Jungmin Shin

+1 614-706-9431 | shin.991@osu.edu | https://c16267.github.io/
Department of Biomedical Informatics, The Ohio State University, 2255 Kenny Rd, Columbus, OH 43210

Summary

Research: High-dimensional statistics, sufficient dimension reduction, statistical deep learning, and spatial statistics, applied to bulk RNA-seq, single-cell and spatial omics, multi-omics integration, and reproducible bioinformatics workflows. Serves as lead biostatistician for immuno-oncology clinical studies. **Teaching:** 12 undergraduate course offerings over seven semesters, English-medium statistics instruction for international master's students, and graduate-level instruction in deep learning for bioinformaticians. **Service:** Journal reviewer, organizer of lab meetings and a deep learning study group, administrator of lab research-computing resources, and statistical consultant across academic departments.

Education

Korea University Seoul, South Korea

Ph.D. in Statistics *Feb. 2025*

- Thesis: Principal Machine: A Unified and Computationally Efficient Approach to Sufficient Dimension Reduction
- Adviser: Dr. Seung Jun Shin

Purdue University West Lafayette, IN, USA

M.S. in Statistics *May 2020*

- Mentors: Drs. Arman Sabbaghi and Kiseop Lee
- Overseas full scholarship, Republic of Korea Ministry of National Defense (MND)

Korea Military Academy Seoul, South Korea

B.S. in Statistical Information Analysis & Military Art and Science *Feb. 2011*

Professional Experience

The Ohio State University Feb. 2025 – Present

Postdoctoral Researcher, Department of Biomedical Informatics *Columbus, OH*

- **Mentor:** Dr. Dongjun Chung
- **Methodology Development:** Developing statistical methods for spatial transcriptomics study design, deep learning for omics, cell-type deconvolution, single-cell integration, and circular spatial data analysis.
- **Collaborative Biostatistics:** Serve as lead biostatistician for PIIO and OSUCCC–James immuno-oncology studies, leading longitudinal biomarker, survival, clustering, and high-dimensional immune-profiling analyses across spectral flow cytometry, cytokine assays, scRNA-seq, TCR-seq, Visium HD, and Stereo-seq. This work has produced abstracts at ASCO, ESMO, ASH, and SITC and two clinical manuscripts, including one co-first-authored manuscript.

Republic of Korea Army Mar. 2011 – Oct. 2024

Retired Army Officer (rank: Major)

- Served in diverse command, leadership, and instructional positions throughout a **14-year military career.**
- Held roles including Platoon Leader, Company Commander, Logistic Officer, and Assistant Professor of Mathematics at Korea Military Academy.

Assistant Professor (Non-Tenure-Track), Department of Mathematics, Korea Military Academy *Apr. 2022 – Jan. 2024*

- Taught undergraduate mathematics and statistics courses, mentored cadets in research and academic planning, and contributed to interdisciplinary research and educational-development initiatives.

Lecturer, Department of Mathematics, Korea Military Academy *Jun. 2020 – Mar. 2022*

- Taught undergraduate mathematics and statistics courses and contributed to quantitative and AI-based education for cadets.

Publications

∗ denotes a corresponding author. ‡ These authors contributed equally to this work.

I. Statistical Methodology

Peer-Reviewed Journal Articles

[J1] **J. Shin**, S. J. Shin, and A. Artemiou (2026). "psvmSDR: An R package for a unified algorithm for sufficient dimension reduction via principal machines," *The R Journal*, in press. arXiv:2409.01547. R package `psvmSDR` available on CRAN: cran.r-project.org/package=psvmSDR.

[J2] **J. Shin**, S. J. Shin, and S. Bang (2025). "A least distance estimator for a multivariate regression model using deep neural networks," *Journal of Statistical Computation and Simulation*, 95(10), 2308–2325. doi:10.1080/00949655.2025.2492195.

[J3] **J. Shin**, S. Kwak, S. J. Shin, and S. Bang (2024). "Simultaneous estimation and variable selection for a non-crossing multiple quantile regression using deep neural network," *Statistics and Computing*, 34, 102. doi:10.1007/s11222-024-10418-4.

[J4] **J. Shin** and S. J. Shin (2024). "Concise overview of principal support vector machine," *Communications for Statistical Applications and Methods*, 31(2), 235–246. doi:10.29220/CSAM.2024.31.2.235.

[J5] **J. Shin**, J. Kang, and S. Bang (2024). "Penalized least distance estimator in the multivariate regression model," *The Korean Journal of Applied Statistics*, 37(1), 1–12. doi:10.5351/KJAS.2024.37.1.001.

