

# Minho Jang

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🌐 Personal Website 📈 Google Scholar 📚 ORCID 🐾 GitHub

## Biography

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He received the B.S. degree in electronics and computer engineering from Chonnam National University, Gwangju, Republic of Korea, in 2021, and the M.S. degree in aerospace engineering from Sejong University, Seoul, Republic of Korea, in 2025. He is currently working as a satellite system engineer at the Satellite Technology Research Center (SaTRec), KAIST, Daejeon, Republic of Korea. His research interests include guidance, navigation, and control (GNC), with a focus on optimal control theory and its applications to missile and satellite systems.

## Areas of Expertise

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- Guidance, Navigation, and Control of Missile and Satellite
- Guidance Law Design: Nonlinear Model Predictive Control, Optimal Trajectory Generation
- Navigation Filtering: Extended Kalman Filter Design, Interacting Multiple Model Algorithms
- Autopilot Design (Three-Loop Architecture) and Trajectory Optimization
- 6-DOF Missile Modeling and Simulation
- Data-Driven and Learning-Based Control: Reinforcement Learning, Deep Neural Networks

## Education

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### M.S. Sejong University

Seoul, Republic of Korea

Aerospace Engineering

Sep. 2021 – Aug. 2025

- Advisor: Prof. Sungsu Park ⚡
- Lab: Flight Dynamics and Control Laboratory
- Thesis ⚡ : Nonlinear Model Predictive Control for Guidance Law with Target Input Estimation
- Coursework: Flight Dynamics and Control; Guidance, Navigation, and Control (GNC); Optimal/Nonlinear Control; Orbital Mechanics; Classical Mechanics

### B.S. Chonnam National University

Gwangju, Republic of Korea

Electronics and Computer Engineering

Mar. 2015 – Aug. 2021

- Advisor: Prof. Jinyoung Kim ⚡
- Lab: Intelligent Electronics Laboratory
- GPA: 3.91
- Coursework: Control Theory; Digital Signal Process (DSP); Electrical/Electronic Circuit Theory; Microprocessor; Dynamics

## Experiences

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### KAIST Satellite Technology Research Center (SaTRec)

Daejeon, Republic of Korea

Research Associate (Contract)  
Satellite System Engineering

Dec. 2025 – Current

- Development of Microsatellite Constellation System

### Sejong University

Seoul, Republic of Korea

Research Assistant (Contract)

Nov. 2025 – Dec. 2025

- Safe Reinforcement Learning for Threat-Responsive Satellite Maneuvering

### Sejong University

Seoul, Republic of Korea

Graduate Research Assistant & Teaching Assistant

Sep. 2021 – Aug. 2025

- Research Assistant:

- Member of Flight Dynamics and Control Lab (FDCL).
- Development of Localization Technology for Wind Power Control Systems
- Fundamental Research on Electromagnetic Modeling for Electronic Warfare Systems  
[EW42: Modeling of Radar-Guided Systems for Electronic Warfare]

- Teaching Assistant:

- AE006885 – Flight Mechanics
- AE002390 – Aerospace Software Applications I
- AE004642 – Dynamics
- Assisted with grading, programming assignments, and practical instruction across multiple key aerospace engineering courses

### Seoul National University

Seoul, Republic of Korea

Exchange Student Program, Department of Mechanical and Aerospace Engineering

Sep. 2020 – Dec. 2020

- Completed advanced coursework in model predictive control as part of a control systems curriculum (ECE430.456)
- Bridged academic backgrounds in electronics engineering with aerospace applications through coursework in Aerospace Traffic and Navigation Systems (MAE2795.004600)
- Gained interdisciplinary exposure to modern control theory and aerospace engineering, deepening understanding of autonomous systems and guidance technologies

## Publications

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### Journal

- [J.2] **Minho Jang**, M. Kim, D. Jang, and S. Park

Capturability Analysis of the Composite Pursuit Guidance Law

*IEEE Transactions on Aerospace and Electronic Systems (TAES)*

Dec.2025 

- [J.1] M. Kim, **Minho Jang**, and S. Park  
A Data-Driven Model Predictive Control for Wind Farm Power Maximization  
*IEEE Access*

