

MD SHAKIR HOSSAIN

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EDUCATION

Ph.D. in Electrical Engineering Drexel University <i>Dissertation: Radio Frequency (RF) Sensing and Evaluation Frameworks for Indoor Wireless Systems</i>	Jun 2026 Philadelphia, PA, USA
M.S. in Machine Learning Engineering Drexel University	Mar 2026 Philadelphia, PA, USA
M.Sc. in Renewable Energy Technology Institute of Energy, University of Dhaka <i>Thesis: Performance Analysis of a Dual-axis Automated Solar Tracker</i>	Dec 2018 Dhaka, Bangladesh
B.Sc. in Electrical and Electronic Engineering Bangladesh University of Engineering and Technology (BUET)	May 2016 Dhaka, Bangladesh

EMPLOYMENT

Adjunct Faculty Department of Electrical and Computer Engineering, Drexel University <i>Course: ECE 512 Wireless Communications</i>	Jan 2026 – Apr 2026 Philadelphia, PA, USA
Research Assistant Department of Electrical and Computer Engineering, Drexel University <i>Research Group: Drexel Wireless Systems Laboratory</i>	Jun 2021 – Jun 2026 Philadelphia, PA, USA
Teaching Assistant Department of Electrical and Computer Engineering, Drexel University	Jun 2021 – Jun 2026 Philadelphia, PA, USA
Junior System Engineer Bangla Phone Limited <i>Expertise: Optical Fiber Network planning, deployment, and maintenance, Layer2/3 Networks</i>	Apr 2016 – Feb 2020 Dhaka, Bangladesh

PUBLICATIONS

Journals:

- **M. S. Hossain**^{*}, K. Anim^{*}, G. Mainland and K. R. Dandekar, “Toward Realistic SDR-Based Emulation of Ray-Traced Millimeter-Wave Indoor Channels for Next-Generation Wireless Systems,” in IEEE Journal of Radio Frequency Identification, vol. 9, pp. 490-506, 2025, doi: 10.1109/JR-FID.2025.3586561. (* = Equal Contribution) 2025
- M. A. S. Tajin^{*}, **M. S. Hossain**^{*}, W. M. Mongan and K. R. Dandekar, “Passive UHF RFID-Based Real-Time Intravenous Fluid Level Sensor,” in IEEE Sensors Journal, vol. 24, no. 3, pp. 3863-3873, 1 Feb.1, 2024, doi: 10.1109/JSEN.2023.3342129. (* = Equal Contribution) 2023
- M. R. Rahman, **M. S. Hossain**, S. Shehab Uddin and A.S.M. Ibrahim, “Fabrication and Performance Analysis of a Higher Efficient Dual-Axis Automated Solar Tracker,” in Iranica Journal of Energy & Environment, vol. 10, no. 3, pp. 171-177, 2019, doi: 10.5829/IJEE.2019.10.03.02. 2019

Conferences:

- M. Tylek, K. Truongcao, **M. S. Hossain** and K. R. Dandekar, “Generative AI for Wireless Interference Modeling: Text-Controlled Waveform Synthesis Using Stable Diffusion,” 2025 IEEE Wireless and Microwave Technology Conference (WAMICON), Cocoa Beach, FL, USA, 2025, pp. 1-4, doi: 10.1109/WAMICON64429.2025.11004115. 2025
- **M. S. Hossain**, K. Anim and K. R. Dandekar, “Machine Learning-Driven State Selection Method for Millimeter-Wave Reconfigurable Array Antenna With 360° Beam Scanning,” 2024 IEEE International Conference on Wireless for Space and Extreme Environments (WiSEE), Daytona Beach, FL, USA, 2024, pp. 5-10, doi: 10.1109/WiSEE61249.2024.10850376. 2024
- **M. S. Hossain**, M. A. S. Tajin and K. R. Dandekar, “UHF RFID tag localization using pattern reconfigurable reader antenna,” 2022 IEEE 22nd Annual Wireless and Microwave Technology Conference (WAMICON), Clearwater, FL, USA, 2022, pp. 1-4, doi: 10.1109/WAMICON53991.2022.9786069. 2022

