

# MD FARHAN TASNIM OSHIM

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Work Authorization: U.S. Permanent Resident (Green Card under EB2 NIW)

## EDUCATION

**UNIVERSITY OF MASSACHUSETTS AMHERST**, MA, USA

Dec 2025 (Expected)

*Ph.D. in Computer Science*

Advisor: Prof. Tauhidur Rahman

Thesis: Towards High-Fidelity Motion Characterization via Radar Vibrometry - Applications in Vital Sign Monitoring and Human-Object Interaction.

**RWTH AACHEN UNIVERSITY**, NW, Germany (Top Engineering School in Germany)

*M.Sc. in Electrical and Computer Engineering*

Advisor: Prof. Peter Vary

Thesis: Optimized Signal Constellations for Hierarchical Modulations with Iterative Decoding.

**ISLAMIC UNIVERSITY OF TECHNOLOGY**, Dhaka, Bangladesh

*B.Sc. in Electrical and Electronic Engineering*

Advisor: Prof. Mohammad Rakibul Islam

Thesis: Efficient Design of Decoding Algorithms using Low Density Parity Check (LDPC) Codes for Wireless Networks.

CGPA: 3.96/4.00 (Top 5% of the class)

## RESEARCH EXPERIENCE

**UNIVERSITY OF MASSACHUSETTS AMHERST**, MA, USA

2018 – Present

*Research Assistant*, Mobile Sensing and Ubiquitous Computing Laboratory ([MOSAIC](#))

- Conduct cutting-edge research on RADAR-based contactless vital sign estimation, vibration-based tagging, motion magnification, NeRF-based SAR, and indoor localization as a Research Assistant at MOSAIC Lab, with findings published in top-tier HCI and Robotics conferences.

**UNIVERSITY OF CALIFORNIA SAN DIEGO**, CA, USA

Jun – Aug 2024

*Research Intern*, Halicioğlu Data Science Institute ([HDSI](#))

- Spearheaded the research project on "Adversarial Perturbations against Unauthorized Radar Sensing," enhancing radar-based gesture recognition and vital sign monitoring. Findings published at ICRA 2025.

**QUALCOMM**, San Diego, CA, USA

Jun – Aug 2023

*Interim Engineering Intern*

- Developed an RNN-based contactless gesture recognition model using FMCW radar data, achieving over 97% classification accuracy.
- Benchmarked against MLP, LSTM and GMM models, achieving superior accuracy and inference speed suitable for real-time embedded deployment, significantly enhancing overall system efficiency.

**TESLA**, Palo Alto, CA, USA

Sep 2022 – Jan 2023

*Research Intern*

- Built vision-based robots for automated data collection and analysis in Passive Entry evaluation using OpenCV, CNNs, and OCR on Raspberry Pi, reducing time to one-fourth, eliminating manual labor and errors, and saving significant costs.
- Executed benchmarking of radar modules from multiple vendors for cabin occupancy detection, evaluating key specs and cost to integrate the best radar for ML-based feature extraction.

**QUALCOMM**, San Diego, CA, USA

May – Sep 2022

*Interim Engineering Intern*

- Implemented a real-time contactless vital sign system using FMCW radar, achieving 0.5 bpm MAE for BR and 1.5 bpm MAE for HR.
- Designed and deployed digital filters, ICA, PCA, and the MUSIC algorithm to enhance system accuracy and reliability.

**BOSCH**, Stuttgart, BW, Germany

Jan – Jul 2015

*Research Intern*

- Implemented Software Defined Radio (SDR) for a Continuous Phase Frequency Shift keying (CP-FSK) based communication system in GNU Radio for power line communication within EV car-battery.
- Designed, evaluated, and tested single and multicarrier modulation schemes with synchronization algorithms through real-channel measurements using USRPs (Universal Software Radio Peripherals).

**FRAUNHOFER FKIE**, Bonn, NW, Germany

Jan – Jul 2014

*Research Intern*

- Designed and implemented a Bit Interleaved Coded Modulation with Iterative Decoding (BICM-ID) based digital communication system that adapts decoding complexity and performance according to the propagation conditions and receiver capabilities.
- Contributed to Software Defined Radio (SDR) activities team in the ongoing research on the topic of future tactical wideband networking waveforms at FKIE facility.

## SKILLS

- Machine Learning & Deep Learning (CNNs, Transformers, Object Recognition & Tracking, Image Segmentation, Pattern Recognition, Feature Extraction), Computer Vision & 3D Modeling (Image Analysis, 3D Reconstruction, Motion Magnification, Neural Radiance Fields (NeRF), Gaussian Splatting, Object Pose Estimation), Signal Processing & Radar Imaging (Time-Series Data Analysis, SAR, Statistical Analysis, Algorithm Development), High-Performance Computing & Implementation (CUDA, Parallel Computing, Big Data Analysis), Visualization & Data Interpretation (Data Visualization, Exploratory Data Analysis (EDA))
  - Programming : Python, C++, MATLAB, PyTorch, TensorFlow, OpenCV, R, SQL, Apache (Hadoop, Spark)
  - Hardware : UWB Radar, FMCW Radar, Doppler Radar, Arduino ESP-32, Raspberry Pi, USRP.

