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, 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

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 maro-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 (4th place) in an internal competition among interns.

NYU Wireless Lab, 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: Wireless Comm, Digital Comm, Fundamentals of Comm 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)
- 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

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

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.
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.

Strength in Vocational Education (STRIVE) Initiative, Abu Dhabi, UAE   **March 2017- May 2017**
Tutor
   • Mentored refugees by developing English language lessons, providing feedback, giving support, and fostering confident language skills.