

Ruth Gebremedhin

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EDUCATION

New York University Tandon School of Engineering

Brooklyn, NY

Aug 2020 - Expected 2025

PhD Electrical Engineering, Advisor: Prof. Thomas Marzetta

Tandon SoE Fellowship, Research Interests: Wireless Communications, Physics based Channel Models, Wave Propagation, Capacity Bounds, Information Theory, Linear Systems and Partial Differential Equations

M.S. in Electrical Engineering

Aug 2020 - May 2022

Relevant Coursework: Detection and Estimation, Wireless Communications, Machine Learning, Information Theory, Linear System Approach to Wave Propagation, Deep Learning, Digital Signal Processing, Digital Communications

New York University Abu Dhabi

Abu Dhabi, UAE

Aug 2016 - May 2020

Full Scholarship, B.S. in Electrical Engineering & Minor in Computer Science

Relevant Coursework: Communication Theory, Comm Networks, Object Oriented Programming, EM Waves

SKILLS

Programming: MATLAB, C++, Python, JavaScript, HTML, LaTeX

Software: WebRTC, Unity, 3D design and printing, EEG Data Acquisition

Language: English (Fluent), Amharic (Native), Tigrigna (Native), Korean (Intermediate speaking and listening)

EXPERIENCE

NYU Wireless

Brooklyn, NY

Aug 2020 - Present

Research Assistant

- Studied the Heat Equation using communication methods to explore the potential of heat and diffusion as a communication channel (Publication awarded best paper at GLOBECOM 2022).
- Simulated the heat channel model and its impulse response to numerically investigate the channel capacity.
- Examined the effective bandwidth of the heat channel and its relationship to input power.

CableLabs

Louisville, CO

May 2023 - Dec 2023

Wireless RF Propagation Intern

- Analyzed the performance of Fixed Wireless Access in 5G shared spectra at Sub-6 and millimeter wave by studying signal variation over OFDM sub-carriers.
- Designed and implemented a noise removal algorithm to pre-process typical suburban channel measurement data.
- Submitted 3 papers and filed 1 patent.

Nokia Bell Labs

Murray Hill, NJ

June 2022 - Aug 2022

Wireless Propagation Modelling Intern

- Implemented a parabolic approximation to the wave equation to improve macro-site path loss prediction in over the top propagation scenarios.
- Conducted a comparative study of the newly developed method with measured path loss data, demonstrating a low error rate.
- Received the Outstanding Innovation Award, ranking in the top 7% worldwide in an internal competition.

NYU Tandon Department of Electrical and Computer Engineering

Brooklyn, NY

Jan 2021 - Present

Course Assistant: Digital Comm, Fundamentals of Comm Theory, Signals and Systems

- Prepared MATLAB exercises that complement lectures and held weekly lab sessions with ~15 students.
- Evaluated weekly assignments, provided feedback and offered support during office hours to ~35 students.

NYU Abu Dhabi Applied Interactive Multimedia Lab

Abu Dhabi, UAE

Research Intern

May - July 2018, 2019 & 2020

- Proposed and implemented a WebRTC based network handshake protocol that enables bidirectional haptic and audiovisual communication as part of the 1918.1.1 IEEE working group.
- Developed and tested a Leader-Follower Teleoperation Codec to communicate haptic data between two devices and explored its application as part of the 5G Tactile Internet.
- Designed a 3D environment using Unity to assess the impact of haptic feedback on cognition and emotion.

NYU Abu Dhabi Residential Education

Abu Dhabi, UAE

Resident Assistant

Aug 2019 - May 2020

- Provided ~25 residents with meaningful interactions through programming and conflict mediation.
- Offered weekly on-call support for emergency and crisis situations to a community of ~500 students.
- Communicated and enforced university and Residential Education policies and procedures.

NYU Abu Dhabi Department of Electrical and Computer Engineering

Abu Dhabi, UAE

Teaching Assistant: Computer Programming for Engineers in C++

Sept - Dec 2018 & 2019

- Facilitated a weekly lab component with ~30 students by answering questions and grading submissions.
- Supported students with their programming assignments during office hours.

