

# Youngwoong Youn

Decision Intelligence | Systems Engineering | Advanced Manufacturing

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## Summary

Interdisciplinary researcher with expertise in intelligent system analysis and physics-informed modeling, dedicated to advancing human perception and decision-making capabilities through intelligent engineering systems. Aiming to Bridge intelligence, performance, and sustainability to develop smarter and more enduring engineering systems for real-world applications.

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## Education

Hanyang University

*Candidate for B.S in Mechanical Engineering*

Seoul, South Korea  
March 2020 - present

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## Research & Project Experiences

### **Fraunhofer IPT.** Institute for Production Technology Aachen, Germany

Department: Modular Production Machines

Head of Department: Florian Hüsing

[ipt.fraunhofer.de](http://ipt.fraunhofer.de)

Group: Interlinked Production Machines

Scientific Supervisor: Sangwook Langenstück-Lee

*Visiting Scientist*

Sep.2025 – Present

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

- Contributed to the German Federal Ministry for Digital and Transport-funded H2GO national research initiative on large-scale fuel cell and electrolyzer production technologies.
- Developed automated algorithms to extract and evaluate geometry parameters of bipolar plates from large-scale manufacturing processes.
- Applied FFT-based methods to detect deviations and noise in plate geometry, enabling quantitative and qualitative comparison with ideal reference structures, and conducted literature review on Fourier and computational methods for geometry evaluation in fuel cell systems.
- Developed GUI data acquisition workflows using Keyence sensor systems for high-precision geometric validation of bipolar plate profiles.

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### **Clean Energy Solution Lab CLES** Seoul, Republic of Korea

Supervisor : Prof. Jiwoong Bae

School of Mechanical Engineering Hanyang University

[cleslab.com](http://cleslab.com)

*Research Intern*

Jun. 2023 – Jun.2025

#### **Capstone Project** ( Jan.2025-Jun.2025 )

- Developed an on-board EIS system to enhance SoC and SoH estimation in electric vehicle battery manage system.
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## **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.

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

Supervisor : Prof. Taehee Lee  
Dept. of Automotive Engineering

[racehanyang.com](http://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.

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## **Independent Research Project**

### **EEG-Based Human–Robot Control System with Generative Signal Modeling** [github repository](#)

- Designed an end-to-end EEG-driven robotic control framework integrating signal processing, motor imagery–based intent inference, and real-time robot actuation.
- Developed a physics-informed generative model to restore sparse EEG channels into full-channel representations for robust downstream analysis and classification.
- Implemented deep learning–based intent classification pipelines and integrated outputs into a ROS2-based control system for real-time velocity command generation.
- Designed a LiDAR-based environment-aware safety filter to preserve user intent while preventing unsafe actions, and validated system performance in Gazebo simulation with collision-aware behavior.

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## **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.

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## **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 by *School of Mechanical Engineering, Hanyang University*
  3. Grand Prize - Eco-friendly Mobility System Control Design Festival (2025)  
organized by *Hanyang University Engineering Education Innovation Center*
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## **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

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## **Scholarship**

School 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.

Korea–Germany Global Talent Development Program (NRF, MSIT),  
Fraunhofer Institute for Production Technology (IPT), Aachen, Germany

- Selected as a funded visiting researcher under the Korea–Germany Global Talent Development Platform, supported by the National Research Foundation of Korea (NRF) and the Ministry of Science and ICT (MSIT), and operated by the Max Planck–POSTECH/Korea Research Initiative, to conduct collaborative research in advanced manufacturing and production technologies.

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[CV updated in Jan.09.2026]