitious 2022

- **Other Services** → Served as the Vice President of Bangladesh Student Association of University of South Carolina 2021-2022 → Served as the General Secretary of Bangladesh Student Association of University of South Carolina 2020-2021 → Served as an adjudicator at the NALSAR University Debating Tournament, Hyderabad, India 2012