JUNGHYUN (ANDY) KIM

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RESEARCH INTERESTS

Machine Learning, Deep Learning, Optimization, Multi-disciplinary Design Optimization, Advanced Design Methods, Operations Research, Systems Engineering, Digital Twin, Modeling and Simulation, Air Traffic Management, Advanced Air Mobility, Aviation Environmental Impact Assessment, Computational Fluid Dynamics

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EDUCATION

Georgia Institute of Technology   Atlanta, Georgia

Ph.D. in Computational Science and Engineering   Aug. 2015 – May 2021

- Advisor: Prof. Dimitri Mavris
- Dissertation: Data-Driven Approach using Machine Learning for Real-Time Flight Path Optimization [J.3]

Georgia Institute of Technology   Atlanta, Georgia

M.S. in Aerospace Engineering   Aug. 2015 – May 2018

- Advisor: Prof. Dimitri Mavris
- Thesis: Multi-Objective Optimization of Departure Procedures at Gimpo International Airport [J.1]

Seoul National University   Seoul, South Korea

M.S. in Aerospace Engineering   Mar. 2012 – Feb. 2014

- Advisor: Prof. Kyuhong Kim
- Thesis: Development and Verification of Density-Based Solver using LU-SGS Algorithm in OpenFOAM [C.3]

Sejong University   Seoul, South Korea

B.S. in Aerospace Engineering   Mar. 2005 – Feb. 2012

- Advisor: Prof. Jon Ahn
- Summa Cum Laude: Ranked 1st out of 53

EMPLOYMENT

Seoul National University   Seoul, South Korea

Adjunct Professor   Mar. 2024 – Present

- Primary instructor, Big Data University & Aviation Drone University

Handong Global University   Pohang, South Korea

Tenure-track Professor   Mar. 2022 – Present

- Assistant professor, School of Applied Artificial Intelligence
- Professor by courtesy, School of Computer Science and Electrical Engineering
- Director, Engineering Systems Design Laboratory

American Airlines   Fort Worth, Texas

Full-time Operations Research Analyst   May 2021 – Feb. 2022

- Evaluated estimated on time and predicted taxi-in time data from different organizations (i.e., American Airlines, NASA, FAA, FlightAware, and PASSUR Aerospace) by comparing with real-world operational data
- Developed simulation models for CLT and DFW airports and analyze various initiatives (e.g., what-if analysis of DFW southwest end-around taxiway) using AirTOP

Hyundai Motor Company   Seoul, South Korea

Research Intern   Dec. 2020 – Jan. 2021

- Established airspace infrastructure for Urban Air Mobility operations in South Korea
- Proposed a PRM-based flight path optimization approach for Urban Air Mobility operations in South Korea

Samsung Electronics   Hwasung, South Korea

Research Intern   May 2020 – Aug. 2020

- Developed a machine learning-based code auto-completion framework for SSD firmware developers
- Proposed a hybrid approach that combines advanced design methods with machine learning techniques to perform sensitivity analysis with respect to diversity parameters of the GPT-2 language model
- Published a research paper on project outcomes with the Device Solution Research team members [J.2]

CJ Logistics   Seoul, South Korea

Research Intern   May 2018 – Aug. 2018

- Developed a framework designed to perform surrogate-based optimization with machine learning techniques for a mega-hub location problem in South Korea
- Performed uncertainty quantification with respect to design variables (i.e., supply, hub capacity, and truck speed) of the transportation network optimization problem
- Published a research paper on project outcomes with the Network Planning team members [C.7]

Siemens (CD-adapco)   Seoul, South Korea

Research Intern   May 2016 – Aug. 2016

- Designed a nozzle for a Surface-to-Air Missile using STAR-CCM+
- Improved transition models implemented in STAR-CCM+

Aerospace Systems Design Laboratory   Atlanta, Georgia

Graduate Research Assistant   Jan. 2016 – Aug. 2019

- Performed parametric uncertainty and sensitivity analysis of environmental impacts of aviation (FAA project)
- Developed a rapid fleet-wide environmental assessment tool (FAA project)
- Performed an exploratory study and modeling for flight trajectory management analysis (Honeywell project)
- Conducted takeoff/climb analysis to support AEDT APM development (FAA project)
- Developed a manufacturing-influenced design method for Unmanned Aerial Vehicles (Boeing project)

Korea Aerospace Research Institute   Daejeon, South Korea

Full-time Researcher   Jan. 2014 – Jul. 2015

- Worked as a system engineer for the KOMPSAT-3A satellite development and launch project
- Designed a shipping container for transportation of low earth orbit satellite to Yasny launch base