NYU Abu Dhabi First Year Dialogue (FYD)

Abu Dhabi, UAE

Facilitator

Aug 2018 - Dec 2018

- Mentored 10 first year students, enabling a smooth transition into NYUAD through discussions and workshops.
- Designed and managed city outings with the FYD group to encourage first year students to explore Abu Dhabi.

NYU Center for Cosmology and Particle Physics

Abu Dhabi, UAE

Research Assistant

May 2017 - June 2017

- Investigated the correlation between star formation and radio luminosity through statistical data analysis.
- Conducted a comparison study of visual luminosity versus radio luminosity to identify star formation patterns.

NYU Abu Dhabi Psychology Laboratory

Abu Dhabi, UAE

Research Assistant

Jan 2017 - Feb 2017

- Coordinated time sensitive human-subject experiment to measure the physiological effects of trade negotiations.
- Run heart pulse rate and blood pressure tests during interactions between participants.

AWARDS & HONORS

Best Paper Award: IEEE Global Communications (GLOBECOM) 2022 Conference

Dec 2022

Outstanding Innovation Award: Global Student Program, Nokia Bell Labs Internship

Aug 2022

Winner of Mozilla's Common Voice for Low-bandwidth Challenge: Mozilla and NVIDIA collaboration

July 2022

SoE Fellowship: NYU Tandon, Department of Electrical and Computer Engineering

Sept 2020

Full Scholarship: NYU Abu Dhabi Admissions

Aug 2016

PUBLICATIONS

1. **R. Gebremedhin**, W. Keusgen, D. Viorel and R. Sun. "MIMO Channel Capacity Measurements in an Outdoor-to-Indoor Environment at 6 and 37 GHz." *IEEE VTC 2024 (Submitted)*.
2. **R. Gebremedhin**, R. Sun, D. Viorel and W. Keusgen. "Frequency Domain Channel Characteristics in an Outdoor-To-Indoor Environment at 6 and 37 GHz." *EuCAP 2024 (Accepted)*.
3. R. Sun, D. Viorel, W. Keusgen and **R. Gebremedhin**. "Empirical Path Loss Model and Small-Scale Fading Statistics in an Indoor Office Environment in 6 and 37 GHz Shared Bands." *EuCAP 2024 (Accepted)*.
4. **R. Gebremedhin**, and T. Marzetta. "Thermal Conduction as a Wireless Communication Channel." *IEEE GLOBECOM 2022 (Best Paper Award)*.
5. W. Park, M. Jamil, **R. Gebremedhin**, and M. Eid. "Effects of tactile textures on preference in visuo-tactile exploration." *ACM TAP 2021*.

6. K. Iiyoshi, **R. Gebremedhin**, V. Gokhale, and M. Eid. "Plug-and-Play Haptic Interaction for Tactile Internet based on WebRTC." *EAI INTETAIN* 2020.
7. K. Iiyoshi*, M. Tauseef*, **R. Gebremedhin***, V. Gokhale, and M. Eid. "Towards standardization of haptic handshake for tactile internet: a WebRTC-based implementation." *IEEE HAVE* 2019 (***Equal Contribution**).

LEADERSHIP & COMMUNITY INVOLVEMENT

Hilary Ballou Center for Teaching and Learning

Abu Dhabi, UAE

Tutor

May 2020 - July 2020

- Trained underprivileged students on online learning tools during the COVID-19 pandemic shutdown, designed curriculum, and taught 9th grade students Biology, Chemistry, Physics and Math.

TEDxNYUAD

Abu Dhabi, UAE

Co-chair of Executive Board

Aug 2017- May 2018

- Gained leadership, logistical and interpersonal skills by organizing the nomination and selection of TEDxNYUAD's 2018 speakers with a team of ~20.
- Collaborated with TED Conferences LLC and NYU Abu Dhabi stakeholders to obtain an official TEDx license, organize a public annual event and market to Abu Dhabi residents.

Strength in Vocational Education (STRIVE) Initiative

Abu Dhabi, UAE

Tutor

March 2017- May 2017

- Mentored refugees by developing English language lessons, providing feedback, giving support, and fostering confident language skills.