MD FARHAN TASNIM OSHIM

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EDUCATION

University of Massachusetts - Amherst **December 2024**
PhD, Computer Science
- Thesis: Towards High-Fidelity Motion Characterization using Radar Vibrometry - Applications in Vital Sign Monitoring and Human Object Interaction.

RWTH Aachen University, Germany **October 2015**
Master's, Communications Engineering
- Thesis: Optimized Signal Constellations for Hierarchical Modulations with Iterative Decoding.

Islamic University of Technology, Bangladesh **October 2011**
Bachelor's, Electrical Engineering
- Thesis: Efficient Design of Decoding Algorithms using LDPC Codes for Wireless Networks.

PROFESSIONAL EXPERIENCE

University of Massachusetts - Amherst **Amherst, MA, USA**
Graduate Assistant *September 2018 - Present*
- Conducted cutting-edge research on Contactless Vital-sign Monitoring, Vibration-based Tagging, Motion-Magnification for Radar, NeRF-based SAR, and Indoor Localization as a Research Assistant at MOSAIC Lab.

University of California - San Diego **Remote**
Research Intern *July 2024 - September 2024*
- Led research on "Adversarial Perturbations against Unauthorized Radar Sensing," enhancing radar-based gesture recognition and vital sign monitoring. Findings submitted for publication at ICRA 2025.

Qualcomm **San Diego, CA, USA**
Interim Engineering Intern *June 2023 - August 2023*
- Developed an RNN (Recurrent Neural Network) based contactless gesture recognition model using FMCW radar data.
- Rigorously compared its performance against multiple neural network architectures, including MLP, GMM, and LSTM networks, demonstrating significant enhancements in accuracy and efficiency.

Tesla **Palo Alto, CA, USA**
Research Intern *September 2022 - January 2023*
- Revamped Passive Entry systems research by developing automated data collection robots utilizing machine vision techniques such as OpenCV, CNNs, OCR alongside Raspberry Pi and 3D printing.
- Reduced data collection time to one-fourth, eliminating manual labor and human errors, saving the company significant costs.

Qualcomm **San Diego, CA, USA**
Interim Engineering Intern *May 2022 - September 2022*
- Implemented a real-time contactless vital sign monitoring system using FMCW radar integrated in Qualcomm antenna module.
- Designed and deployed digital filters, ICA, PCA, and the MUSIC algorithm to enhance the accuracy and reliability of the monitoring system.

Robert Bosch GmbH **Stuttgart, BW, Germany**
Research Intern *January 2015 - July 2015*
- Implemented Software Defined Radio (SDR) for a Continuous Phase Frequency Shift keying (CP-FSK) based system for communication over power line within car-battery.

Fraunhofer FKIE **Bonn, NW, Germany**
Research Intern *January 2014 - July 2014*
- Designed a BICM-ID based digital communication system that adapts decoding complexity and performance according to the propagation conditions and receiver capabilities.

SKILLS

Programming : Python, C/C++, MATLAB, R, SQL, JavaScript, Pytorch, Tensorflow, OpenCV, NumPy, SciPy, CUDA
Software : CST Studio, GNU Radio, Simulink, QtOctave, OrCAD PSpice, AutoCAD, SAS, CAN
Hardware : UWB Radar, FMCW Radar, Doppler Radar, Arduino ESP-32, Raspberry Pi, USRP

PUBLICATIONS

- **Md Farhan Tasnim Oshim**, 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, **Under Review**.

- **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.
  PrePrint | Video

- Charlotte E. Goldfine, **Md Farhan Tasnim Oshim**, Brittany P. Chapman, Deepak Ganesan, Tauhidur Rahman, Stephanie P. Carreiro, "*Contactless Monitoring System Versus Gold Standard for Respiratory Rate Monitoring in Emergency Department Patients: Pilot Comparison Study*" JMIR Formative Research 8 (2024), e44717.
  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*", 2022 IEEE Sensors, October 30 -November 2, 2022, pp. 1-4, Dallas, Texas, USA.
  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'20, October 20-23, 2020, Virtual Event, USA.
  Link | PDF | Video | Media Coverage

- **Md Farhan Tasnim Oshim***, Charlotte E. Goldfine*, Stephanie P. Carreiro, Brittany P. Chapman, Deepak Ganesan, Tauhidur Rahman, "*Respiratory Rate Monitoring in Clinical Environments with a Contactless Ultra-Wideband Impulse Radar-based Sensor System*", HICSS 2020, January 7-10, 2020, Pages: 3366-3375, Maui, Hawaii, USA.
  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, Volume 89, Issue 1, Pages: 145-161.
  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*", Proceedings of WInnComm- Europe 2015, October 6-8, 2015, Pages: 38-47, Erlangen, Germany.
  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*", Proceedings of WInnComm (2015), March 24-26, 2015, Pages: 129-134, San Diego, California, USA.
  Link | PDF

- Mohammad Rakibul Islam, Khandaker Sultan Mahmood, **Md Farhan Tasnim Oshim**, and Md. Moshiur Rahman Farazi, "*Intensity reflection coefficient based Min-Sum decoding for Low Density Parity Check Codes*", Frequenz: Journal of RF-Engineering and Telecommunications (2012), Volume 66, Issue 7-8, Pages: 229-238
  Link | PDF

WORK AUTHORIZATION

U.S. Permanent Resident (Green Card, NIW EB2)