Hyeong Kyun Park

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https://scholar.google.com/citations?user=49nXJfwAAAAJ

EDUCATION

Purdue University, West Lafayette, IN

M.S., Statistics Overall GPA: 3.85/4.00 2024-Present

- Joint M.S. in Computer Science, Statistics

B.S., Computer Science, Data Science, Applied Statistics Overall GPA: 3.62/4.00 2019-2022

- 4+1 B.S./M.S. Program *(discontinued M.S. to complete mandatory Korean military service)*
- Concentration: Machine Intelligence
- Minor: Mathematics

RESEARCH INTEREST

OOD Generalization; Adversarial Robustness; Interpretability; Computer Vision; Medical Imaging

PEER-REVIEWED PUBLICATIONS

Park, H.K., Stonestreet, L., Nakamura, K., Mahan, E., White, D., Roberts, J., Wang, S., Xi, Bowei. *Domain Adversarial Learning for Domain Generalization in Pump Fault Diagnosis*. (under review at **Applied Artificial Intelligence**).

Son, Y.H.*, **Park, H.K.*,** Sheng, C., Jang, J., Park, J., Park, S.J. *Deep Learning-Enhanced Cardiac Microphysiological Systems: Studying In Vitro and In Vivo Reentry Arrhythmia.* (under review at **Nature Biomedical Engineering**). (*equal contribution)

Park, H. K., Son, Y. H., Kim, N. K., Jang, J., Sheng, C., Choi, D., Park, J., Cho, H. C., Park, S. J. (under review). *Unsupervised Deep Convolutional Autoencoder-Based Anomaly Detection Approach for Identification of Arrhythmogenic Rhythms in Atrioventricular Block Hearts.* (under review at **Biomedical Signal Processing and Control).**

Lim, Y.*, **Park, H. K.***, & Han, J. (under review). *Analysis of perceptions on the development and use of AI digital textbook for technology subjects in South Korea.* (under review at **Canadian Journal of Science, Mathematics, and Technology Education).** (*equal contribution)

Han, J., **Park, H. K.**, & Kelley, T. R. (2023). *Engineer's notebook as a cognitive device: Developing a realtime collaborative engineer's notebook iOS application.* Technology and Engineering Teacher, 82(5), 20-26.

Han, J., & **Park, H. K.** (2020). Language, Culture, and Identity Development in Adolescence: A Case Study of a Sixteen-Year-Old Multilingual Boy. INTESOL Journal, 17(1). doi:10.18060/24498.

SELECTED CONFERENCE PRESENTATIONS (PUBLISHED ABSTRACTS)

Park, H.K. (2026, March 27). *Bridging Academia and Industry with AI*. ITEEA Annual Conference, Virginia Beach, VA.

Han, J., **Park, H.K.** (2026, January 15). *Fostering Identity and Ownership in STEM.* Indiana STEM Education Conference, West Lafayette, IN.

Park, H.K. (2026, January 15). *From Coursework to Research: A Scalable Model for Student–Industry AI Collaboration.* Indiana STEM Education Conference, West Lafayette, IN.

Barron, C., Benfica, L., Crabill, D., Gee, M., Koch, T., Ogunmodede, S., Oh, C., **Park, H.K.**, Roberts, N., Tang, H., Tuinstra, M., VanAlstine, J., Ward, M. (2025, September 4). *Applied Statistical and Deep Learning Methods for Multi Environment Genomic Prediction in Maize*. 2025 Indiana Invasive Species Conference, Hammond, IN. doi:10.5703/1288284318195. https://docs.lib.purdue.edu/sydag/2025/posters/19/.

Park, H.K., Han, J., Lim, Y. (2025, January 16). *Boosting Computational Thinking in Integrated STEM Education with CAD.* Indiana STEM Education Conference, West Lafayette, IN. doi:10.5703/1288284317819. https://docs.lib.purdue.edu/instemed/2025/briefs/7/.

Son, Y.H.*, **Park, H.K.*,** Sheng, C., Jang, J., Park, J., Park, S.J. (2023, October 12). *Deep Learning-Enhanced Cardiac Microphysiological Systems: Studying In Vitro and In Vivo Reentry Arrhythmia*. **2023 Biomedical Engineering**

Society Annual Meeting, Seattle, WA. https://2023bmesannual.eventscribe.net/fsPopup.asp?PosterID=606899&mode=posterInfo (*equal contribution)

Park, H.K., Son, Y.H., Kim, N.K, Jang, J., Sheng, C., Choi, D., Park, J., Cho, H.C., Park, S.J. (2023, August 2). *Unsupervised Anomaly Detection For Identifying Arrhythmogenic Rhythms In Atrioventricular Block Hearts Using Deep Convolutional Autoencoders*. **2023 American Heart Association Basic Cardiovascular Sciences Scientific Sessions**, Boston, MA. https://bcvs.apprisor.org/index.cfm?k=2zhtxnoaaa

