

Moh Sabbir Saadat

Ph.D. - Computer Engineering
University of South Carolina

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HIGHLIGHTS

I am a researcher specializing in ubiquitous wireless sensing (mmWave radio) and digital health perception using multi-modal data. My expertise spans digital signal processing, deep learning, and machine learning. My work focuses on building robust, data-driven systems that bridge advances in AI/ML with intelligent perception applications. I also have experience in collaborative and inter-disciplinary research. **I am at the "All But Defense" stage in my Ph.D., and is looking for a suitable opportunity.**

EXPERIENCE

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

- Pursue novel ideas in ubiquitous wireless sensing and digital health perception. (*9 publications, 1 patent*).
- Build synchronized multimodal systems (*radio, camera, audio*), execute data preprocessing, and develop evaluation benchmarks.
- Build complex ML models, and execute large-scale distributed training on GPU backend to benchmark them for various tasks.
- Spearhead inter-disciplinary research collaboration through knowledge-sharing and visualization of outcomes.
- Assisted a 400+ level class on computer networks with 100+ students for 6 semesters (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 in the medical imaging domain.
- Built liaison between the engineering department and the existing clientele.

EDUCATION

Ph.D. in Computer Engineering, *University of South Carolina* **April, 2026**
M.Sc. in Computer Engineering, *University of South Carolina* **August, 2024**
B.Sc. in Electrical & Electronics Engineering, *Bangladesh University of Engineering & Technology* **March, 2016**

SKILLS

Software Engineering: Python, MATLAB, C++, Java, HTML, Git version control, Shell scripting, Linux.
ML libraries: PyTorch, TensorFlow, Keras, TensorBoard, Ray Tune, Scikit-learn, MATLAB Deep Learning.
ML models: Graph Neural Network, Vision Transformers, Generative Adversarial Network (GAN), Autoencoder, Few-shot Learning, LSTM.
Foundation AI models: MobileNet, ResNet, Mediapipe, HRNet, Whisper, WhisperX, BERT, Sentence-BERT.
Computational skills: Range-angle, Micro-doppler, Antenna array (FMCW radar), PCD processing, Clustering, STFT, Wavelet, DTW.
Tools: Latex, Gnuplot, Inkscape, Onshape CAD, TI mmWave Studio, ROS, Codex, Github Copilot.

PROJECTS

- **Vision and Audio-based digital health perception for post-stroke recovery assessment** (*Multi-modal sensors, pose, ASR, time-series*)
 - Built multi-sensors prototype with fine hardware-software synchronization. (*4k camera, microphone array, smart-watch, wireless*)
 - Facilitating the collection of clinical trials from stroke survivors and healthy subjects for post-stroke recovery assessment.
 - Translating conventional clinical practices to a vision- and audio-based AI-enabled automated system.

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- * Assessing motor functionality from full-body images and facial abnormality from facial images. (*HRNet, Mediapipe*)
 - * Image processing pipeline to mask identity and lighting conditions in facial images.
 - * Audio noise cancellation and Audio Speech Recognition (ASR). (*Spectral noise cancellation, Whisper, WhisperX*)
 - * Cognitive assessments through Large Language Models (LLM). (*BERT, Sentence-BERT, BLIP*)
 - * Exploring speech intelligibility through phonetic comparison.
- **Co-existence of human-activity sensing on indoor wireless system** (*3D pose, Range-angle, μ -doppler, Graph Neural Network, Xformer*)
 - Graph neural network pipeline to overcome low-rate sensing signal due to co-existing networking.
 - Graph and Recurrent neural network (LSTM) to estimate sequences of 3D keypoints coordinates.
 - Deployment of activity recognition model on a real-time system ($\sim 98\%$ prediction accuracy with $\sim 2s$ initial latency).
 - Explored the Transformer model to develop an end-to-end system leveraging range-angle-doppler heatmaps sequence.
 - **Imaging hidden objects with handheld millimeter-wave devices** (*SAR, Compressed sensing, cGAN, Ray-tracing*)
 - Leverage Synthetic Aperture Radar (SAR) principle to enable imaging from a small antenna array.
 - Overcome sparse sampling and motion non-linearity with signal processing methods. (*compressed sensing, unsupervised clustering*)
 - Overcome information loss in reflected wireless signal through cGAN-based image super-resolution.
 - Overcome the lack of ground truth data through ray-tracing based simulation of wireless signal reflections.
 - **Temperature characterization and mitigation through scheduling** (*Mathematical modeling, Algorithm design*)
 - We study the temperature behavior of a 60-GHz mmWave access points.
 - We propose a smart scheduling scheme to overcome the overheating problem in mmWave networking devices.

RECENT PUBLICATIONS

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- *[Under review]* **Moh Sabbir Saadat**, Ryan Titus, Haley Verkuilen, Phil Fleming, Souvik Sen, Sanjib Sur. “*NeuroMotion: A Contactless and Automated Approach to Assessing Post-Stroke Severity in Facial and Motor Functions.*” *IEEE Transactions on Neural Systems and Rehabilitation Engineering* [TNSRE 2026]
 - *[To be submitted]* **Moh Sabbir Saadat**, Ryan Titus, Haley Verkuilen, Phil Fleming, Souvik Sen, Sanjib Sur. “*NeuroConv: An Automated Approach to Assessing Post-Stroke Speech Functions from Audio.*” *IEEE Transactions on Neural Systems and Rehabilitation Engineering* [TNSRE 2026]
 - **Moh Sabbir Saadat**, Ryan Titus, Haley Verkuilen, Phil Fleming, Sanjib Sur, Souvik Sen. “A Contactless and Automated Approach to the Acute Stroke Assessment.” *AHA International Stroke Conference (February 2025)* [AHA ISC 2025]
 - **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. “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]

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- **Moh Sabbir Saadat**, Sanjib Sur, Srihari Nelakuditi. "Aquila: 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 Ubiquitous 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**]

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 Ubiquitous 2022
 - Pervasive and Mobile Computing 2025
- **Other Services**
 - Served as the Vice President of Bangladesh Student Association at the University of South Carolina 2021-2022
 - Served as the General Secretary of Bangladesh Student Association at the University of South Carolina 2020-2021
 - Served as an adjudicator at the NALSAR University Debating Tournament, Hyderabad, India 2012