Rachel J. Ha

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OBJECTIVE

Graduate Electrical and Computer Engineering student pivoting into microelectronics, nanotechnology, electrical designs and applications, circuit technology, and silicon and hardware engineering. A self-driven professional with proven ability to tackle complex problems using strong analytical, communication (both written and verbal), and problem-solving skills. Actively recruiting for full-time positions.

EDUCATION

Georgia Institute of Technology | Atlanta, GA *August 2022 – Present*

- Bachelor of Science in Computer Engineering (Cybersecurity & Telecommunications), Minor in Economics, GPA 3.72 **May 2025**
- Master of Science in Electrical and Computer Engineering **May 2026**

Yonsei University | Seoul, South Korea (12 Credit Hours) *August 2024 – December 2024*

Georgia Tech-Europe | Metz, France (13 Credit Hours) *May 2023 – August 2023*

SKILLS

Programming: Java, Python, C, C++, MIPS Assembly, VHDL, System Verilog, RISC-V Assembly, Linux, Shell, SQL, HTML, CSS, JavaScript
Hardware: Microcontrollers, FPGAs, Oscilloscope, Logic Analyzer, Microprocessors, DE-10, PCB Fabrication, HFSS, LTSpice, Cadence, COMSOL
Software: Altera Quartus II, NI LabVIEW, GitHub, IDA Pro, MATLAB, Wireshark, SolidWorks**,** Ubuntu, EAGLE, PyTorch, MS Office, Power BI, Azure
Organizations: Georgia Tech Women in Electrical and Computer Engineering, Alpha Xi Delta, Club Ice Hockey
Languages: English (fluent), Korean (fluent), Spanish (awarded CT Seal of Biliteracy 2022), French (conversational)

Relevant Courses

Fall 2025:

- *ECE 6776:* Integrated and Low-Cost Microelectronics Systems Packaging
- *ECE 6422:* Interface IC Design for MEMS and Sensors
- *ECE 6450:* Intro to Microelectronics Technology
- *ECE 8883:* Advanced Glass-Core Packaging

Spring 2026 (Currently Enrolled):

- *ECE 6001:* Technology Entrepreneurship
- *ECE 6100:* Advanced Computer Architecture
- *ECE 6239:* Enterprise Cybersecurity Management
- *ECE 6458:* Gigascale Integration
- *ECE 8893:* Parallel Programming for FPGAs

EXPERIENCE

Teaching Assistant for ECE Discovery Studio | Atlanta, GA *August 2023 – Present*

- **Graduate Teaching Assistant** *January 2026 – Present*
  - Head GTA for a 675+ student ECE course, managing course operations including Canvas organization, comprehensive attendance tracking, and grading oversight while coordinating instructional logistics at scale
  - Hosts a weekly practicum for 37 Peer Leaders, analyzing student performance trends and recurring questions, and provides individualized coaching on professional development including resumes, e-portfolios, and interview preparation
- **Undergraduate Peer Leader Fellow** *August 2023 – May 2025*
  - Selected as an ECE Peer Leader Fellow in a highly competitive leadership development program and served for 3 years, mentoring new ECE majors using deep knowledge of Georgia Tech ECE resources, opportunities, and pathways in a required course serving 260+ students each semester
  - Led a cohort of 15 first- and second-year ECE students each semester, building community and supporting student success through consistent mentorship, guidance, and professional accountability

Software and Data Engineering Intern @ Avanos Medical | Atlanta, GA *June 2025 – August 2025*

- Developed and deployed a PowerBI sales analytics dashboard, transforming and analyzing large datasets to deliver interactive visualizations conveying dozens of critical KPI metrics used by the Avanos sales team for data-driven decision-making
- Designed and proposed chatbot solutions for SAP finance data integration, leveraging Microsoft Azure and Foundry to build five potential data pipelines with two alternative implementation approaches, laying groundwork for future deployment

High-Voltage Bushing Design and Fabrication Undergraduate Research Intern | Atlanta, GA *January 2024 – February 2025*