[J6] H. Kim and **J. Shin*** (2022). "The LSTM-based algorithm for detecting vessel abnormal behaviors," *Korean Journal of Military Art and Science*, 78(2), 471–495. doi:10.31066/kjmas.2022.78.2.017.

[J7] **J. Shin**, H. Kim, and S. J. Shin (2021). "A comparison study of inverse censoring probability weighting in censored regression," *The Korean Journal of Applied Statistics*, 34(6), 957–968. doi:10.5351/KJAS.2021.34.6.957.

Peer-Reviewed Conference Proceedings

[C1] A. B. Alshaibani, S. T. Carrell, L.-H. Tseng, **J. Shin**, and A. Quinn (2020). "Privacy-preserving face redaction using crowdsourcing," *Proceedings of the AAAI Conference on Human Computation and Crowdsourcing*, 8, 13–22. (Full paper) doi:10.1609/hcomp.v8i1.7459.

Book

[B1] **J. Shin**, J. Kang, Y. Lee, and S. Bang (2022). *Introduction to Statistics and Its Application with R.* Kyowoo. ISBN: 979-11-251-0339-4. product.kyobobook.co.kr/detail/S000001648061.

Submitted and Under Review

[S1] **J. Shin** and S. J. Shin (2025). "Penalized principal machines for sufficient dimension reduction and its efficient computation," revision submitted to *Computational Statistics & Data Analysis*. R package `ppmSDR` available on CRAN: cran.r-project.org/web/packages/ppmSDR.

[S2] J. Xie‡, **J. Shin**‡, H. Jeon, W. Chang, K. J. Jung, Y. Jeon, Z. Li, Q. Ma, and D. Chung (2026). "SpaDesign: Simulation-based framework for determining sequencing depth for spatial transcriptomics experiments," revision invited from *PLOS Computational Biology*.

[S3] **J. Shin**, D. Chung, and S. Bang (2026). "Penalized deep support vector machines for nonlinear classification and variable selection," *under review*.

[S4] **J. Shin**, D. Chung, S. J. Shin, and S. Bang (2025). "A unified framework of penalized deep composite quantile regression for simultaneous function estimation and variable selection," *under review*.

In Preparation

[M1] **J. Shin** and D. Chung (2026). "spaCraft: Calibrated power analysis and sample-size planning for multi-sample spatial transcriptomics," *in preparation*.

[M2] **J. Shin**, A. Gupta, P.-H. Mao, K. Thakkar, J. Y. Kim, Y. Cho, J. Yoo, T. Amireddy, K. J. Jung, H. Jeon, J. Xie*, and D. Chung* (2026). "Circular data analysis in spatial omics," *in preparation*.

[M3] M. Kotian‡, **J. Shin**‡, ..., and D. Chung (2026). "CellPacman: An interpretable machine-learning pipeline for phenotypic discovery and dose–response characterization of Cell Painting assays," *in preparation*. **(Co-first author.)**

II. Biomedical and Collaborative Research

Peer-Reviewed Conference Abstracts

[A1] M. R. Bonomi, **J. Shin**, M. Sikorski, M. T. Cunha, R. Teodorescu, B. Klamer, J. Pan, R. Fahad, Y. Bao, Y. Guo, W. Yang, J. Hwang, E. Gogineni, S. Zhu, S. Y. Kang, J. W. Rocco, D. Blakaj, P. Bhateja, D. Chung, and M. P. Rubinstein. "Biomarker-driven exploratory clustering of cytokine and hematologic profiles in a Phase II trial of metronomic chemotherapy plus cemiplimab in R/M HNSCC," *ESMO 2026 Congress*, Madrid, Spain, Oct. 2026. Accepted e-Poster, Abstract No. 4631. Contribution: Lead biostatistician; conducted UMAP–HDBSCAN clustering, cluster characterization, and biomarker–survival association analyses.

[A2] M. R. Bonomi, **J. Shin**, M. T. Cunha, F. Rind, J. Hwang, E. Gogineni, S. Zhu, S. Kang, J. Rocco, D. Blakaj, P. Bhateja, D. Chung, and M. Rubinstein. "Cytokine analysis in a Phase II trial of metronomic carboplatin/paclitaxel plus cemiplimab for recurrent/metastatic head and neck squamous cell carcinoma," *2026 ASCO Annual Meeting*, Chicago, IL, USA, May 2026. Poster Session: Head and Neck Cancer, Board 501, Abstract No. 6044. doi:10.1200/JCO.2026.44.16_suppl.6044.
Contribution: Lead biostatistician; conducted longitudinal cytokine analyses, response-group comparisons, multiplicity-adjusted testing, and survival association analyses.

