Ruth Gebremedhin

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EDUCATION

New York University Tandon School of Engineering   Brooklyn, NY
*PhD Electrical Engineering, **Advisor:** Prof. Thomas Marzetta*   **Aug 2020 - Expected 2026**
> **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

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

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.
- 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.

Nokia Bell Labs   Murray Hill, NJ
Math & Algorithms Intern   **June 2024 - Aug 2024**
- Implemented a near field wideband channel model to assess the effect of beam squint on capacity in MISO systems.
- Designed an array geometry solution to beam squint problem that lowers the number of True Time Delay elements.
- Received the Outstanding Innovation Award.

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

Student Travel Grant from ECE department: EuCAP 2024 **Mar 2024**
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*.

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*.

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*.

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**).

ACADEMIC SERVICE

Reviewer: IEEE Journal on Selected Areas in Information Theory (JSAIT)
Reviewer: IEEE International Symposium on Information Theory (ISIT)

LEADERSHIP & COMMUNITY INVOLVEMENT

Hilary Ballon 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 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.