Son, Y.H.*, **Park, H.K.*,** Sheng, C., Jang, J., Park, J., Park, S.J. (2023, July 31). *Deep Learning-based Cardiac Microphysiological Systems For Studying Reentry Arrhythmia*. **2023 American Heart Association Basic Cardiovascular Sciences Scientific Sessions**, Boston, MA. https://bcvs.apprisor.org/index.cfm?k=e4zrs3x70t (*equal contribution)

RESEARCH EXPERIENCE

Graduate Deep Learning Researcher PI: Rajiv Khanna, Andrea Agiollo 2025-Present
Department of Computer Science, Purdue University

- Compare SoTA Neurosymbolic and subsymbolic models (LTN, CBM, CLIP, DeepProbLog) on arithmetic, logic, and high-stakes tasks with high reasoning shortcut tendencies
- Develop a novel part-based, adversarially robust AI classifier for the CityScapes benchmark through end-to-end training of a segmentation model and a Neurosymbolic model, outperforming baselines on PGD and AutoAttack benchmarks [manuscript]
- Conducted a comparative study of causal and non-causal reinforcement learning agents using the CausalWorld robotic environment, evaluating robustness and transferability under controlled domain-shift protocols
- Implemented and analyzed variants of the CausalCF algorithm integrating interventions and counterfactual reasoning, demonstrating improved out-of-distribution generalization and partial cross-task transfer between robotic manipulation tasks [manuscript]
- Built a Bayesian-guided human–LLM AutoFE framework improving tabular modeling over prior LLM-based systems (CAAFE, OCTree, LLM-FE)

Graduate Research Assistant PI: Mark Daniel Ward 2024-Present
Beck's Hybrids (Sponsored Project) | The Data Mine, Purdue University

- Deployed a multi-modal regression predictive breeding model for clients nationwide, integrating custom hybrid ranking objectives and training methods to learn temporally invariant features to improve out-of-distribution accuracy by 50%
- Conduct high-replication ablation studies to make statistically significant decisions, supported by GPU acceleration and PyArrow and Polars integration for 61% computational latency reduction
- Integrated Weights & Biases for reproducible evaluation and KPI-driven insights and dashboards to communicate to non-technical stakeholders

Deep Learning Researcher PI: Sung-Jin Park 2022
Biohybrid System Lab | Biomedical Engineering Department, Georgia Institute of Technology and Emory University School of Medicine

- Patented a novel 2-channel spatiotemporal DNN classifying cardiac electrophysiological videos with phase singularity real-time and in vivo, achieving 91% Kappa and 95% concordance rate across all atrial fibrillation class categories
- Patented a novel unsupervised deep residual convolutional autoencoder network to identify atrioventricular block ECG anomalies with 98% accuracy and overcome data imbalance issue

Machine Learning Researcher PI: Wen Jiang 2022
The Jiang CryoEm Lab | Department of Biological Sciences, Purdue University

- Performed generative clustering of 2D images via Gaussian mixture model to reconstruct 3D images of SARS-CoV-2 spikes from arbitrary angles
- Conduct CryoSparc image motion correction, CTF fitting, and particle picking of cryogenic electron microscopy images with GPU computing cluster, preprocessing 1.2TB Data

Lead Undergraduate Research Assistant PIs: Erin P. Hennes, Sean P. Lane 2020-2021
The SuperPower Project | Department of Psychological Sciences, Purdue University

- Deployed a genetic algorithm and neural network for high-dimensional parameter optimization under constrained resources, improving software performance and resource efficiency for computing required sample sizes by 90%
- Coded Monte Carlo simulation-based, a priori power analysis techniques of various nonparametric statistical distributions

Undergraduate Research Assistant PI: Todd R. Kelley 2019-2020
TRAILS Team | Department of Technology Engineering Education, Purdue University
- Constructed path models based on survey-based statistical analysis coefficients with SPSS AMOS 26 to investigate causal relationships between potential factors of student STEM learning T-STEM Survey-based statistical analyses
- Designed and developed Real-Time Collaborative Engineer's Notebook iOS Application, an affordable, portable, and functional electric device solution to foster online collaboration among pre-college technology engineering students and enable effective engineering design instruction

MISCELLANEOUS TALKS

Cha, A., **Park, H.K.** (2026, January 15). *AI-Enhanced Project Design: Market Synthesis and Ideation.* Indiana STEM Education Conference, West Lafayette, IN.