University of Alberta   Alberta, Canada

Research Intern   Dec. 2012 – Feb. 2013

- Conducted a computational study of a circular cylinder at low Reynolds number for open-loop control
- Published a research paper on project outcomes with professors in the school of mechanical engineering [C.2]

PUBLICATIONS

Conference Proceedings

[C.18] Juchan Lee, Seulki Kim, Sumin Ahn, and **Junghyun Kim** (Corresponding author), "What-if Scenario Analysis of Regional Air Mobility Operations in South Korea", International Council of the Aeronautical Sciences (ICAS), September 2024, Under review

[C.17] Hahyeon Moon, Jungha Park, and **Junghyun Kim** (Corresponding author), "Development of Decision Support Systems for RAM Operations in South Korea: Dynamic Corridor Network Generation", American Institute of Aeronautics and Astronautics (AIAA) Aviation, August 2024, Under review

[C.16] **Junghyun Kim**, Seonu Kim, Hahyeon Moon, Rubiga Kim and Kwang-Ju Kim, "Development of Decision Support Systems for Water Leakage Management", IEEE International Conference on Advanced Video and Signal-Based Surveillance (AVSS), July 2024, Under review

[C.15] Seonyoung Park, Seulki Kim, Junseok Seo, Joel Shin, Seokbum Jang, and **Junghyun Kim** (Corresponding author) "Development of a Multi-Objective Decision Making System for Delivery Truck Route Planning", Institute of Industrial and Systems Engineers (IISE) Conference, On-going

[C.14] Eunbi Cho, Sungil Hong, Hyeseo Yoon, Eunsung Cho, Jinho Shim, Joohee Oh, and **Junghyun Kim** (Corresponding author), "Data-Driven Approach using Unsupervised Learning for Detecting Anomalies in Facility Operations", Institute of Electrical and Electronics Engineers (IEEE) International Conference on Big Data, December 2022, https://doi.org/10.1109/BigData55660.2022.10020434

[C.13] **Junghyun Kim**, Simon Briceno, Cedric Justin, and Dimitri Mavris, "Designated Points-Based Free-Flight Approach to Enable Real-Time Flight Path Planning", American Institute of Aeronautics and Astronautics (AIAA) Aviation, August 2021, https://doi.org/10.2514/6.2021-2403

[C.12] **Junghyun Kim**, Simon Briceno, Chao Zhang, and Dimitri Mavris, "Supervised Learning-based Wind Regression to Enable Real-Time Flight Path Planning", American Institute of Aeronautics and Astronautics (AIAA) SciTech, January 2021, https://doi.org/10.2514/6.2021-0519

[C.11] **Junghyun Kim**, Simon Briceno, Cedric Justin, and Dimitri Mavris, "A Data-Driven Approach using Machine Learning to Enable Real-Time Flight Path Planning", American Institute of Aeronautics and Astronautics (AIAA) Aviation, June 2020, https://doi.org/10.2514/6.2020-2873

[C.10] Coline Ramee, **Junghyun Kim**, Marie Deguignet, Cedric Justin, Simon Briceno, and Dimitri Mavris, "Aircraft Flight Plan Optimization with Dynamic Weather and Airspace Constraints", International Conference on Research in Air Transportation (ICRAT), June 2020, Link

[C.9] **Junghyun Kim**, Kisun Song, Seulki Kim, and Dimitri Mavris, "Data-Driven Approach for Understanding the Impact of Weather on Commercial Flight Path", American Institute of Aeronautics and Astronautics (AIAA) Aviation, June 2019, https://doi.org/10.2514/6.2019-3191

[C.8] **Junghyun Kim**, Kisun Song, Seulki Kim, Yongchang Li, and Dimitri Mavris, "Aircraft Mission Analysis Enhancement by using Data Science and Machine Learning Techniques", American Institute of Aeronautics and Astronautics (AIAA) Aviation, June 2019, https://doi.org/10.2514/6.2019-3311

[C.7] **Junghyun Kim**, Kisun Song, Changyun Chung, and Dimitri Mavris, "A Surrogate-based Optimization for a Mega-Hub Location Problem in South Korea using Artificial Neural Network", Institute of Industrial and Systems Engineers (IISE) Conference, May 2019, Link

[C.6] Kisun Song, Kyunghak Choo, **Junghyun Kim**, and Dimitri Mavris, "Multi-objective Decision Making of a Simplified Car Body Shape Towards Optimum Aerodynamic Performance", American Society of Mechanical Engineers (ASME), August 2017, https://doi.org/10.1115/DETC2017-67234