[A3] N. Denlinger, N. Song, . . . , **J. Shin**, . . . , and T. Voorhees. "Safety and immunomodulatory effects of siltuximab prophylaxis prior to standard-of-care CD19-directed chimeric antigen receptor T-cell therapy for B-cell lymphomas: Final Phase I trial results," *67th ASH Annual Meeting*, Dec. 2025. Published abstract in *Blood*, 146, 2385. doi:10.1182/blood-2025-2385.
Contribution: Lead biostatistician; conducted time-matched cohort comparisons of spectral flow cytometry, cytokine, clinical-response, and survival data.

[A4] S. Priya, Y. Koguchi, R. Teodorescu, K. J. Jung, **J. Shin**, D. Chung, . . . , and M. P. Rubinstein. "Decoding immune suppression in Merkel cell carcinoma through integrated spatial transcriptomics and multiplex proteomics," *Society for Immunotherapy of Cancer 40th Annual Meeting*, Houston, TX, USA, Nov. 2025. Poster, Publication No. A106. doi:10.1136/jitc-2025-SITC2025.0094.
Contribution: Lead biostatistician; integrated and analyzed spatial transcriptomics and multiplex proteomics data.

In Preparation

[M4] N. Denlinger[‡], **J. Shin**[‡], N. Song, . . . , D. Chung, M. P. Rubinstein, Z. Li, M. de Lima, P. Caimi, and T. Voorhees (2026). "Phase I study assessing the safety and immunomodulatory effects of prophylactic siltuximab prior to standard-of-care CD19-directed chimeric antigen receptor therapy," *in preparation.* **(Co-first author.)**
Contribution: Lead statistician; performed all statistical analyses, including linear mixed-effects models, survival analysis, multivariate regression, and longitudinal data analysis.

[M5] N. Mladkova-Suchy[‡], K. Dibs[‡], **J. Shin**, G. Tocaj, E. Tili, D. Konieczkowski, D. Mitchell, S. Baliga, S. J. Ma, S. Zhu, E. Gogineni, J. Grecula, A. Yilmaz, D. Chung, M. K. K. Niazi, A. Limbach, M. Old, J. Rocco, C. Rolfo, A. Chakravarti, P. Bhateja, M. Bonomi[‡], and D. Blakaj[‡] (2026). "Clinical and genomic predictors of hyperprogression in recurrent/metastatic head and neck cancer: Discovery and validation," *in preparation.*
Contribution: Lead biostatistician responsible for all statistical analyses.

Teaching Experience

Guest Lecturer – The Ohio State University Columbus, OH
BMI 7235: Machine Learning and AI in Omics Data Analysis *Spring 2026*
- Covered statistical foundations and practical applications of deep learning models for high-dimensional omics data.

Invited Lecturer – Korea University College of Medicine Online
Basic Statistics: Theory and Applications (Dr. Lee Jong-wook Fellowship Program; online, English-medium) *Feb. – May 2026*
- Delivered approximately 30 hours of English-medium instruction in foundational statistics and data analysis to international master's students selected as Dr. Lee Jong-wook Fellows. Supported by the Korea Foundation for International Healthcare (KOFIH).

Assistant Professor / Lecturer – Korea Military Academy Seoul, South Korea
Department of Mathematics *2020 – 2024*
- Taught undergraduate mathematics and statistics courses over seven semesters:
- Mathematical Statistics (Spring 2021), Calculus (Fall 2020), Math for AI (Fall 2020), Linear Algebra (Fall 2022, Fall 2023), Data Analysis for Military Defense (Spring 2021, Fall 2022), Introduction to Statistics (Spring 2021, 2022, 2023), Data Visualization (Fall 2021, Spring 2023).
- Mentored cadets in research and academic planning while contributing to interdisciplinary defense research and AI-based educational initiatives.

Teaching Assistant – Purdue University West Lafayette, IN
STAT 301 Elementary Statistical Methods *Summer 2019*
- Office hours, grading assignments, proctoring/grading exams, and teaching lab sessions.

