

# Ruth Gebremedhin

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## EDUCATION

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### 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, Detection and Estimation

M.S. in Electrical Engineering

Aug 2020 - May 2022

**Relevant Coursework:** Wireless Communications, Machine Learning, Information Theory, Linear Systems for Wave Propagation, Deep Learning, Digital Signal Processing, Digital Communications

### New York University Abu Dhabi

Abu Dhabi, UAE

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

Aug 2016 - May 2020

## 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), Korean (Intermediate speaking and listening), Amharic (Native), Tigrigna (Native)

## EXPERIENCE

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### NYU Wireless

Brooklyn, NY

Research Assistant

Aug 2020 - Present

- 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

Wireless RF Propagation Intern

May 2023 - Dec 2023

- 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

Wireless Propagation Modelling Intern

June 2022 - Aug 2022

- 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

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

Jan 2021 - Dec 2023

- 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.

## AWARDS & HONORS

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<b>Best Paper Award:</b> IEEE Global Communications (GLOBECOM) 2022 Conference	<b>Dec 2022</b>
<b>Outstanding Innovation Award:</b> Global Student Program, Nokia Bell Labs Internship	<b>Aug 2022</b>
<b>Winner of Mozilla's Common Voice for Low-bandwidth Challenge:</b> Mozilla and NVIDIA collaboration	<b>July 2022</b>
<b>SoE Fellowship:</b> NYU Tandon, Department of Electrical and Computer Engineering	<b>Sept 2020</b>
<b>Full Scholarship:</b> NYU Abu Dhabi Admissions	<b>Aug 2016</b>

## PUBLICATIONS

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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

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### 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 9<sup>th</sup> 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 the Abu Dhabi community.

### 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.