TEACHING EXPERIENCE

Instructor

ECE 512: Wireless Communications
Drexel University

Winter’25
Enrollment: 35
Philadelphia, USA

- Student evaluation rating: **4.63/5.00**
- Fundamentals of modern wireless systems.
- Fundamentals of radio propagation and link performance.
- Cellular concepts: interference, base stations and cell sites, handoffs, system capacity.
- Fading environments: multipath propagation, delay spread, Doppler Spread, statistically fading channel models.
- Multiple-access schemes: FDMA, TDMA, CDMA, SDMA.
- Beamforming and MIMO techniques: phases/adaptive antenna array, multi-array (MIMO) communication systems.

Teaching Assistant

ECE 630: Software Defined Radio (SDR) Laboratory
Drexel University

Summer’22, Spring’23–26
Avg. Enrollment: 50
Philadelphia, USA

- Designed and authored **four complete labs** (AM/FM, QAM, OFDM, etc), including manuals and lectures
- Delivered lectures explaining the theory and implementation of the labs I designed
- Led lab sessions, demonstrations, and graded student reports and assignments
- Maintained and managed a SDR testbed with over 50 universal software radio peripheral (USRP) radios
- Taught SDR hardware (USRP N210, X310) and open-source software (e.g., pySDR, GNURadio, DragonRadio)
- Held office hours and helped students in troubleshooting radio issues

Teaching Assistant

ECE 512: Wireless Communications
Drexel University

Winter’23, Winter’24
Avg. Enrollment: 20
Philadelphia, USA

- Prepared course materials and contributed to designing the programming assignments
- Assisted students with wireless systems simulations (Cell handoffs, MIMO, etc.) using Python and MATLAB
- Held office hours and graded homework, assignments, and exams

Teaching Assistant

ECE 303: ECE Laboratory
Drexel University

Winter’21, Spring’22, Fall’22, Winter’22, Fall’24, Fall’25
Avg. Enrollment: 60
Philadelphia, USA

- Taught microcontroller programming (e.g., ATMEGA2560, MSPM0L1306, Arduino UNO) and sensor integration.
- Delivered lectures on microcontroller fundamentals, including timers, counters, and register operations.
- Taught FPGA design with Vivado and Vitis on the Zybo Z7-10 board.
- Instructed students on HDL programming for FPGA.

- Taught Linux-based embedded programming on Raspberry Pi and Beaglebone Black.
- Guided data visualization and analysis using Python and MATLAB.
- Mentored students' term projects, led lab sessions, and graded reports.
- Assisted with ABET accreditation.

Teaching Assistant

ECE 201: Foundations of Electric Circuits I
Drexel University

Fall'21, Summer'24
Avg. Enrollment: 50
Philadelphia, USA

- Led lab and recitation sessions, graded reports, homework, and exams, and held office hours
- Taught students lab instruments like oscilloscope, function generators, multimeters, etc, and helped debug circuits
- Taught simulation software like multisim and tinkercad for circuit validation.

Teaching Assistant

ECES 521: Probability & Random Variables
Drexel University

Fall'23
Enrollment: 38
Philadelphia, USA

- Graded homework and exams
- Proctored exams and held office hours

Lecturer

Mathematics & Physics
Udvash Academic Care

2010–15
Avg. Class Size: 30
Dhaka, Bangladesh

- Lectured on 11th and 12th-grade Mathematics and Physics courses, designed lessons, and graded exams.
- Held Q&A sessions, reviews, and make-up classes, and led academic counseling with students and parents.