Jul. 2024 ♂

## Conference

- [C.6] D. Song, D. Jang, **Minho Jang**, and S. Park  
Technical Requirements Analysis for AAM/UAM Simulators  
*Conference of the Korean Society for Aeronautical and Space Sciences (KSAS)* 2025
- [C.5] **Minho Jang**, M. Kim, H. Lim, D. Lee, and S. Park  
Study on Missile Evasion for Unmanned Aircraft using Artificial Potential Field  
*Conference of the Korean Society for Aeronautical and Space Sciences (KSAS)* 2023
- [C.4] H. Lim, M. Kim, **Minho Jang**, D. Lee, and S. Park  
Research on Halo Phasing Orbit Design based on Optimal Control  
*Conference of the Korean Society for Aeronautical and Space Sciences (KSAS)* 2023
- [C.3] D. Lee, M. Kim, **Minho Jang**, H. Lim, and S. Park  
Lambert's Problem Solver Using Physics-Informed Neural Network  
*Conference of the Korean Society for Aeronautical and Space Sciences (KSAS)* 2023
- [C.2] M. Kim, H. Lim, **Minho Jang**, D. Lee, and S. Park  
Wind Speed and Wind Direction Prediction Using LSTM Model  
*Conference of the Korean Society for Aeronautical and Space Sciences (KSAS)* 2023
- [C.1] M. Kim, **Minho Jang**, H. Lim, and S. Park  
A Study on Deep Neural Network-Based Wake Modeling for Wind Farms  
*Conference of the Korean Wind Energy Association (KWEA)* 2022

## Project Experiences

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### Safe Reinforcement Learning for Threat-Responsive Satellite Maneuvering

Oct. 2025 – Feb. 2026

Funded by: National Research Foundation of Korea (NRF)

Managing Institution: Sejong University

- Development of reinforcement learning-based control policies that satisfy Lyapunov stability conditions
- Implementation of an autonomous GNC framework capable of handling diverse orbit and threat scenarios
- Construction of a real-time simulation environment using Basilisk for policy verification and validation
- Design of generalized algorithms applicable to various missions, including military satellites, service drones, and relay satellite operations
- Tools & Software Used: Python, Basilisk, Pytorch, Gymnasium, RLLib

### Development of Localization Technology for Wind Power Control Systems

Sep. 2021 – Feb. 2025

Funded by: Ministry of Trade, Industry and Energy (MOTIE)

Managing Institution: Korea Institute of Energy Technology Evaluation and Planning (KETEP)

- Designed and deployed the FAST.Farm mid-fidelity simulator for wind farm dynamics, enabling online environmental modeling and data collection
- Applied dynamic mode decomposition (DMD) to reduce the dimensionality of high-fidelity wind flow field data from FAST.Farm, improving computational efficiency for control algorithms
- Implemented Kalman Filter-based state estimation to enhance predictive accuracy of reduced-order wind field models
- Developed a model predictive control framework to maximize total wind farm power output using the estimated flow field states
- Engineered real-time socket communication (ZeroMQ) between the central control server and distributed wind turbine controllers
- Published the research as a journal paper in collaboration with graduate researchers at Sejong University [J.1]
- Tools & Software Used: MATLAB, Fortran, Python, OpenFAST, FAST.Farm, ZeroMQ

**Fundamental Research on Electromagnetic Modeling for Electronic Warfare Systems**  
[EW42: Modeling of Radar-Guided Systems for Electronic Warfare]

Sep. 2021 – Dec. 2021

Funded by: Defense Acquisition Program Administration (DAPA)

Managing Institution: Agency for Defense Development (ADD)

- Assisted in the design and evaluation of guidance algorithms for anti-ship missiles, supporting analysis through simulation and system modeling
- Supported the development and implementation of missile engagement modeling and visualization using the Unity engine, enabling online scenario simulation
- Tools & Software Used: MATLAB/Simulink

## Independent Research

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**Design of Nonlinear Model Predictive Control-Based Guidance Law**

Mar. 2025 – Aug. 2025

- Designed a look angle-based nonlinear model predictive control guidance framework tailored for strapdown seekers
- Developed an adaptive extended Kalman filter (AEKF) using look angle measurements from the strapdown seeker, and implemented an interacting multiple model (IMM) algorithm to estimate target inputs
- Tools & Software Used: Julia, JuMP.jl, Ipopt.jl