## PUBLICATION

- Md Farhan Tasnim Oshim**, Huaishu Peng, Tauhidur Rahman, “*MetaScatter: Computational Design of 3Dprinted Meta-Reflector Structures Supporting Radar-Based Identification*”, *MobileHCI 2025* (Under Preparation).
- Md Farhan Tasnim Oshim**, Nigel Doering, Bashima Islam, Tsui-Wei Weng, Tauhidur Rahman, “*Anti-Sensing: Defense against Unauthorized Radar-based Human Vital Sign Sensing with Physically Realizable Wearable Oscillators*”, *IEEE ICRA 2025*. [\[PrePrint\]](#)
- Md Farhan Tasnim Oshim**, Albert Reed, Suren Jayasuriya, Tauhidur Rahman, “*NeRF-enabled Analysis-Through-Synthesis for ISAR Imaging of Small Everyday Objects with Sparse and Noisy UWB Radar Data*”, *International Conference on Intelligent Robots and Systems, IEEE IROS 2024*. [\[Link\]](#) | [\[PDF\]](#) | [\[Video\]](#)
- Charlotte Goldfine, **Md Farhan Tasnim Oshim**, Brittany Chapman, Deepak Ganesan, Tauhidur Rahman, Stephanie Carreiro, “*Contactless Monitoring System Versus Gold Standard for Respiratory Rate Monitoring in Emergency Department Patients: Pilot Comparison Study*” *JMIR Formative Research 2024*. [\[Link\]](#) | [\[PDF\]](#)
- Md Farhan Tasnim Oshim**, Toral Surti, Charlotte Goldfine, Stephanie Carreiro, Deepak Ganesan, Suren Jayasuriya, Tauhidur Rahman, “*Eulerian Phase-based Motion Magnification for High-Fidelity Vital Sign Estimation with Radar in Clinical Settings*”, *IEEE Sensors 2022*. [\[Link\]](#) | [\[PDF\]](#)
- Md Farhan Tasnim Oshim**, Julian Killingback, Dave Follette, Huaishu Peng, Tauhidur Rahman, “*MechanoBeat: Monitoring Interactions with Everyday Objects using 3D Printed Harmonic Oscillators and Ultra-Wideband Radar*”, *ACM UIST 2020*. [\[Link\]](#) | [\[PDF\]](#) | [\[Video\]](#) | [\[Media Coverage\]](#)
- Md Farhan Tasnim Oshim\***, Charlotte Goldfine\*, Stephanie Carreiro, Brittany Chapman, Deepak Ganesan, Tauhidur Rahman, “*Respiratory Rate Monitoring in Clinical Environments with a Contactless Ultra-Wideband Impulse Radar-based Sensor System*”, *HICSS 2020*. [\[Link\]](#) | [\[PDF\]](#) | \* Equal Contribution
- Matthias Tschauner, **Md Farhan Tasnim Oshim**, Marc Adrat, Markus Antweiler, Benedikt Eschbach, Peter Vary, “*Design and analysis of hierarchically modulated BICM-ID receivers with low inter-layer interferences*”, *Springer: Journal of Signal Processing Systems 2017*. [\[Link\]](#) | [\[PDF\]](#)
- Matthias Tschauner, **Md Farhan Tasnim Oshim**, Marc Adrat, Markus Antweiler, Benedikt Eschbach, Peter Vary, “*On the Design of Hierarchically Modulated BICM-ID Receivers with Low Inter Layer Interferences*”, *WInnComm Europe 2015*. [\[Link\]](#) | [\[PDF\]](#)
- Marc Adrat, **Md Farhan Tasnim Oshim**, Matthias Tschauner, Markus Antweiler, Benedikt Eschbach, Peter Vary, “*On hierarchically modulated BICM-ID for receivers with different combinations of Code Rate and Modulation Order*”, *WInnComm 2015*. [\[Link\]](#) | [\[PDF\]](#)
- Mohammad Rakibul Islam, Khandaker Sultan Mahmood, **Md Farhan Tasnim Oshim**, and Md. Moshir Rahman Farazi, “*Intensity reflection coefficient based Min-Sum decoding for Low Density Parity Check Codes*”, *Frequenz: Journal of RF-Engineering and Telecommunications 2012*. [\[Link\]](#) | [\[PDF\]](#)

## HONORS AND AWARDS

- Dr. Dave Lomet Graduate Scholarship* at CICS, UMass Amherst (\$5,000) 2025
- CICS UMass Amherst Travel Grant* for attending IROS 2024 (\$800) 2024
- IEEE Robotics & Automation Society Travel Grant* for attending IROS 2024 (\$1,000) 2024
- Graduate Teaching Fellowship* by CICS, UMass Amherst AY 2023 – 2024
- Krithi Ramamritham Computer Science Scholarship* at CICS, UMass Amherst (\$1,600) 2022
- Organization of Islamic Cooperation (OIC) Scholarship* for Undergraduate studies (\$7,500) 2011

## SERVICE

- Reviewer for *ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)* 2024 & 2019
- Hackathon Judge at *HackUMass’24 & Hack(H)er-413 Hackathon’24* 2024
- Graduate Representative, *CICS, UMass Amherst* AY 2021 – 2022
- Student Volunteer at *34<sup>th</sup> ACM Symposium on User Interface Software and Technology (UIST)* 2021