MENTORSHIP EXPERIENCE

Vertically Integrated Projects (VIP Program)

Drexel University

Fall'24, Winter'24, Spring'25, Summer'25
Philadelphia, USA

- **Generative AI-based Interference Waveform Synthesis**
 - Mentored a team on generative AI-based interference waveform synthesis using stable diffusion.
 - Supervised the data collection using SDRs
 - Guided the project to completion, resulting in an IEEE conference paper.
- **Automated Infant Ventilation System**
 - Supervised students in the development of an automated infant ventilator with embedded systems and ML.
 - Guided them to create a software framework for respiratory scenario generation for a medical mannequin
 - Assisted students in developing a data transportation pipeline from the sensors to the central controller
 - Co-authored a journal article under review from this project.
- **Radar Tracking**
 - Guided a VIP undergraduate student in developing a multi-target and single-target radar tracking system using USRP X310 SDRs.
 - Supervised the implementation of a Joint Probabilistic Data Association (JPDA) filter in GNU Radio for real-time radar tracking and visualization.
 - Assisted the student with deploying and testing the radar system on the SDR testbed.

Students Tackling Advanced Research (STAR Program)

Drexel University

Summer'24, Summer'25, Summer'23
Philadelphia, USA

- **Modulation Recognition**
 - Mentored a student in developing a deep learning-based digital modulation recognition system using SDR
 - Supervised the data collection using SDRs and model training
- **Intravenous Fluid Level Sensor**
 - Collaborated with a STAR student in data collection for an RFID-based intravenous fluid level sensor.

- The collaboration resulted in an IEEE journal article.

Senior Design Projects
Drexel University

AY'2023, AY2024
Philadelphia, USA

- **Real-time Intelligent Antenna Steering**
 - Assisted students in using a reconfigurable antenna to narrow the search space of a directional antenna.
 - Guided in developing ML algorithms for localization to reduce the search space and pinpoint the user location.
 - Guided the team in collecting training data and deploying the trained model on the SDR platform.
- **Simulation of Reconfigurable Intelligent Surface**
 - Guided a senior design group in simulating a reconfigurable intelligent surface (RIS) with ray-tracing simulation.
 - Assisted with RIS state selection using reinforcement learning, and validating the results with SDR software.

TECHNICAL SKILLS

SDR Hardware: USRP (B210, N210, X300, X310), RTL-SDR, HackRF.

SDR Software: UHD, GNU Radio Companion, DragonRadio, MATLAB (LTE/5G Toolboxes, Simulink)
Python (NumPy/SciPy for DSP), LabVIEW, PySDR, SoapySDR.

RF Hardware: Vector Network Analyzers (VNA), Spectrum Analyzers, RF Signal Generators.

Lab Equipment: Oscilloscopes, Digital Multimeters, Function Generators, NI myDAQ.

Simulation: MATLAB & Simulink, MultiSim, Wireless InSite.

FPGA & Embedded: Xilinx Vivado, Vitis, Verilog/VHDL, C/C++.

Microcontrollers (MCU): ATmega2560, Arduino Ecosystem (Uno/Mega), ESP32.

Single-Board Computers (SBC): Raspberry Pi, BeagleBone Black.

Programming: Python, C/C++, MATLAB, Bash.

AWARDS & RECOGNITION

The George Hill, Jr. Endowed Fellowship Drexel university	2021-2023 Philadelphia, USA
Doctoral Student Teaching Fellow College of Engineering, Drexel University	2024, 2025 Philadelphia, USA
BSTF Student Travel Grant Bangladesh Sweden Trust Fund	2023 Dhaka, Bangladesh
BUET Technical Scholarship Bangladesh University of Engineering and Technology (BUET)	2010-2015 Dhaka, Bangladesh
Bangladesh Mathematical Olympiad (BdMO) Second Runner-up: National Competition	2008 Dhaka, Bangladesh
Bangladesh Mathematical Olympiad (BdMO) Champion: Regional Competition	2008 Rajshahi, Bangladesh
Bangladesh Mathematical Olympiad (BdMO) Second Runner-up: Regional Competition	2007 Rajshahi, Bangladesh