Abhishek Adhikari

M.S./Ph.D. Student, Electrical Engineering

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US Citizen

Education

Columbia University Ph.D. in Electrical Engineering (GPA: 3.78), Advised by Prof. Gil Zussman — *New York, NY, Feb. 2023 - Present*

· Evergreen Fellowship

Columbia University M.S. in Electrical Engineering (GPA: 3.78) — *New York, NY, Feb. 2023*

Drexel University B.S. in Computer Engineering, Magna Cum Laude (GPA: 3.86) — *Philadelphia, PA, June 2021*

Activities, Awards and Honors

· Columbia Electrical Engineering Student Ambassador, 2022-Present

· NSF CS3-ERC Columbia Student Leadership Council Co-Chair, 2023-2024

· NSF GRFP Honorable Mention, 2022

· Columbia Evergreen Fellowship, awarded to top incoming EE graduate students, 2021

· IEEE-HKN and Tau Beta Pi, executive board at Drexel, 2019-2021

· Dean's List, Drexel, 2018-2021

· A.J. Drexel Scholarship, partial tuition scholarship, 2018

· Pennsylvania NASA Space Grant Scholarship, enables select first-year students to perform research at Penn State University, 2017

Research Experience

Nokia Bell Labs 6G Radio Systems Summer Intern — *Murray Hill, NJ, June 2023 - August 2023*

· Joint Communications and Sensing (JCAS) real-world measurements and statistical modeling.

Supervised by Dr. Dmitry Chizhik, Dr. Jinfeng Du, and Dr. Reinaldo Valenzuela

Nokia Bell Labs Propagation Modeling Summer Intern — *Murray Hill, NJ, June 2022 - August 2022*

· Collected over 15 million power measurements to determine coverage of 28 GHz wireless around the corner of a typical urban block.

· Created a path loss model for around-corner scenarios with 6 dB RMSE.

· Collected measurements and performed analysis for over-the-top NLOS scenarios of 28 GHz wireless.

· Developed software for a rotating 140 GHz channel sounder which generates angle-power spectrum at a high resolution.

Supervised by Dr. Dmitry Chizhik, Dr. Jinfeng Du, and Dr. Reinaldo Valenzuela

Columbia University Graduate Assistant *New York, NY, July 2021 - Present*

Evaluating Outdoor-to-Indoor mmWave for Beyond-5G

· Characterizing the outdoor propagation of millimeter-wave (mmWave) signals at a middle school located in NYC, a modern coffee shop with UV-protection glass, and a 100-year-old building with metal window gratings using a Nokia Bell Labs 28 GHz channel sounder.

· Determined that outdoor-to-indoor mmWave FWA is capable of achieving data rates of 1.3 Gbps indoors, particularly in an area where 30 percent of the population lacks internet access.

In collaboration with Dr. Dmitry Chizhik, Dr. Jinfeng Du, and Dr. Reinaldo Valenzuela (Nokia Bell Labs)

Sensing Weather Phenomena with mmWave Radar

· Collecting extensive radar measurements using a mmWave radar sensor to train a machine learning model using high-quality weather phenomena data.

In collaboration with Prof. Tingjun Chen (Duke) and Dr. Jonathan Ostrometzky (Tel Aviv University)

Lockheed Martin ATL Senior Capstone Project, Team Lead *Philadelphia, PA, Sept. 2020 - June 2021*

· Designed a software-defined mmWave radar testbed to enable rapid prototyping of multi-target tracking (MTT) algorithms for autonomous vehicles through RF ray tracing and channel emulation.

· Built and tested a Joint Probabilistic Data Association tracking filter with real-world software-defined radio (SDR) radar MTT data collected by testbed.

Lockheed Martin ATL Applied Research Co-Op *Cherry Hill, NJ, May 2020 - Sept. 2020*

· Created a GNU Radio Out-Of-Tree Module to wrap a C++ radar algorithm (CA-CFAR) into a Python interface for use with SDR.

· Wrote a C++ benchmarking tool to characterize radar algorithm performance.

· Enabled real-time I/Q collection from SDR through SoapySDR, SDRAngel, and UHD.

NASA Challenge Wireless Communication Lead *Philadelphia, PA, Sept. 2019 - June 2020*

· Developed wireless communication architecture for a lunar rover to send soil data to a lander located outside a permanently-shadowed-region (PSR) while lacking direct line of sight.

· Organized meetings with computer engineering students to develop wireless architecture and communicate with team leads from a diversity of disciplines to ensure that our work aligns and integrates with the rover, power, and sampling system teams.

NASA Space Grant Research Assistant *University Park, PA, Jan. 2017 - Dec. 2018*

· Analyzed the microscopic wear of Micro Electrical-Mechanical Systems by testing the friction coefficient between silicon substrates exposed to various gases.

· Selected to present research in a conference sponsored by Penn State University.

Publications

Conferences and Journals

· Y. Fu, M. Turkcan, M. Ghasemi, Z. Mo, C. Zang, **A. Adhikari**, Z. Kostic, G. Zussman, X. Di, "AI-Powered CPS-Enabled Vulnerable-User-Aware Urban Transportation Digital Twin: Methods and Applications," submitted to IEEE Intelligent Transportation Systems Transactions, November 2025.