[C.5] Kisun Song, Kyunghak Choo, **Junghyun Kim**, and Dimitri Mavris, "Aerodynamic Automobile Shape Optimization by Incorporating Reverse Shape Design Method with CFD analysis", American Society of Mechanical Engineers (ASME), August 2017, https://doi.org/10.1115/DETC2017-67175

[C.4] Seokpum Kim, Xiang Chen, Gregory Dreifus, John Lindahl, Inseung Kang, **Junghyun Kim**, and et al., "An Integrated Design Approach for Infill Patterning of Fused Deposition Modeling and Its Application to An Airfoil", Society for the Advancement of Material and Process Engineering (SAMPE) Conference, May 2017, Link

[C.3] **Junghyun Kim** and Kyuhong Kim, "A Development and Verification of Density-Based Solver Using LU-SGS Algorithm in OpenFOAM", International Council of Aeronautical Sciences (ICAS), September 2014, Link

[C.2] **Junghyun Kim**, C.F. Lange, and C.R. Koch, "A Computational Study of a Circular Cylinder at Low Reynolds Number for Open Loop Control of Von-Karman Vortex Shedding", International OpenFOAM Conference, June 2013, Link

[C.1] **Junghyun Kim**, Kyuhong Kim, and Jon Ahn, "A Computational Study on the Design of Airfoils for a Fixed Wing MAV and the Aerodynamic characteristic of the vehicle", International Council of Aeronautical Sciences (ICAS), September 2012, Link

Journal Articles

[J.10] Sungil Hong, Eunhwa Yang, and **Junghyun Kim** (Corresponding author) "Maintenance Work Order Assignment Optimization using Operation & Maintenance Data: Georgia Tech Campus Case Studies", Building Service Engineering Research and Technology, Under review

[J.9] **Junghyun Kim** and Seulki Kim, "Data-Driven Approach Toward Airspace Design for Regional Air Mobility Operations in Korea", American Institute of Aeronautics and Astronautics (AIAA) Journal of Aerospace Information Systems, Published in June 2023, https://doi.org/10.2514/1.I011245

[J.8] Yeongwon Song, Hyukjun Ha, Wongu Lee, Kwonyoung Lee, and **Junghyun Kim** (Corresponding author) "Data-Driven Approach using Supervised Learning for Predicting Endpoint Temperature of Molten Steel in Electric Arc Furnace", Steel Research International, Published in May 2023, https://doi.org/10.1002/srin.202300143

[J.7] **Junghyun Kim** and Dimitri Mavris, "Flight Data Clustering for Offline Evaluation of Real-Time Trajectory Optimization Framework", Decision Analytics Journal, Published in April 2023, https://doi.org/10.1016/j.dajour.2023.100221

[J.6] **Junghyun Kim** and Changyun Chung, "Surrogate-based Optimization Approach for Capacitated Hub Location Problem with Uncertainty", Cogent Engineering, Published in March 2023, https://doi.org/10.1080/23311916.2023.2185948

[J.5] Sungil Hong, **Junghyun Kim** (Corresponding author), and Eunhwa Yang, "Automated Text Classification of Historical Maintenance Data of Higher Education Buildings using Text Mining and Machine Learning Techniques", American Society of Civil Engineers (ASCE) Journal of Architectural Engineering, Published in December 2021, https://doi.org/10.1061/(ASCE)AE.1943-5568.0000522

[J.4] **Junghyun Kim** and Kyuman Lee, "Unscented Kalman Filter-aided Long Short-Term Memory (UKF-LSTM) Approach for Wind Nowcasting in the Aviation Industry", MDPI Aerospace – Special Issue in Application of Data Science to Aviation, Published in August 2021, https://doi.org/10.3390/aerospace8090236

[J.3] **Junghyun Kim**, Simon Briceno, Cedric Justin, and Dimitri Mavris, "Data-Driven Approach using Machine Learning for Real-time Flight Path Optimization", American Institute of Aeronautics and Astronautics (AIAA) Journal of Aerospace Information Systems, Published in July 2021, https://doi.org/10.2514/1.I010940

[J.2] **Junghyun Kim**, Kyuman Lee, and Sanghyun Choi, "Machine Learning-based Code Auto-Completion Implementation for Firmware Developers", Applied Sciences – Special Issue in Applied Machine Learning, Published in November 2020, https://doi.org/10.3390/app10238520

[J.1] **Junghyun Kim**, Dongwook Lim, Dylan Monteiro, Michelle Kirby, and Dimitri Mavris, "Multi-Objective Optimization of Departure Procedures at Gimpo International Airport", International Journal of Aeronautical and Space Sciences, Published in April 2018, https://doi.org/10.1007/s42405-018-0027-1