Park, H. K. (2025, September 5). *TECH50900: Quantitative Data Analysis – Advanced Techniques* [Lecture]. Purdue University, West Lafayette, IN.

Park, H.K., Mahan, E., Nakamura, K., Stonestreet, L. (2025, April 25). *Real-Time Robust Vibration Time Series Multi-Label Classification for Centrifugal Pump Fault Condition Detection.* ML@Purdue Projects Poster Session, West Lafayette, IN.

Park, H.K., Jung J.W. (2023, October 18). *Research Trends in Enhancing Guided Missiles Reliability*. 2023 Defense Agency for Technology and Quality Technical Exchange Conference, Daejeon, South Korea.

Park, H.K. (2023, April 13). *Large Language Models and Applicability in National Defense*. Republic of Korea Army Ammunition Support Command Military Science Lecture Series, Daejeon, South Korea.

Park, H.K. (2023, March 29). *Developing a Weapons System Depot Maintenance Database Management System for Reliability Analysis*. Republic of Korea Army Military Science Research Presentations @ KAIST, Daejeon, South Korea. https://www.youtube.com/watch?v=kVK_1JwyyZQ&t=3s

Lim, Y., Han, J., **Park, H.K.** (2024, November 11). *Teachers' Perceptions of AI Digital Textbooks for Technology Education in Korea.* 2024 Purdue Purdue AI in P-12 Education Conference, West Lafayette, IN.

Han, J., **Park, H.K.** (2019, October 17). *Bilingual Children's Languages, Cultures, and Identity Development*. 2019 Mid-Western Educational Research Association Annual Meeting, Cincinnati, Ohio.

PATENTS

Park, H.K., Stonestreet, L., Nakamura, K., Mahan, E. *TE Connectivity Invention Report 07559 - Real-Time Robust Pump Fault Detection via Efficient Domain-Adversarial Neural Networks*

Park, H.K., Son, Y.H., Lee, Y.D. Park, S.J. *Emory Invention Report 23203 - Deep Learning-Enhanced Cardiac Microphysiological Systems*

Park, H.K., Son, Y.H., Lee, Y.D. Park, S.J. *Emory Invention Report 23207 - Deep Convolutional Autoencoders-Based Unsupervised Anomaly Detection Method for Identifying Arrhythmogenic Rhythms in Atrioventricular Block Hearts*

INDUSTRY EXPERIENCE

Science and Technology Researcher 2022-2024
Logistics Command | Republic of Korea Army

1. Full Stack Web Development and Project Management
- Developed the Digital Weapons Maintenance and Analytics Platform and integrated predictive maintenance procedures and data-driven reliability tools, resulting in 40% increase in system reliability and significant reduction in maintenance costs across all service branches

- Created and distributed automatic path and schedule optimization platform, streamlining logistics management procedure and increasing operational efficiency by 50%
- Manage the Army Data Mart Web Platform development project, ensuring regulatory compliance, negotiating data acquisition deals, and conducting client consultations to deliver intuitive UI/UX designs for enhanced user experiences

2. Business Consulting

- Drafted the Request for Proposal for Business Process Reengineering and Information Strategy Planning in a Smart Factory project covering AI, IoT, Cloud, Big Data, and Mobile innovations
- Benchmarked state-of-the-art AI for adversarial robustness, including robust general surveillance and hyperspectral imaging against localized patch attacks
- Offered consulting and technical evaluations of multi-million dollar business projects in AI and IoT, assisting administrative decision-making of Army generals
- Transcribed for meetings between officials of US Department of Defense and ROK Ministry of National Defense to foster business cooperation in explosive ordnance disposal

3. Modeling and Simulation Analysis Research

- Deployed a production-level image classification model pre-trained on the VGG-16 CNN and tuned on laser displacement sensor-based frames, fully automating inspection procedure of 60 army units with 92% accuracy across six categorizations
- Automated RAM analysis to provide insights for optimizing yearly weapons maintenance plans and forecasting equipment demands

Lead Data Science Researcher PI: Mark Daniel Ward 2021-2022
Cummins Inc.; *The Data Mine (Sponsored Project)* | Purdue University

- Deployed a multi-modal ranking and recommendation system for 200+ farms, integrating custom ranking objective functions to improve out-of-distribution accuracy by 40%.
- Optimized GPU-accelerated HPC pipelines using the NVIDIA data science ecosystem (PyArrow, CuPy, Polars) for large-scale data transformation, reducing model training time by 30% and compute requirements by 61%.
- Led team of 4 data scientists in presenting project updates at weekly stakeholder meetings with the Director of The Data Mine

Software Engineer Intern 2021
Bosoniqs Inc. | Portland, OR

- Developed 9 demonstrative web applications with pure-Python library PyWebIO, increasing engagement and service user base
- Performed database engineering, UI/UX designs, API queries, and software quality assurance testing