- D. Chizhik, J. Du, J. Sapis, R. Valenzuela, **A. Adhikari**, G. Zussman, M. Almendra, M. Rodriguez, R. Feick, "Backscatter Measurements and Statistical Models for RF Sensing in Indoor Cluttered Environments," in Proc. of IEEE Transactions on Antennas and Propagation, October 2025.
- D. Chizhik, J. Sapis, J. Du, R. Valenzuela, **A. Adhikari**, J. Drogo, G. Zussman, M. Almendra, M. Rodriguez, R. Feick "Measured RF Backscatter Power Statistics in Indoor Sensing," in Proc. of IEEE AP-S/URSI, Ottawa, Canada, July 2025.
- **A. Adhikari**, "mmWave Communications, Sensing, and Interference Mitigation," in Proc. of ACM MobiSys Rising Stars Forum, Anaheim, CA, June 2025.
- **A. Adhikari**, S. Mukherjee, A. Mehta, M. Kohli, D. Chizhik, J. Du, R. Feick, R. Valenzuela, G. Zussman, "Around-corner and Over-top 28 GHz Measurement in Manhattan: Path loss and AoA for MU-MIMO," in Proc. of IEEE INFOCOM'25, London, UK, May 2025.
- M. Kohli, **A. Adhikari**, G. Avci, S. Brent, J. Moser, S. Hossain, A. Dash, I. Kadota, R. Feick, D. Chizhik, J. Du, R. Valenzuela, G. Zussman, "Outdoor-to-Indoor 28 GHz Wireless Measurements in Manhattan: Path Loss, Environmental Effects, and 90% Coverage," in IEEE/ACM Transactions on Networking, 1-16, January 2024.
- T. Chen, P. Maddala, P. Skrimponis, J. Kolodziejski, **A. Adhikari**, H. Hu, Z. Gao, A. Paidimarri, A. Valdes-Garcia, M. Lee, S. Rangan, G. Zussman, I. Seskar, "Open-access millimeter-wave software-defined radios in the PAWR COSMOS testbed: Design, deployment, and experimentation," in Computer Networks, Volume 234, 109922, October 2023.
- D. Chizhik, J. Du, M. Kohli, **A. Adhikari**, R. Feick, R. Valenzuela, G. Zussman, "Accurate Urban Path Loss Models Including Diffuse Scatter," in Proc. of European Conference on Antennas and Propagation (EuCAP) 2023, Mar. 2023.
- M. Kohli, **A. Adhikari**, G. Avci, S. Brent, J. Moser, S. Hossain, A. Dash, I. Kadota, R. Feick, D. Chizhik, J. Du, R. Valenzuela, G. Zussman, "Outdoor-to-Indoor Measurements of 28 GHz Wireless in a Dense Urban Environment," in Proc. of ACM MobiHoc'22, Seoul, South Korea, Oct. 2022.
- **A. Adhikari**, S. Parihar, S. Das, M. Jacovic, A. Trezza, V. Pano, K. R. Dandekar, "Software-Defined Radar Testbed for Multi-Target Tracking," in Proc. of IEEE RadarConf'22, NYC, NY, Mar. 2022.

Patents

- **A. Adhikari**, "System and method for controlling, sharing, release and management of digital data between smart mobile device(s) and external device(s) using a connector pad," U.S. Utility Patent 10,348,691, filed May 14, 2018, and issued July 9, 2019.
- **A. Adhikari**, "System and method for making a quick connection between a smart mobile device and external audio speakers and video monitors using a connector pad," U.S. Utility Patent 9,998,848, filed Nov. 13, 2015, and issued June 12, 2018.

Tutorials

- **A. Adhikari**, M. Kohli, J. Shane, P. Netalkar, T. Chen, D. Raychaudhuri, I. Seskar, G. Zussman, "The COSMOS Testbed – a Platform for Advanced Wireless, Smart Cities, Edge-cloud, and Optical Experimentation," presented at 2023 Midscale Experimental Research Infrastructure Forum, Boston, MA, Tutorial, May 2023.
- **A. Adhikari**, J. Raulin, A. Raj, Z. Wang, J. Shane, J. Kolodziejski, P. Skrimponis, B. Lantz, D. Kilper, I. Seskar, T. Chen, S. Rangan, G. Zussman, "COSMOS Testbed for Advanced Wireless and Edge Cloud Research," presented at 2022 ACM SIGCOMM, Amsterdam, NL, Tutorial, Aug. 2022.