Dr. Lukas Graber, Georgia Tech Department of Electrical and Computer Engineering

- Evaluated and selected thermoset materials, liaised with manufacturers, and presented findings, leading to the adoption of optimized bushing materials enhancing tensile strength, thermal conductivity, and specific heat capacity
- Automated and streamlined the bushing fabrication process using LabVIEW, accounting for precision and safety in pressurized systems for thermoset quantities ranging from 10g to 125kg

Teaching Assistant for Programming for Hardware & Software Systems *May 2024 – May 2025*

- Developed and graded assignments, projects, and exams, ensuring clarity and alignment with course objectives devoting 10+ hours/week
- Offered mentorship to 250+ students, addressing individual challenges regarding embedded systems development, low level optimizations in C and assembly, and application development

Structured Information for Precision Neuroengineering Undergraduate Researcher | Atlanta, GA *February 2024 – May 2024*

Dr. Sankar Alagapan, Georgia Tech Department of Electrical and Computer Engineering

- Aided in designing a neural network leveraging ML to analyze EKG data and predict physiological responses, driving innovation in bio-sensing technologies
- Implemented MATLAB programs to streamline data collection, reducing the need for manual attention and intervention by 300%

HapCompass Bioinformatics Student Researcher | Storrs, CT *July 2021 – June 2022*

Dr. Derek Aguiar, UCONN Department of Computer Science and Engineering

- Optimized a greedy algorithm for haplotype assembly, increasing accuracy and efficiency compared to competitors
- Implemented Dijkstra's, Kruskal's, and Boruvka's algorithms in Python to supplement advanced haplotype reconstruction

PROJECTS

Advanced Glass-Core Package Fabrication | Advanced Glass-Core Packaging *August 2025 – December 2025*

- Fabricated an advanced glass core package substrate, forming through glass vias and cavities, embedding chips, and laminating ABF dielectric to create a high-density interconnect platform
- Executed back-end packaging fabrication steps including surface preparation, seed layer deposition, maskless photolithography, copper electroplating, photoresist stripping, and seed layer etching to define metal routing and interconnect features
- Evaluated final substrate quality and reliability using warpage and surface metrology plus internal and electrical inspection, and identified key process sensitivities such as alignment, cavity sizing, and thermal mismatch effects on cracking and warpage

Multi-Layer Interconnect Package Design | Integrated and Low-Cost Microelectronics Systems Packaging *November 2025 – December 2025*

- Designed and optimized a grounded coplanar waveguide routing scheme, using 45 degree bends and symmetry to reduce impedance discontinuities and reflections, and selecting trace and via dimensions through parametric S parameter analysis
- Created and compared multiple die to BGA escape routing strategies across four metal layers, prioritizing short trace length, minimal layer transitions, and reduced via count, then quantified tradeoffs using total routing length and vias per net
- Proposed manufacturing aware design rule improvements and a compatible advanced packaging process flow, recommending glass substrates, organic damascene RDL, femtosecond laser microvia formation, and thermal and thermomechanical mitigation approaches for high power dies

MEMS Coriolis Gyroscopes | Interface IC Design for MEMS and Sensors *December 2025*

- Authored a technical review on MEMS Coriolis gyroscopes, thoroughly describing how vibratory gyros operate and how mechanical structure choices impact sensitivity, noise, and long-term stability
- Analyzed key error sources and reliability limits including quadrature coupling, bias drift, scale-factor nonlinearity, parasitics, temperature effects, and aging, and summarized how these factors constrain real-world performance in navigation and consumer applications
- Compared modern interface circuit and control approaches for high-performance MEMS gyros, covering low-noise transimpedance readout, switched-capacitor and high-voltage ASIC integration, and feedback strategies for drive stabilization and mode matching

Electroplating and Electroless Plating Deposition| Introduction to Microelectronics Technology *December 2025*