**Missile Aerodynamic Prediction Based on a Semi-Empirical Method**

Dec. 2024 – Mar. 2025

- Measured the geometric features (e.g., length, diameter) of the PAC-3 MSE missile using a 3D CAD tool to generate accurate input data
- Generated aerodynamic coefficients of the missile using Missile DATCOM based on the extracted geometry
- Constructed a look-up table (LUT) for aerodynamic coefficients, including control derivatives, and developed a neural network surrogate model to approximate and replace the LUT
- Tools & Software Used: Julia, Missile DATCOM, Autodesk Fusion, Pytorch

## **Development of a 6-DOF Missile Defense System Simulation Framework**

Jun. 2024 – Apr. 2025

- Developed a 6-DOF missile defense simulation framework under an the WGS-84 Earth model, incorporating centrifugal and Coriolis accelerations as well as a zonal gravity model
- Implemented the equations of motion for a ballistic missile using aerodynamic data extracted from the PRODAS missile analysis software
- Designed an LQR-based autopilot for the interceptor missile to achieve stable trajectory control
- Integrated Google Earth terrain data to visualize and analyze missile trajectories and attitudes
- Tools & Software Used: Julia, PRODAS, Google Earth

## **Capturability Analysis of Composite Pursuit Guidance**

May. 2024 – Jul. 2025

- Analyzed the capturability of pure proportional navigation to identify its limitations, and designed a hybrid guidance law combining pursuit guidance to ensure a full-range capture region
- Submitted the research as a journal paper in collaboration with graduate researchers at Sejong University [J.2]
- Tools & Software Used: Matlab/Simulink, Python

## **A Study on Missile Evasion Strategies for Unmanned Aircraft**

Feb. 2023 – Nov. 2023

- Implemented and applied an artificial potential field (APF) algorithm, a classical collision avoidance technique, to enable missile evasion maneuvers
- Published the research as a conference paper in collaboration with graduate researchers at Sejong University [C.5]
- Explored missile evasion strategies using reinforcement learning approaches to enhance autonomous response capabilities
- Tools & Software Used: Python, Tensorflow, Pytorch

## **Awards**

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### **2020 Capstone Design Competition**

Dec. 2020

Chonnam National University

- Recognized for developing an innovative engineering project in the 2020 Capstone Design Competition hosted by the Engineering Education Innovation Center

## **Activities**

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### **LIG Nex1 Co., Ltd.**

Yongin, Republic of Korea

Future Space Navigation & Satellite Technology Research Center

Jul. 2023

Industry–Academia Internship Program

- Completed on-site internship training program focused on advanced technologies in space navigation and satellite technology

### **Chonnam National University**

Gwangju, Republic of Korea

Glocal Specialization Exploration Program

CA, USA

- Selected for a university-sponsored overseas program aimed at exploring global research environments and cutting-edge industrial technologies
- Visited the Robotics & Mechanisms Laboratory ([RoMeLa](#) ⚡) at UCLA, led by Prof. Dennis Hong, to observe research on robotics and AI-based autonomous systems
- Explored the Stanford University campus to gain insight into Silicon Valley's innovation ecosystem and global academic culture in electronics and computer engineering
- Visited Google headquarters to discuss industrial applications and future directions of artificial intelligence and deep learning with an engineering expert
- At Tesla headquarters, engaged with a Korean engineer working on autonomous driving systems and deepened understanding of computer vision and image processing technologies applied in real-world automotive systems

Jul. 2017

**Samsung Electronics**

Gwangju, Republic of Korea

Aug. 2015

Design Your Dream Corporate Experience Program

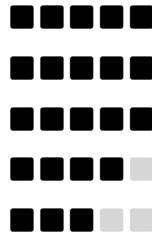
- Completed the “Design Your Dream” university corporate experience camp organized by Samsung Electronics, Gwangju Volunteer Center

## Technical Skills

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### Programming Languages:

- MATLAB/Simulink
- Julia
- Python
- Fortran
- C/C++



### Frameworks & Tools:

- [Missile DATCOM](#) ⚡
- [OpenFAST](#) ⚡
- [FAST.Farm](#) ⚡
- [JuMP.jl](#) ⚡
- [Ipopt.jl](#) ⚡
- [ZeroMQ](#) ⚡
- [Pytorch](#) ⚡
- [Basilisk](#) ⚡