Posters and Demos

- P. Maddala, J. Kolodziejski, **A. Adhikari**, K. Hermstein, D. Chen, L. Zhu, T. Chen, I. Seskar, G. Zussman, "Demo: Experimentation with Mobile 28 GHz Phased Array Antenna Modules," in Proc. of ACM MobiCom'24, Washington, D.C., Demo, Nov. 2024.
- **A. Adhikari**, K. Hermstein, Y. Wu, T. Legbandt, C. Bastidas, T. Chen, F. Moshary, I. Seskar, G. Zussman, "28 GHz Phased Array Interference Measurements and Modeling for a NOAA Microwave Radiometer in Manhattan," in Proc. of ACM MobiCom'24, Washington, D.C., Poster Presentation, Nov. 2024.
- D. Chen, T. Wang, E.S.F. Portillo, **A. Adhikari**, R. Feick, J. Du, D. Chizhik, G. Zussman, "28 GHz mmWave Measurements for Joint Sensing and Communications," presented at 2023 IEEE MIT Undergraduate Research Technology Conference (URTC), Cambridge, MA, Poster Presentation, Oct. 2023.
- **A. Adhikari**, S. Mukherjee, A. Mehta, M. Kohli, R. Feick, D. Chizhik, J. Du, R. Valenzuela, G. Zussman, "Turning the Block in NYC and Still Getting 5G Coverage? mmWave Around-the-Corner Measurements for Dense Urban Deployment," presented at Columbia Smart Cities Poster Session, NYC, NY, Poster Presentation, Apr. 2023.
- **A. Adhikari**, S. Mukherjee, A. Mehta, M. Kohli, R. Feick, D. Chizhik, J. Du, R. Valenzuela, G. Zussman, "Turning the Block in NYC and Still Getting 5G Coverage? mmWave Around-the-Corner Measurements for Dense Urban Deployment," presented at 2023 Columbia Data Science Day, NYC, NY, Poster Presentation, Apr. 2023.
- **The Clinton School**, Traceroute Lab w/ COSMOS Edu. Toolkit, NYC, Jan. 2023.
- S. Mukherjee, A. Mehta, **A. Adhikari**, D. Chizhik, J. Du, R. Feick, R. Valenzuela, G. Zussman, "Turning the Block in NYC and Still Getting 5G Coverage? mmWave Around-the-Corner Measurements for Dense Urban Deployment," presented at 2022 IEEE MIT Undergraduate Research Technology Conference (URTC), Cambridge, MA, Poster Presentation, Oct. 2022.
- **A. Adhikari**, M. Kohli, G. Avci, S. Brent, J. Moser, S. Hossain, A. Dash, S. Mukherjee, C. Garland, I. Kadota, R. Feick, D. Chizhik, J. Du, R. Valenzuela, G. Zussman, "mmWave Measurements for Fixed and Mobile Wireless Access Algorithm Development," presented at 2022 Columbia Data Science Day, NYC, NY, Poster Presentation, Apr. 2022.
- **Silicon Harlem**, Demo of COSMOS Edu. Toolkit to various communities and stakeholders, West Harlem, NYC, Feb.-Apr. 2022.
- G. Avci, S. Brent, S. Hossain, J. Moser, A.D. Estigarribia, M. Kohli, I. Kadota, **A. Adhikari**, D. Chizhik, J. Du, R. Feick, R. Valenzuela, G. Zussman, "Outdoor-to-Indoor 28 GHz mmWave Measurements in the COSMOS Testbed Deployment Area," presented at 2021 IEEE MIT Undergraduate Research Technology Conference (URTC), Cambridge, MA, Poster Presentation, Oct. 2021.
- **Silicon Harlem**, Demo of COSMOS Edu. Toolkit to Silicon Harlem, West Harlem, NYC, Sept. 2021.

Datasets

- **NIST**, 28 GHz Outdoor-to-Indoor Measurements Taken at a Middle School, NextG CMA Dataset on NIST Public Dataset Repository (nextg.nist.gov/submissions/131).

Paper Review Experience

- ACM MobiSys 2023 (2 Papers)
- ACM/IEEE IPSN 2023 (1 Paper)
- ACM S3 2023 (1 Paper)

Teaching and Mentorship Experience

Teaching Assistant

- Columbia, Electrical Engineering CSEEW4119 Computer Networks, CVN TA, Spring 2023

- Columbia, Electrical Engineering ELEN9701 Info and Communication Theories, Head TA, Fall 2022
- Columbia, Electrical Engineering CSEEW4119 Computer Networks, Head TA, Spring, Summer 2022
- Columbia, Electrical Engineering ELENE1201 Introduction to Electrical Engineering, Fall 2021
- Participated in the COSMOS/EFRI RET/REM program, Sept. 2021

Undergraduate Students

- Shivan Mukherjee, Columbia University, January 2022 - September 2022
- Carson Garland, Columbia University, January 2022 - May 2022
- Kaya Celebi, REU from Duke University, June 2021 - January 2023
- Sabbir Hossain, Columbia-Amazon SURE, City College of New York, June 2021 - August 2021

High School Students

- David Chen, Stuyvesant High School (now at Yale University), June 2023 - September 2023
- Aahan Mehta, Stuyvesant High School (now at Duke University), June 2022 - September 2022
- Jared Moser, Stuyvesant High School (now at Johns Hopkins University), June 2021 - August 2022

Skills

Software

- Python, MATLAB, C/C++, Linux, GNU Radio, Wireless InSite Ray Tracing

Hardware

- Software-Defined Radio, mmWave Channel Sounder, RF Emulation, Optical Fiber, Radar