

# Ruth Gebremedhin

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## EDUCATION

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**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, Data Structures and Algorithms, Linear System Approach to Wave Propagation, Information Theory, Digital Signal Processing.

**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:** Fundamentals of Communication Theory, Communication Networks, Introduction to Machine Learning, Signals and Systems, Electromagnetic Waves.

## EXPERIENCE

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**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.

## **SKILLS**

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**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).

## **AWARDS & HONORS**

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**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**

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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, Wanjo, 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**

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**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 9<sup>th</sup> 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.