



Songji Eun

KAIST Electrical Engineering

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EDUCATION

Korea Advanced Institute of Science and Technology

Bachelor of Electrical Engineering, Minor in Computer Science, GPA 3.98/4.3(96.8/100)

Daejeon, South Korea

May. 2021 – Present

Georgia Institute of Technology

Bachelor of Electrical and Computer Engineering, Exchange Student, GPA 4.0/4.0

Atlanta, GA

Aug. 2024 – Aug. 2025

Busan Il Science Highschool

High school, Major in Biology

Busan, South Korea

Feb. 2018 - Jan. 2021

RESEARCH INTEREST

I aim to advance semiconductor microfabrication techniques for biomedical applications, developing high-precision bioelectronic interfaces and microfluidic systems to enhance diagnostic and therapeutic technologies.

RESEARCH EXPERIENCE

Fully Integrated Fabrication of Plastic Microfluidic Chips

Jan. 2025 – Present

Biomedical Microsystems Laboratory, Georgia Institute of Technology

Atlanta, GA

- Develop microfluidic chip fabrication workflow transitioning from polycarbonate(PC) to polystyrene(PS) for improved biocompatibility and enable easier surface functionalization
- Optimize hot embossing techniques to achieve high-precision microfluidic channels on PS substrates
- Establish a surface functionalization process compatible with PS to maintain biomolecular activity
- Design and implement an electrode deposition process optimized for PC and PS, addressing adhesion challenges and ensuring conductivity for bioelectronic applications

Flow Rate Monitoring and Control System for Biochip Applications

Aug. 2024 – Present

Biomedical Microsystems Laboratory, Georgia Institute of Technology

Atlanta, GA

- Developed a microcontroller-based system using Arduino to capture and store ADC data for flow rate monitoring
- Investigated the effects of sensor positioning and chip resistance on flow rate accuracy, optimizing FRS placement for practical use
- Analyzed pressure-driven flow control by mapping measured and calculated resistance values to determine required driving pressure
- Implemented a data processing pipeline using gradient analysis and Euclidean distance matching to synchronize pressure and flow rate data
- Designed validation experiments to compare projected and actual flow rates for system optimization

Optimization of ACF Bonder Parameters for Biomedical Applications

Jun. 2023 – Aug. 2023

Brain/Biomedical Microsystems Lab, KAIST

Daejeon, South Korea

- Optimized of bonding conditions of ACF bonder for microelectrode arrays and flexible ECoG devices, refining parameters such as temperature, pressure, and time
- Conducted impedance tests to evaluate the bonding quality, and identified optimal bonding conditions that minimize electrode resistance while ensuring stable electrical connections
- Developed a precise alignment and bonding strategy to address electrode failures at the edge regions
- Packaged bonded microelectrode array device, tested organoide
- Detected organoid and brain signals with devices bonded with ACF bonder

WORK EXPERIENCE

Start-up Intern at AI Team

Dec. 2023 – Feb. 2024

Barreleye, AI-based Breast Ultrasound Image Analysis Solution

Seoul, South Korea

- Tools & technologies used: Python, Computer Vision
- Developed a body-marker extraction tool for breast ultrasound images using Python and OpenCV
- Implemented contour detection and ellipse fitting to identify anatomical markers and reference points
- Handled exception cases to improve robustness in marker detection and extraction
- Validated system performance using large clinical datasets, including noisy and incomplete images

CLEANROOM EXPERIENCE

- Trained and familiar with microfabrication processes
- Tools : STS Pegasus ICP, STS ICP, Vision RIE, Denton Explorer - E-beam Evaporator, Unifilm Sputterer, CHA E-beam Evaporator, Denton Discovery - RF/DC Sputterer, ADT 7100 Dicing Saw, Heidelberg MLA150, Heidelberg MLA300, Tencor KLA Profilometer, Plasma Cleaner, Spin coater

PROJECTS

Tree Tap

Aug. 2024 – Present

- **Received Best Interdisciplinary Award**, Capstone Design Expo 2024
- Conducted customer discovery through interviews with park rangers, hikers, and SAR professionals, identifying needs for affordable and reliable emergency communication in national parks
- Develop a low-power mesh network device using LoRa and BLE communication protocols to provide SOS and non-emergency communication for park visitors
- Develop hardware for the TreeTap, integrating PCB design, solar power harvesting, and a weather-proof enclosure

Advanced NMOS Process Simulation | *Semiconductor Design, ATHENA & ATLAS*

Apr. 2024 – Jun. 2024

- Developed NMOS device simulation using ATHENA and ATLAS for cutting-edge CMOS process modeling
- Simulated critical stages including ion implantation, gate oxide growth, and high-temperature annealing
- Performance analysis through IV curves, threshold voltage, and saturation current for varying gate oxide thickness
- Fine-tuned channel implantation to achieve precise V_{th} control

KAIST Board of Audit and Inspection Project | *React, Figma*

Mar. 2023 – Jul. 2023

- Development of bankbook transaction details and budget plan management page using React for the frontend
- Strategic decision-making process regarding feature selection and functionality definition
- Collaboration within the development team using Git for version control, enhancing workflow efficiency

AWARDS & HONOR

Undergraduate Research Spring Symposium

Apr. 2025

Fabrication of Plastic-Based Microfluidic Devices for Low-Cost, Scalable Analytical Systems

Best Interdisciplinary Award, Capstone Design Expo 2024

Dec. 2024

Tree Tap Project

2024 Spring KAIST Dean's List

Sep. 2024

Within top 3% of academic performance in Department of Electrical Engineering

2023 Fall KAIST Dean's List

Mar. 2024

Within top 3% of academic performance in Department of Electrical Engineering

Excellence Award, AI-based Library Service Idea Contest

Nov. 2023

Proposal of an image-based book recommendation system

Encouragement Award, National Challenge of Scientific Inventions, Top Award, Busan Challenge of Scientific Inventions

Nov. 2019

Study on the Removal of Microplastics in Salt

SCHOLARSHIPS

Korea Electric Power Corporation Scholarship

KEPCO Foundation

May 2024 – Present

KRW 7,000,000(approx. \$5080) in total

Korea-USA High-tech Youth Exchange Support Scholarship

KIAT Foundation

Aug. 2024 - Present

USD \$9000(approx. ₩11,709,000) in total

EXTRACURRICULAR ACTIVITIES

Young Engineers Honor Society(YEHS) Junior member

May 2024 – Present

- Inspired elementary students in engineering through hands-on activities at the Junior Engineering Class
- Advised high school students on electronics careers, providing guidance for major selection and future paths

Vice President of KAIST Volunteer Club

Sep. 2022 – Jun. 2023

- Provided academic guidance to students at Geukdong Children's Education Center
- Organized and led activities at Yuseong Welfare Center, engaging the community through conversations and games

2023, 2024 KAIST Buddy Program

Sep. 2023 - Jun. 2024

- Helped exchange students adjust to Korean culture and campus life

KAIST Orchestra 2nd Violin

Mar. 2021 - Present

- Playing violin in chamber music concert, regular concert

TECHNICAL SKILLS

Tools: COMSOL Multiphysics, KiCAD, AutoCAD, SolidWorks, Git, React, VS Code, Visual Studio

Programming Languages: Matlab, Java, Python, C, Verilog, Javascript

Languages: Native to Korean, Fluent in English (iBT TOEFL 103), Intermediate to Chinese (HSK 3)

Libraries: opencv, pydicom, scikit-image, NumPy, Matplotlib, scanpy, React