Grants and Funded Research

Statistical Power Analysis Framework for Multi-Sample and Cross-Platform Spatial Omics Feb. 2025 – Present
- **Sponsor:** National Institutes of Health (NIH) / NIGMS (Grant No. 5R01GM152585-02)
- **Role:** Postdoctoral Researcher (PI: Dr. Dongjun Chung)
- **Total Amount:** $1,590,918
- **Description:** Lead methodology development and software implementation for a statistical power analysis framework for multi-sample, longitudinal, and cross-platform spatial transcriptomics experiments.

A Study on Nonlinear Multivariate Regression Using Deep Neural Networks Jun. 2022 – May 2025

- **Sponsor:** National Research Foundation of Korea (NRF) (Grant No. NRF-2022R1F1A1061622)
- **Role:** Co-Investigator (PI: Dr. Sungwan Bang)
- **Total Amount:** $103,448
- **Description:** Co-led methodological development of deep neural network–based multivariate nonlinear regression and non-crossing multiple quantile regression models.

NBC-RAMS Data Conversion Standardization Module Development Research Jan. 2023 – Jun. 2024

- **Sponsor:** Agency for Defense Development (ADD, Grant No. 202300030001), Republic of Korea
- **Role:** Co-Investigator (PI: Dr. Byounghak Lee)
- **Total Amount:** $149,530
- **Description:** Contributed to the development of a technique for converting NBC-RAMS data into 3D holographic representations for an AR/VR military training platform.

Invited Talks

[I1] **J. Shin** and D. Chung. spaCraft: Calibrated power analysis and sample-size planning for multi-sample spatial transcriptomics. Department of Biomedical Informatics Seminar, **The Ohio State University**, Columbus, OH, USA, Sep. 2026 (planned).

[I2] **J. Shin** and D. Chung. spaCraft: Calibrated power analysis and sample-size planning for multi-sample spatial transcriptomics. *Lightning Talk*, **IMS New Researchers Conference** (NRC 2026), UMass Amherst, MA, USA, Jul. 2026. *Selected participant; fully funded by NSF and IMS.*

[I3] **J. Shin**, S. J. Shin, and A. Artemiou. Penalized principal machines for sufficient dimension reduction and its efficient computation. **1st IMS International New Researchers Conference** (1st INRC), Seville, Spain, Dec. 2025. *One of 50 early-career researchers selected worldwide; funded by IMS.*

[I4] **J. Shin** and S. J. Shin. Principal machine: A unified and computationally efficient approach to SDR. Department of Statistics, **Purdue University**, West Lafayette, IN, USA, Apr. 2025.

Honors & Awards

2025 – Best Ph.D. Dissertation Award, College of Political Sciences, Korea University
2024 – Best Student Paper Prize, The Korean Statistical Society (500,000 KRW)
2023 – Best Paper Prize, Chung-Nam Institute (300,000 KRW)
2023 – Letter of Commendation for simulation support, ROK Army Chief of Staff (Army General)
2024 – 17 Letters of Commendation from the Republic of Korea Army (career total)

Conference Presentations

Contributed Oral Presentations

[O1] **J. Shin** and D. Chung. spaCraft: Calibrated power analysis and sample-size planning for multi-sample spatial transcriptomics, *JSM 2026*, Boston, MA, USA, Aug. 2026.

[O2] **J. Shin** and S. J. Shin. Computationally efficient sparse sufficient dimension reduction via least squares support vector machine and its extensions, *CFE-CMStatistics 2024*, King's College London, London, UK, Dec. 2024.

[O3] **J. Shin**, S. Kwak, S. J. Shin, and S. Bang. Computationally efficient sparse sufficient dimension reduction via least squares support vector machine and its extensions, *Korean Statistical Society Summer Conference*, Seoul, S. Korea, Jul. 2024.

[O4] **J. Shin** and S. J. Shin. Computationally efficient sparse sufficient dimension reduction via least squares support vector machine and its extensions, *Korean Data Analysis Society Summer Conference*, Seoul, S. Korea, Jun. 2024.

[O5] **J. Shin**, S. Kwak, S. J. Shin, and S. Bang. Deep neural network based non-crossing multiple quantile regression estimator, *Korean Data Analysis Society Winter Conference*, Pusan, S. Korea, Jan. 2024.

[O6] **J. Shin**, S. J. Shin, and S. Bang. A least distance estimator for a multivariate regression model using deep neural networks, *International Army Modeling and Simulation Education Conference*, Daejeon, S. Korea, Oct. 2023.

[O7] **J. Shin** and S. J. Shin. A unified principal sufficient dimension reduction package: psvmSDR, *Korean Data Analysis Society Summer Conference*, Seoul, S. Korea, Jul. 2023.