Posters

[P.2] **Junghyun Kim** and Dimitri Mavris "Machine Learning Applications in the Aviation Industry", Georgia Scientific Computing Symposium, February 2020

[P.1] Sungil Hong, **Junghyun Kim**, and Eunhwa Yang, "Improving Facility Management Performance by Optimizing Work Order Assignment with Genetic Algorithm", Conference of Computational Interdisciplinary Science, March 2019

TEACHING EXPERIENCES

Seoul National University   Seoul, South Korea

Primary Instructor   Mar. 2024 – Present

- Introduction to Machine Learning – Spring 2024

Handong Global University   Pohang, South Korea

Primary Instructor   Mar. 2022 – Present

- Introduction to Machine Learning (AIX20003) – Fall 2022, Spring 2023, Fall 2023, Spring 2024
- Algorithm (AIX30006) – Spring 2022, Spring 2023, Spring 2024
- Calculus 1 (GEK10095) – Spring 2022, Fall 2022, Spring 2023, Fall 2023, Spring 2024
- Capstone Design (AIX40005) – Fall 2022, Fall 2023

Georgia Institute of Technology   Atlanta, Georgia

Graduate Teaching Assistant   Aug. 2019 – May 2021

- Mentored 43 students in semester-long aircraft design projects of the Senior aircraft design (AE4341) class
- Graded programming assignments, projects, and exams for the Fixed-wing aircraft design (AE6343) and the Advanced design methods (AE6373) classes
- Graded quizzes, projects, research assignments for the Aerospace systems engineering (AE6372) class
- Delivered lab session lectures for the Introduction to engineering graphics and visualization (ME1770) class

Seoul National University   Seoul, South Korea

Graduate Teaching Assistant   Mar. 2012 – Sep. 2013

- Designed and delivered lectures for the Fluid dynamics class

- Guided 58 students in the preparation of wind tunnel experiment activities

Sejong University   Seoul, South Korea

Teaching Assistant   Mar. 2011 – Dec. 2011

- Graded assignments for the Jet propulsion class

ADVISING AND MENTORING

Ph.D. Students

Jinwoo Go (Georgia Institute of Technology)

- Deep learning-based mesh generation for CFD simulations (Mar. 2022 – Mar. 2023)

M.S. Students

Hahyeon Moon (Handong Global University)

- Development of a decision support system for AAM operations in South Korea (Mar. 2023 – Mar. 2025)

Myeongju Lim (Handong Global University)

- Aviation environmental impact assessment (Sep. 2023 – Sep. 2025)

Fauiz Setiawan (Handong Global University)

- Uncovering the relationship between traffic patterns and emissions in Indonesia (Sep. 2023 – Sep. 2025)

Undergraduate Students

Yoobin Park, Chungho Park, Juchan Lee, Shinkook Cha, Yujin Kim (Handong Global University)

- Optimizing middle mile logistics: Vertiport placement in Gyeongsangbuk-do (Sep. 2023 – Jun. 2024)

Eunbi Cho, Hyeseo Yoon, Eunsung Cho, and Jinho Shim (Handong Global University)

- Data-driven approach using machine learning for detecting anomalies in facility operations (Sep. 2022 – Dec. 2022)

Sunyoung Park, Junseok Seo, Joel Shin, and Seokbum Jang (Handong Global University)

- Development of a decision support system for truck route planning (Sep. 2022 – Dec. 2022)

Rubiga Kim and Junseok Seo (Handong Global University)

- Wearable device design optimization (Sep. 2022 – Dec. 2022)

Hangyul Seon (Handong Global University)

- Gender/age estimation using a deep learning model (Sep. 2022 – Dec. 2022)

INVITED TALKS

Conference

INFORMS Annual Meeting (Oct. 15, 2023)

International Forum on UNESCO UNITWIN Higher Education (Aug. 12, 2022)

MERRIC Webinar (May 27, 2022; Apr. 29, 2022)

AirTOP User Group Meeting (Nov. 9, 2021)

INFORMS Annual Meeting (Oct. 25, 2021)

University

School of Air Transportation, Korea Aerospace University (Dec. 27, 2023)

School of Computer Science, Andong University (Sep. 13, 2023)

School of Computer Science and Electrical Engineering, Handong Global University (Dec. 1, 2022; Oct. 5, 2022)

School of Mathematics and Statistics, Handong Global University (Nov. 24, 2022)

School of Mechanical and Control Engineering, Handong Global University (Sep. 13, 2022)

College of Science and Engineering, Aoyama Gakuin University (Aug. 17, 2022; Aug. 8, 2023)