- Developed and delivered a technical presentation on metal plating for thin-film deposition, explaining core principles, process goals, and where electroplating and electroless plating fit among common deposition methods
- Explained electroplating fundamentals from anode/cathode setup through oxidation-reduction reactions, highlighting how current density and solution chemistry influence deposition rate, film quality, and material compatibility
- Compared electroplating versus electroless plating across driving mechanisms, applicability, process control needs, and tradeoffs, and summarized emerging directions such as pulse and smart plating systems, nanoparticle embedding, and additive manufacturing integration

Tower Commander - Aeroponic Farm Sensing Unit (Electrical Lead) | Senior Capstone *January 2025 – May 2025*

- Designed and developed a multi-sensor system to monitor pH, EC, temperature, and water depth, with battery life of 90+ days
- Engineered custom PCB and signal conditioning circuitry to integrate analog and digital sensors for accurate data acquisition
- Implemented and optimized embedded software to process sensor signals and streamline farm operations, saving 80+ labor hours per day and reducing labor costs by $750,000 annually

Cyber-Physical Security and Resilience Engineering for UAV Systems | Cybersecurity of Drones *January 2025 – May 2025*

- Engineered a Software-in-the-Loop simulation to analyze and mitigate GPS sensor failures, simulating jamming and spoofing attacks, examining EKF response, and proposing algorithmic improvements to enhance drone fail-safe mechanisms
- Developed and executed custom security protocols for UAV communication by intercepting MAVLink messages, injecting malicious commands, and evaluating encryption techniques to reinforce resilience against cyber threats
- Conducted in-depth analysis of EKF performance by introducing spoofed sensor data, monitoring state estimation drift, and modifying filter parameters to improve UAV robustness under adversarial conditions

DRAM Analysis (Project Lead) | Electronic Materials *November 2024*

- Directed a team of 5 in developing innovative approaches for high-bandwidth memory applications at Samsung and SK Hynix, driving advancements in semiconductor materials with focus in silicon properties and applications
- Conducted comparative analyses of U.S. and Korean semiconductor markets, forecasted trends, and designed material innovations introducing new solutions to improve DRAM performance

Power Optimization in Device-to-Device Communications | Wireless Communication Systems *November 2024 – December 2024*

- Designed and trained a deep reinforcement learning model optimizing power allocation and improving both energy efficiency and throughput in device-to-device (D2D) networks by implementing an algorithm focused on reinforcement learning
- Integrated communication theory with modern AI techniques, including DRL policy optimization, threshold satisfaction assurance, and parallel Deep Q-Networks
- Achieved stabilized convergence for both training loss and training reward showing effective handling of tradeoff between system capacity and energy efficiency

Malware Reverse Engineering | Introduction to Malware Reverse Engineering *January 2024 – May 2024*

- Successfully reverse-engineered malware, including viruses and worms such as Michaelangelo, Harulf, Lucifer, DOS7, and SQLSlammer
- Extracted and documented payload functionalities, control flows, and obfuscation techniques employed by the malware

- Improved proficiency in low-level programming, debugging, and understanding of binary execution environments

Trivia Trek - Interactive Learning Embedded Board Game (Design Lead) | Junior Capstone *January 2024 – May 2024*

- Directed the design of a customizable trivia board game integrating LCDs, Micro:bit processors, and feedback servos for educators
- Led risk management, design reviews, and development processes, simulating real-world CI/CD and Agile/Scrum methodologies

FPGA Peripheral Metronome | Digital Design Laboratory *November 2023 – December 2023*

- Managed a team of 5 ensuring delegation of tasks, completion of project deliverables, and mitigation of project risks given short timeline
- Implemented an interactive metronome using a Servo and DE-10 FPGA board allowing customization of 256-time signatures at various tempos, producing audible beat patterns and matching visual LED displays

Embedded Missile Videogame | Programming for Software & Hardware Systems *July 2023 – August 2023*

- Designed and implemented the Atari video game on breadboard using MBED microcontroller, LCD display, speaker, joystick, and push switches, enhancing system capabilities and elevating user interaction with multiple levels and dynamic, customizable game features
- Programmed in C and MIPS, bridging high-level and low-level programming to create a seamless, fully functional breadboard video game