Poster Presentations

[P1] **J. Shin**, J. Xie, and D. Chung. spaDesign2: A statistical framework for power analysis in multi-sample spatial transcriptomics, *2026 Annual Joint Biostatistics Symposium*, Columbus, OH, USA, Apr. 2026.

Research Collaborations & Team Science

Head and Neck Cancer Chemoimmunotherapy Biomarker Research Group 2025 – Present

- OSUCCC–James, OSU. Study lead: Dr. M. R. Bonomi (Medical Oncology).
- Phase II trial (NCT04862650): cemiplimab + metronomic carboplatin/paclitaxel, R/M HNSCC; accrual ongoing.
- Role: Lead biostatistician — cytokine/hematologic profiling, UMAP–HDBSCAN clustering, and survival association analyses [A1, A2].

Merkel Cell Carcinoma Xenium Probe Design Research Group 2025 – Present

- Pelotonia Institute for Immuno-Oncology (PIIO), The Ohio State University. Group lead: Dr. Mark P. Rubinstein.
- Role: TCR-seq data analysis in collaboration with immuno-oncologists and immune-monitoring scientists.

Deep Learning–Based SVM Methodology Research Group 2025 – Present

- Ongoing collaboration with Dr. Sungwan Bang, Department of Mathematics, Korea Military Academy.
- Role: Co-investigator developing deep learning methods for simultaneous function estimation and input-variable selection in support vector machine classifiers.

Mediation Analysis for Spatial Transcriptomics Research Group 2026 – Present

- Joint collaboration between Yonsei University (Dr. Ick Hoon Jin, Department of Applied Statistics) and The Ohio State University (Dr. Dongjun Chung).
- Role: Co-mentor responsible for omics data processing and interpretation.

Academic Service

Chung Lab Meeting – The Ohio State University 2025 – Present

- Coordinate presentations and scheduling and regularly present research to graduate students in statistics, computer science, and bioinformatics.

Deep Learning Study Group – The Ohio State University 2025 – Present

- Serve as organizer and primary presenter on deep learning methodology and applications to high-dimensional omics data.

Statistical Consultant – Department of Statistics, Purdue University May 2019 – May 2020

- Provided statistical consulting to Purdue faculty and students across Agriculture, Nursing, Industrial Engineering, Education, and related disciplines; assisted with experimental design, statistical software, and data analysis.

Journal Reviewer

- *The R Journal*, *Bioinformatics*

Computational & Bioinformatics Skills

Statistical Computing: R, Python, SAS, Stata, MATLAB
Bioinformatics & Assays: Bulk RNA-seq; single-cell multi-omics (scRNA-seq, scATAC-seq); spatial transcriptomics (Visium (HD), Stereo-seq); TCR-seq; spectral flow cytometry; and cytokine assays
Workflows & Computing: Linux, Bash, Slurm/HPC, nf-core, FastQC, MultiQC, and reproducible pipeline development
Server Administration: Managed a research lab server — resource allocation and environment isolation/updates (EPEL, SCL, compiler toolchains, renv) to ensure cross-machine reproducibility of experiments
Machine Learning: TensorFlow, PyTorch, C/C++, and Java

Language

Korean (native), English (proficient)

References

Dr. Seung Jun Shin
Ph.D. advisor
Professor and Director of Graduate Program, Department of Statistics, Korea University
Head, International Research Collaboration Center
Administrative Director, Office of Research Management
sjshin@korea.ac.kr | sjshin.net

Dr. Dongjun Chung
Postdoctoral mentor
Professor and Division Chief of Bioinformatics and Computational Biology, Department of Biomedical Informatics, College of Medicine, The Ohio State University
Director, Biomedical Informatics Shared Resources, The Ohio State University Comprehensive Cancer Center–James
Faculty, Interdisciplinary Ph.D. Program in Biostatistics, The Ohio State University
chung.911@osu.edu | sites.google.com/site/statdchung

Dr. Arman Sabbaghi
M.S. mentor
Associate Director of Biostatistics, Santen Inc.
Former Associate Professor, Department of Statistics, Purdue University
sabbaghi@purdue.edu | stat.purdue.edu/~sabbaghi

Dr. Mark P. Rubinstein
Scientific collaborator
Associate Professor, Division of Medical Oncology, The Ohio State University
Scientific Co-Director, Immune Monitoring & Discovery Platform (IMDP), PIIO
Mark.Rubinstein@osumc.edu | u.osu.edu/immunemonitoring