

# Seo Taek Kong

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## Qualifications

- PhD specializing in the theoretical foundations of machine learning, with first-author publications in premier venues (NeurIPS, AAAI).
- Expertise in stochastic optimization and probability theory, with applications to algorithm design and analysis (diffusion models, non-asymptotic central limit theorems and Wasserstein bounds).
- Four years of industry experience developing ML/DL models (computer vision, LLMs, ensembles), including 3 years as a full-time researcher at VUNO and a 12-month Applied Scientist (PhD) internship at Amazon.

## Education

**University of Illinois, Urbana-Champaign** **December 2026 Expected**  
Ph.D. Candidate, Electrical and Computer Engineering & Coordinated Science Laboratory  
Advisor: R. Srikant

**University of Illinois, Urbana-Champaign** **August 2014 - May 2017**  
B.S. with Highest Honors, Electrical and Computer Engineering  
James Scholar Honors Program, Minor in Mathematics

## Work Experience

**Amazon, Applied Scientist Intern** **12 Months**  
*Search Relevance. Palo Alto, CA.* May 2023 - February 2024

- Designed a novel LLM tailored for semantic search ranking, which outperformed a highly-optimized production baseline with a  $\sim 1.2\%$  relative lift in nDCG@1, a significant gain at this operational scale.
- Formulated a listwise ranking method for LLMs, enabling the model to evaluate the relevance of multiple products for an input query.
- Architected a scalable data pipeline on AWS to train LLMs on a massive corpus.

*Product Quality and Perfect Order Experience. Seattle, WA.* May 2024 - August 2024

- Spearheaded an initiative to solve a critical data sparsity problem, developing a predictive satisfaction model from the ground up that expanded metric coverage from  $<5\%$  to 100%.
- Owned the full project lifecycle, from problem formulation and data acquisition to building the final ensemble model (GBDTs & NN) using behavioral signals.
- The resulting satisfaction score was validated as a powerful feature, and its integration into production systems was greenlit for development.

**VUNO Inc., Advanced Research Team Lead and Researcher** **May 2019 - August 2022**

- Contributed to the development and analysis of deep learning models across diverse medical imaging modalities, including Chest X-ray, CT, and histopathology.
- Led research on novel ML methods to address key production challenges, resulting in a first-author NeurIPS publication on active learning and a first-author AAAI publication on out-of-distribution detection.
- Promoted to Research Lead, where I set the technical direction for the advanced research team and mentored junior members on projects spanning from initial concept to publication.

**ICTK Holdings, Cryptography Developer Intern** **June 2017 - August 2017**

- Developed a lightweight Elliptic Curve Cryptography (ECC) library from scratch in C and Assembly, optimizing for low-latency and minimal memory usage on embedded systems.
- The library was successfully deployed into production on IoT devices following the internship.

## Technical Skills

- **Languages & Platforms:** Python, C, Assembly, AWS (EC2, SageMaker)
- **Libraries & Frameworks:** PyTorch, HuggingFace, AutoGluon, Scikit-learn, NumPy, Pandas
- **Machine Learning Applications:** LLM (Search & Ranking), Computer Vision (Classification & Segmentation), Ensemble Methods
- **Theoretical Foundations:** Stochastic Optimization, Probability, Active Learning, OOD Detection

# Academic Leadership and Honors

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- **Session Chair**, INFORMS Applied Probability Society (APS) 2025.
  - Invited to lead a session on finite-time bounds in machine learning applications.
- **Peer Reviewer**, Top-Tier Machine Learning Venues
  - Regularly serve as a reviewer for premier conferences, including NeurIPS (2022, 2023, 2025), ICML (2022, 2023), and the Open Journal of Control Systems.
- **Recipient of Multiple Awards**
  - Graduated with Highest Honors (Summa Cum Laude equivalent), the top academic distinction awarded by the electrical and computer engineering department.
  - INFORMS Travel Grant (2025), Best Interdisciplinary Award at Engineering Open House (2016)

# Selected Publications and Patents (\* INDICATES EQUAL CONTRIBUTION)

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Full publication list and preprints available via [Google Scholar](#).

1. Seo Taek Kong et al. *Nonasymptotic CLT and Error Bounds for Two-Time-Scale Stochastic Approximation*. 2025. eprint: [2502.09884](#)
2. Saptarshi Mandal\* and Seo Taek Kong\* et al. *Spectral Clustering for Crowdsourcing with Inherently Distinct Task Types*. 2024. arXiv: [2302.07393](#)
3. Jaeyoung Kim\* and Seo Taek Kong\* et al. “Key feature replacement of in-distribution samples for out-of-distribution detection”. In: *Proceedings of the AAAI Conference on Artificial Intelligence*. 2023
4. Seo Taek Kong et al. “A Neural Pre-Conditioning Active Learning Algorithm to Reduce Label Complexity”. In: *Advances in Neural Information Processing Systems*. 2022

## In Progress

1. *Wasserstein Error Bounds for Diffusion Models without Log-Concavity*
2. *Sharp Asymptotics in Nonlinear Stochastic Approximation and Wasserstein-p Error Bounds*

## Patents

1. *Method for Constructing Dataset*. KR Patent Application
2. *Method for Detecting Abnormal Findings and Generating Interpretation Text of Medical Image*. U.S. & International Patent Application
3. *Method to Read Chest Image*. U.S. & International Patent Application