College of Engineering, Andijian Machine Building Institute (Jul. 1, 2022)

Department of Robot and Smart System Engineering, Kyungpook National University (Jun. 3, 2022; Feb. 7, 2023)

School of Life Sciences, Handong Global University (Apr. 2022)

School of Computational Science and Engineering, Georgia Institute of Technology (Mar. 24, 2021)

School of Aerospace Engineering, Pusan National University (Jul. 18, 2018)

Academy

Dure Global Academy (July 7, 2023)

Suwon Central Baptist Church (May 21, 2023)

Wonchon Hana Christian Academy (Aug. 31, 2022)

Central Christian Academy (Jul. 20, 2022)

Hackers Academy (Jun. 28, 2021; Jun. 25, 2016; April 30, 2015)

Central Yeadam Christian Academy (Jun. 18, 2021)

Industry

Maze Inc. (Mar. 15, 2023; Aug. 11, 2023)

Gyeonggi Community Media Center (Dec. 15, 2022)

Hyundai Motor Company (Aug. 16, 2019)

Gimpo International Airport (Oct. 17, 2017)

Research Institute

Korea Airports Cooperation (Nov. 7, 2023)

Korea Institute of Science and Technology (Sep. 1, 2023)

Korea Research Institute for Defense Technology Planning and Advancement (Dec. 20, 2022)

Korea Transport Institute (Sep. 28, 2022)

Korea Aerospace Research Institute (May 3, 2022)

AWARDS AND HONORS

Hyundai Motor Group Graduate Research Fellowship

$24,000 per year   Jan. 2020 – May 2021

- Received a graduate research fellowship for the best graduate research presentation for the Artificial Intelligence strand at the Hyundai Global Top Talent Forum

Young Professional Grant

$5,000 / $3,000   Jun. 2018 – Nov. 2018 / Jun. 2019 – Nov. 2019

- Awarded a grant from the Korea-American Scientists and Engineers Association (KSEA) for Artificial Intelligence and Unmanned Aerial Vehicle research

Korean Government Overseas Fellowship

$40,000 per year   Aug. 2015 – Aug. 2017

- Selected as one of 22 people out of all students studying engineering in South Korea in 2014

Korea Aerospace Industry (KAI) Graduate Research Award

$1,000   Nov. 2016

- Received a one-time stipend for the best paper award at the KAI graduate research competition

Seoul National University Scholarship

- Won merit-based scholarship for Spring semester in 2013

Graduate Teaching Assistant of the Year

- Selected as the best teaching assistant of Fall 2012 semester in the School of Aerospace Engineering at Seoul National University

Sejong University Scholarship

- Won honors scholarship for three semesters (Fall 2010, Spring 2011, and Fall 2011)

HACKATHON EXPERIENCES

Georgia Tech Sports Innovation Challenge Hackathon

Participated in the event   Feb. 2020

- Pitched the idea with machine learning techniques to predict game attendance by utilizing the collection of MLB historical baseball data and conducted sensitivity analysis with variables (e.g., stadium temperature) to account for what variables are correlated

Boeing Innovation Challenge Hackathon

Selected as a finalist   Jan. 2019

- Pitched the idea with state-of-art machine learning and optimization techniques to improve demand and supply forecasting for aircraft components

Chick-fil-A Technology Innovation Hackathon

Won first place   Nov. 2018

- Pitched the basic idea with computer vision and Operations Research skills to improve not only customer service but internal operations by providing average wait time for Drive-thru and Dine-in

PROFESSIONAL SERVICE

Session Chair

AIAA Aviation 2021 Forum

- Served as a session (Machine Learning and Big Data Applications to Air Transportation) co-chair at the 2021 AIAA Aviation to the smooth operation of the session

Reviewer

Conference

- AIAA SciTech 2024 Forum

- AIAA Aviation 2023 Forum
- AIAA SciTech 2023 Forum
- AIAA Aviation 2022 Forum

Journal
- ASCE Journal of Aerospace Engineering
- AIAA Journal of Air Transportation
- AIAA Journal of Aerospace Information and Systems
- Advances in Aircraft and Spacecraft Science
- Applied Computing and Geosciences
- IEEE Transactions on Intelligent Transportation System

Student Volunteer

Georgia Tech CSE Graduate Student Association   Jan. 2021 – May 2021
- Volunteered to share what it is like to be a Ph.D. student in the School of Computational Science and Engineering (CSE) at Georgia Tech for prospective students

International Student Educational Board (ISEB)   Sep. 2016 – Sep. 2017
- Organized the student program at the International Astronautical Congress (IAC) to help student participants have an enriching experience at the IAC

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