LEADERSHIP EXPERIENCE

Project Manager | TE Connectivity AI Cup, ML@Purdue 2024-2025

- Patented a domain-adversarial multivariate time-series classifier with mel-spectrogram features, achieving x5 higher robustness under distribution shifts and enabling $200K in deployment savings across 30+ sites
- Developed a GPU-accelerated end-to-end training and evaluation pipeline with reproducible experimentation tracked via W&B
- Led a 5-person Agile team, aligning technical progress with KPIs and translating results into stakeholder-facing insights

Team Leader | Algorithmic Trading Club, ML@Purdue 2024-2025

- Led 20 students in 6 quantitative finance competitions
- Backtested and executed arbitrage-based algorithmic strategies using QuantConnect API
- Applied hybrid momentum strategies (VWAP, RSI, MA) in short-term trading for commodities, foreign exchange, and indices
- CME Group 2024 University Trading Challenge, Jane Street Real-Time Market Data Forecasting 2024, IMC Prosperity 3

Sergeant, Squad Leader | Republic of Korea Army, Ministry of National Defense 2022-2024

- Recruited as Military Science and Technology Soldier
- Managed 8 soldiers during operations and delegate orders issued by Platoon Commander

Dev Lead | Purdue Hello World 2021
- Led scrum team to develop web app and native mobile app for managing, hosting, and judging the Hello World Hackathon, serving 300+ students
- Technologies: Node (ExpressJS), React (NextJS), GCP, MongoDB

Principal Cellist, Purdue Philharmonic Orchestra 2019–2020

TEACHING ASSISTANTSHIPS

CS 19300 – Tools Fall 2021, Spring 2022
STAT 19000 - Data Mine Seminar Fall 2021, Spring 2022

SKILLS

Programming Languages: Python, Git, Bash, SQL, R, Java, SAS, Swift, C/C++, Javascript
Machine Learning: PyTorch, TensorFlow, W&B, MLFlow, OpenCV, Scikit-Learn, Cuda
Development: Flask, FastAPI, Django, React, NodeJS, TailwindCSS, Java Spring, MySQL, Cubrid, MongoDB
Platforms/Tools: HPC, AWS Sagemaker, Docker, Kubernetes, Databricks, PySpark, Slurm, Firebase
Languages: Korean (native), English (fluent), German (intermediate)

HONORS AND SCHOLARSHIPS

TE-AI Cup 2025 3rd/82 Place (2nd Nationally) | TE Connectivity 2025
- Annual international scholarship competition developing an innovative, profitable, and scalable industrial AI solution by utilizing SoTA research methodologies

Special Grade Soldier (x2) | Republic of Korea Army 2023-2024
- Top 5 grade in Army Fitness Test, Combat, CBRN, Rifle Training, Mentality across the brigade

Army Chief of Staff's Citation | Republic of Korea Army 2023
- Awarded for meritorious service in software development for weapons analysis and maintenance

Army Logistics Commander Research Excellence Award | Republic of Korea Army 2023
- Awarded to top 2 of 20 graduate-level science and technology soldiers drafted for research roles in logistics

G. A. Ross Award Nominee | Purdue University
2022
- Nominated for most outstanding graduating male who has shown a commitment to scholarship, leadership, and service and who displays outstanding character

Live Case Competition Finalist | Consulting Skills Consortium 2020
- Reached final round of case competition jointly hosted by Bain & Company, Accenture, McKinsey & Company, and Purdue Krannert School of Management

Dean's List and Semester Honors | Purdue University 2019-2022
Comcast Leaders and Achievers Scholarship | Comcast NBCUniversal 2019

PROFESSIONAL MEMBERSHIPS

Mu Sigma Rho Honors Society 2022-Present
- US national statistics honor society

Association for Computing Machinery 2019-2022
- US-based international learned society for computing

Ascend Leadership 2019-2022
- Largest Pan-Asian business professional membership organization in North America

REFERENCES

Mark Daniel Ward, Professor and Director of The Data Mine
Department of Statistics and Mathematics
Purdue University
(765) 496-9563, mdw@purdue.edu

Sung-Jin Park, Assistant Professor
Coulter Department of Biomedical Engineering
Georgia Institute of Technology
Emory University School of Medicine
(404) 712-8596, sung.jin.park@emory.edu

Erin P. Hennes, Associate Professor
Department of Psychological Sciences
MU Institute for Data Science & Informatics
Harry S Truman School of Government & Public Affairs
University of Missouri
(646) 670-1600, ehennes@missouri.edu

Bowei Xi, Associate Professor
Department of Statistics
Purdue University
(765) 494-3899, xbw@purdue.edu