

Youngwoong Youn

AI & Simulation | Computational Materials | Intelligence

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Summary

My research focuses on AI-driven simulations and computational modeling to optimize materials and energy systems. I am extending this foundation toward neuromorphic and brain-inspired computing, as well as robotics perception and intelligent systems. My goal is to bridge physics-based engineering with next-generation computational architectures to advance sustainable and adaptive technologies.

Education

Hanyang University
Candidate for B.S in Mechanical Engineering

Seoul, South Korea
March 2020 - present

Research & Project Experiences

Fraunhofer IPT. Institute for Production Technology Aachen, Germany

Supervisor : Martin Artez M.Sc.
Group leader of Interlinked production machines

ipt.fraunhofer.de
Sep.2025 – Present

Automated Geometry Analysis for Large-Scale Fuel Cell Bipolar Plate Production

- Contribute to the joint research project H2GO, focusing on scaling production technology for fuel cell and electrolyzer components.
- Develop automated algorithms to extract and evaluate geometry parameters of bipolar plates directly from large-scale manufacturing processes.
- Apply FFT-based methods to detect deviations and noise in plate geometry, enabling quantitative comparison with ideal reference structures.
- Conduct literature review on Fourier and computational methods for geometry evaluation in hydrogen fuel cell systems.
- Train on Alicona optical measurement systems to support precision validation of algorithm outputs against experimental data.

Clean Energy Solution Lab CLES Seoul, Republic of Korea

Supervisor : Prof. Jiwoong Bae
Dept. of Mechanical Engineering Hanyang University

cleslab.com
Jun. 2023 – Jun.2025

Capstone Project (Jan.2025-Jun.2025)

- Currently developing an on-board EIS system to enhance SoC and SoH estimation in electric vehicle BMS.

Research & Project Experiences (cont.)

Capstone Project (cont.)

- Designed a generative DRL model (A2C) to restore incomplete EIS data, improving battery condition analysis
- Integrated the system using commercial Evaluation Board, advancing real-time battery monitoring for EV applications.
- integrated DRL-based BMS system for accurate SOC and SOH estimation with MATLAB Simulink, incorporating equivalent circuit model fitting techniques coupled with electrochemical theory.

Grace Capacity Utilization in NMC and LFP Battery Cells (May.2024 - Nov.2024)

- Analyzed grace capacity strategies in NMC and LFP 18650 battery cells to assess their impact on performance and lifespan.
- Developed and conducted Python-based simulations to model grace capacity variations while maintaining energy efficiency.
- Applied machine learning regression models to analyze charge-discharge cycle trends and evaluate the effects of grace capacity variations on battery longevity.

Transformer Core Materials and Market Study (Contract Project, KETI) (Sep.2023 – Oct. 2024)

- Independently conducted a contract research project commissioned by Korea Electronics Technology Institute (KETI), on transformer principles, core material properties, and market trends.
- Evaluated silicon steel, ferrite, amorphous, and nanocrystalline alloys in terms of electromagnetic, thermal, and mechanical reliability.
- Reviewed technologies for residual magnetism removal and insulation degradation relevant to transformer reliability.
- Delivered a final report integrating technical assessment with global and domestic market analysis.

Enhancing Conductivity of Polymer Electrolyte via Magnetic Heating (Aug.2023 – Mar. 2024)

- Designed and fabricated a coil and power supply system to apply an AC magnetic field for electrolyte heating.
- Prepared and tested PEO-based electrolytes with magnetic powders to enhance ionic conductivity.
- Conducted EIS, and XRD and FTIR Spectroscopy to analyze conductivity changes and material interactions.
- Integrated the electrolyte into a battery cell and evaluated performance under cycling conditions.

Research group of Automotive Control Engineering RACE Seoul, Republic of Korea

Supervisor : Prof. Taehee Lee
Dept. of Automotive Engineering

racehanyang.com

Gearbox Designer, Powertrain Dept

Jun. 2020 – Jul. 2021

FSAE 2021 Competition

- Led the development of an electric powertrain system for Hanyang University's Formula SAE team, the only Asian team competing in FSAE Nevada 2021.
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Research & Project Experiences (cont.)

FSAE 2021 Competition (cont.)

- Designed the planetary gearbox and integrated the Battery Management System and motor-inverter system, ensuring efficient energy management and optimization.
- Enhanced component reliability and efficiency by performing structural analyses using FEM simulations and systematically analyzed optimal gear ratios using Simulink.

Coordinator, External Affairs

Jan. 2021 – Jul. 2021

Partnership & Sponsorship Development

- Managed sponsorship proposals and actively identified and contacted potential new sponsors.
- Handled the development and management of promotional materials and team related content across various social media platforms.
- Secured sponsorships providing essential electronic and mechanical components, enhancing operations and reducing costs.

Conference

The Korean Society Of Automotive Engineers

Youn, Y., & Bae, J. (2024). Comparative Analysis of Grace Capacity in NMC and LFP Battery Cells for Electric Vehicle Applications. *KSAE 2024 Annual Autumn Conference & Exhibition*, 1917–1917.

Awards

1. KSAE Formula Student EV part (2021)
 - First Place for Altair Optimum Design Award
 - Silver Place For Technology Idea Award
2. Capstone Project Award - Poster Session (2025)
organized *Department of Mechanical Engineering, Hanyang University*
3. Grand Prize - *Eco-friendly Mobility System Control Design Festival* (2025)
organized by *Hanyang University Engineering Education Innovation Center*

Services

Military Service at ROK Army

The 1st Logistics Support Command
Maintenance Technician

Oct. 2021 – Feb. 2022

Volunteer Work

Meal Preparation Volunteer, Seongdong Senior Welfare Center
Provided cooking and meal distribution support for senior citizens

Mar. 2024 – Jun. 2024

Skills

- Language : **Python, MATLAB, C/C++**
- OS : Linux, Windows
- Framework & Library : PyTorch, Pandas, NumPy, Scikit-learn, OpenAI Gym etc.
- Mechanical Design : **CATIA**, SolidWorks, Fusion360
- Electrical Design : KICAD, LTSPICE
- Computer Simulation : **Ansys, Ansys Fluent**, Altair, COMSOL
- Embedded Systems : STM32 MPU, Arduino development
- Manufacturing : Lathe, Milling (both Manual & CNC)
Composite CFRP Manufacturing (infusion, prepreg layup, autoclave curing, Resin Transfer Molding, and compression molding techniques)
Battery Electrode & Solid Electrolyte film fabrication

Bold font means the tools that used the most

Scholarship

Department of Mechanical Engineering Scholarship, College of Engineering

- Led the video production and editing of career counseling content featuring alumni insights to guide junior students in career planning.

Personal Interests

- Exploring advanced mobility technologies and racing strategies through Formula One
- Viola performance and orchestral music interpretation
- Studying architectural knowledge derived from human behavior and philosophy

[CV updated in Sep.14.2025]