

# YUN GOO LEE

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Seoul, Republic of Korea (South Korea)

Multiphysics simulation engineer specializing in CFD-based thermal analysis, RF propagation modeling, and data-driven design optimization for virtual validation and early-stage design verification.

## TECHNICAL SKILLS

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### CORE DOMAINS

- ♦ Multiphysics virtual validation (CFD thermal / RF propagation / Electric-field analysis)
- ♦ Physics-based surrogate modeling & data-driven design optimization
- ♦ Electro-optic devices, high-speed optical systems & experimental characterization

### SIMULATION & ANALYSIS

- ♦ CFD/Thermal: Star-CCM+, COMSOL Multiphysics
- ♦ RF/Electromagnetics: CST Studio Suite, Ansys HFSS
- ♦ Design Optimization: HEEDS, DOE, R<sup>2</sup>/MAPE-based model validation

### EXPERIMENT & HARDWARE

- ♦ High-speed optical scanning systems & electrical/optical signal synchronization
- ♦ Cleanroom fabrication and material/device characterization.  
(thin-film deposition, lithography, sputtering/evaporation, SEM/EDS, polarized microscopy)

### PROGRAMMING & TOOLS

- ♦ Python, Java, C/C++, MATLAB, LabVIEW, NI Multisim/Ultiboard, AutoCAD, CATIA V5, ANSA, Excel

## EXPERIENCES AND PROJECTS

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**Hyundai Motor Company**, Hwasung-si, Gyeonggi-do, South Korea

Dec.2024 – Present

### Senior Research Engineer

[1] EV Battery Thermal Simulation and Virtual Validation | Star-CCM+, HEEDS

- ♦ Perform CFD-based thermal analysis of EV battery modules and packs to evaluate cooling performance, maximum temperature, temperature uniformity, and thermal management design directions.
- ♦ Analyze the effects of cooling conditions and structural design parameters on battery temperature distributions and support design improvement decisions through simulation-based virtual validation.

[2] Data-Driven Design Optimization for Immersion Cooling | CFD, Python, Java

- ♦ Derived thermal/hydraulic performance metrics such as Nusselt number and Darcy friction factor, and built physics-based surrogate models to predict design-performance relationships.
- ♦ Automated design-parameter calculation, simulation post-processing, and data analysis workflows using Python and Java.

[3] Early-Stage RF Propagation Modeling for Wireless BMS | CST Studio Suite, Ansys HFSS

- ♦ Contribute to early-stage 2.4 GHz RF propagation modeling for wireless BMS applications inside EV battery pack environments.
- ♦ Evaluate antenna placement, shielding effects, propagation paths, and signal strength to support communication robustness assessment.

**Pennsylvania State University**, University Park, Pennsylvania, US

Aug. 2017 – Dec. 2023

### Research Assistant

- ♦ Designed and demonstrated a high-energy, high-speed laser scanning system using time-division multiplexed electro-optic beam combining.
- ♦ Developed electro-optic beam deflector for high-speed applications by both simulations and experiments.

### Teaching Assistant

- ♦ Laboratory sessions in analog electric circuit. (R2R circuit, Baxandall tone-control circuit, Multisim/Ultiboard)

**Korean Institute of Science and Technology**, Seoul, South Korea

Feb. 2015 – Aug. 2017

### Research Intern

- ♦ Developed wearable thermoelectric devices for energy harvesting purposes by 1-D thermal resistance modeling. (50uW/cm<sup>2</sup> under walking conditions)

## EDUCATION

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**Pennsylvania State University**, University Park, PA, US (GPA: 3.64/4.00)

Aug. 2017 – Dec. 2023

**Ph.D.** Electrical Engineering (Electro-optics Lab)

**Doctorate Thesis:** Advanced electro-optic beam steering devices based on KTN crystals.

**Korea University**, Seoul, South Korea

Mar. 2015 – Feb. 2017

**M.S.** Electrical Engineering (Semiconductor and Nano)

**Master Thesis:** Design, fabrication, and characterization of thermoelectric generators for wearable electronics.

**Korea University**, Seoul, South Korea

Mar. 2007 – Feb. 2015

**B.S.** Electrical and Computer Engineering

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## ACTIVITIES

- ♦ Member of SPIE/OSA, Penn State Univ. Student Chapter, USA

Aug. 2017 – Dec. 2023

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## SELECTED PUBLICATIONS

- ♦ **Y. G. Lee**, A. Shang Jr., R. Liu, W. Zhang, and S. Yin, “Polarization-independent reflective-type KTN beam deflector with a single KTN crystal”, *Optics Continuum*, **2022**, 1 (2), 238-245
- ♦ **Y. G. Lee**, C. J. Chen, A. Shang Jr., R. Liu, J. H. Chao, and S. Yin, “Enhanced c-axis KTN beam deflector by compensating compositional gradient effect with a thermal gradient”, *OSA Continuum*, **2021**, 4 (2), 665-671
- ♦ **Y. G. Lee**, A. Shang Jr., R. Liu, W. Zhang, and S. Yin, “2-dimensional KTN deflector enabled large capacity time division multiplexing based beam combining”, *Proc. of SPIE*, **2021**, 11826, 32-37
- ♦ **Y. G. Lee**, C. J. Chen, A. Shang Jr., R. Liu, and S. Yin, “Analyzing thermal effect in KTN crystal for high-speed continuous optical beam deflection”, *Proc. of SPIE*, **2020**, 11498, 114980D
- ♦ **Y. G. Lee**, J. Kim, M. -S. Kang, S.-H. Baek, S. K. Kim, S. -M. Lee, J. Lee, D. -B. Hyun, B. -K. Ju, S. E. Moon, J. -S. Kim, B. Kwon, “Design and experimental investigation of thermoelectric generators for wearable applications”, *Advanced Materials Technologies*, **2017**, 2 (7), 1600292
- ♦ R. Liu, A. Shang Jr., **Y. G. Lee**, M. A. Kabir, Y. Ji, K. Wu, and S. Yin, “Electrode surface topology enhanced KTN deflector”, *Optics Continuum*, **2022**, 1 (12), 2637-2644
- ♦ S. Yin, J. H. Chao, **Y. G. Lee**, A. Shang Jr., C. J. Chen, M. Dubinskiy, R. C. Hoffman, “Recent development of high energy solid state laser based on time division multiplexing (TDM)”, *Proc. of SPIE*, **2019**, 11123-13

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## OTHERS

- ♦ Native in Korean and fluent in English
- ♦ 2-year military service in 304<sup>th</sup> Expeditionary Signal Battalion of US Army as a KATUSA (Korean Augmentation to the United States Army) soldier.