

Ruth Gebremedhin

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EDUCATION

New York University Tandon School of Engineering, Brooklyn, NY

Aug 2020 - Present

PhD in 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

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

Relevant Coursework: Communication Theory, Communication 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

Nokia Bell Labs, Murray Hill, NJ

June 2022 - Aug 2022

Wireless Propagation Modelling Intern (MATLAB)

- Implemented a parabolic equation approximation for the wave equation to improve macro-site path loss prediction in over the top propagation scenarios.
- Conducted a comparison study of the newly developed method with measured path loss data, resulting in low error rate and demonstrating the effectiveness of the method.
- Received the Outstanding Innovation Award from the Global Student Program, ranking in the top 7% worldwide in an internal competition among interns.

NYU Wireless, Brooklyn, NY

Aug 2020 - Present

Research Assistant (MATLAB)

- 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.

NYU Tandon Department of Electrical and Computer Engineering, Brooklyn, NY

Jan 2021 - Present

Course Assistant: Digital Communications, Fundamentals of Communication Theory (MATLAB)

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

NYU Abu Dhabi Applied Interactive Multimedia Lab, Abu Dhabi, UAE

May - July 2018, 2019 & 2020

Research Intern (C++, HTML, JS)

- 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

Aug 2019 - May 2020

Resident Assistant

- 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 **Sept - Dec 2018 & 2019**

Teaching Assistant: Computer Programming for Engineers in C++

- 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 **Aug 2018 - Dec 2018**

Facilitator

- 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 **May 2017 - June 2017**

Research Assistant (Python, pandas)

- 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 **Jan 2017 - Feb 2017**

Research Assistant

- 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. **Gebremedhin, Ruth G.**, and Thomas L. Marzetta. "Thermal Conduction as a Wireless Communication Channel." In *GLOBECOM 2022-2022 IEEE Global Communications Conference*, pp. 1085-1090. IEEE, 2022 (**Best Paper Award**).
2. Park, Wanjoo, Muhammad Hassan Jamil, **Ruth Ghidey Gebremedhin**, and Mohamad Eid. "Effects of tactile textures on preference in visuo-tactile exploration." *ACM Transactions on Applied Perception (TAP)* 18, no. 2 (2021): 1-13.
3. Iiyoshi, Ken, **Ruth Gebremedhin**, Vineet Gokhale, and Mohamad Eid. "Plug-and-Play Haptic Interaction for Tactile Internet based on WebRTC." In *12th EAI International Conference on Intelligent Technologies for Interactive Entertainment*, EAI, 2020.
4. Iiyoshi*, Ken, Mahrukh Tauseef*, **Ruth Gebremedhin***, Vineet Gokhale, and Mohamad Eid. "Towards standardization of haptic handshake for tactile internet: a WebRTC-based implementation." In *2019 IEEE International Symposium on Haptic, Audio and Visual Environments and Games (HAVE)*, pp. 1-6. IEEE, 2019 (***Equal Contribution**).

LEADERSHIP & COMMUNITY INVOLVEMENT

Hilary Ballon Center for Teaching and Learning, Abu Dhabi, UAE **May 2020 - July 2020**

Tutor

- 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 **Aug 2017- May 2018**

Co-chair of Executive Board

- 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.

Tutor

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