TITUS HYUNKYU LEE

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EDUCATION

University of Virginia, School of Engineering and Applied Science, Charlottesville, VA ***August 2023 - May 2027***

B.S. in Electrical Engineering and Computer Engineering, Minor in Business.

- Major GPA: 4.0/4.0 in both Electrical and Computer Engineering, Cumulative GPA: 3.93/4.0.
- Recipient, A. James Clark Scholars Program at UVA, Clark Scholar (one of 17).
- Activities: Theta Tau Professional Engineering Fraternity, Taekwondo Club, Mechatronics and Robotics Society.

Study Abroad Program: UVA in Guatemala ***Summer 2024***

- Studied engineering and public health aspects such as power plants, infrastructure, healthcare, potable water, sanitation, environment, and education, and examined the influence of economic, political, cultural, and historical factors on these aspects.

RESEARCH EXPERIENCE

Research Intern, **DGIST - Robotics & Mechatronics Engineering,** Daegu, South Korea ***Summer 2025***

- Researched over 20 peer-reviewed papers on triboelectric nanogenerators (TENGs), analyzing operational principles across four working modes and identifying material-performance correlations. Devised and fabricated two TENG prototypes (vertical contact-separation and single-electrode), applying NaOH treatment to enhance cotton fabric surface roughness and verified hydrophobicity improvements using contact angle measurements.
- Developed a TENG-based intruder alert system by integrating a self-powered sensor with a microcontroller-based processing unit for real-time motion detection. Acquired and analyzed voltage output using an electrometer and LabVIEW-controlled linear motor across 30+ test iterations, generating comparative performance graphs. Shadowed SEM and XRD workflows for surface/morphology insights and delivered three technical presentations over 90+ lab hours.

PROJECTS

Audio Analyzer PCB - Hardware ***Spring 2025***

- Designed and fabricated a real-time audio analyzer PCB lighting red and green LEDs based on bass and treble frequencies; implemented a signal chain with a summing amplifier, Sallen-Key filters (650 Hz & 2 kHz), and peak detectors for frequency isolation.
- Integrated analog and PWM LED drivers using discrete components and MOSFETs to control brightness; validated dynamic LED response through Multisim circuit simulations and live testing with audio input.

FIFA Scouting Recommender – Software ***Spring 2025***

- Developed a machine learning tool using Python and scikit-learn on a 17,000-player FIFA data set, combining KNN with K-Means and HDBSCAN to cluster players by playstyle and recommend undervalued prospects statistically similar to elite players.
- Cleaned and preprocessed data using pandas; tuned clustering by iterating K-Means (k = 3–10) and HDBSCAN parameters, evaluating silhouette scores, PCA plots, and cluster compactness to identify optimal groupings and facilitate scouting insights.

Vocal Isolation via Signal Processing – Software ***Spring 2025***

- Built a Python pipeline to isolate vocals from mixed audio using spectral gating and harmonic-percussive source separation (HPSS); applied short-time Fourier transform (STFT) with librosa for time-frequency signal analysis.
- Tuned gating thresholds and separation parameters to reduce artifacts and enhance vocal clarity; validated performance through waveform comparison and spectrogram analysis across diverse test tracks.

8-bit Central Processing Unit (CPU) - Hardware ***Fall 2024***

- Designed and implemented an 8-bit CPU in VHDL using Quartus with a 5-bit address bus, 32 memory locations, R/W control, and asynchronous reset; achieved accurate signal timing via hierarchical modular architecture.
- Verified full instruction set functionality using Quartus test benches and custom assembly code; constructed opcode decoder, instruction sequencer, and ALU to support arithmetic, data movement, and conditional branching.

SKILLS

- Programming Languages: Python, C, C++, Java, VHDL, JavaScript, Bash, x86 Assembly.
- Tools & Software: Quartus, NI Multisim, AutoCAD, Fusion 360, Git, Microsoft Office.
- Languages: English (Native), Korean (Native).
- Relevant Coursework: Software Development Essentials, Microelectronics, Communications, Electronics, Signals & Systems, Machine Learning, Embedded Computer Systems, Applied Circuits, Digital Logic Design, Computer Systems and Organization, Data Structures and Algorithms, Discrete Mathematics and theory, Mathematics of Information.

OTHER EXPERIENCE

Mentor, **Computer4Kids,** Charlottesville, VA ***August 2024 - Present***

- Provided one-on-one mentoring to middle school students in STEM education and engineering, guiding through hands-on projects, fostering technical skills, and encouraging problem-solving and teamwork.

Library Circulation Assistant, **Clemons Library,** University of Virginia, Charlottesville, VA ***August 2024 - Present***

- Assisted patrons with checkouts, basic IT support, and re-shelving; worked flexible weekend and evening shifts.