

KAO KITICHOTKUL

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EDUCATION

Boston University Ph.D. in Electrical Engineering	GPA 4.00/4, Expected Dec 2025
Advised by Vivek K Goyal.	
Stanford University M.S. in Electrical Engineering	GPA 4.00/4.3, Jun 2022
Stanford University B.S. in Electrical Engineering, <i>distinction</i>	GPA 4.09/4.3, Jun 2022

RESEARCH INTERESTS

Computational Imaging, Statistical Signal Processing, Machine Learning, Lidar

EXPERIENCE

Mitsubishi Electric Research Laboratories <i>Research Scientist Intern</i>	May - Dec 2024 & Jun - Nov 2025
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- Pioneer Doppler SPL, enabling direct velocity estimation using single-photon lidar (SPL) for the first time.
- Drive the research agenda for Doppler SPL, develop its probabilistic model, design estimators, perform statistical analysis, implement simulators and estimators, validate the approach via simulation and experiments.

Boston University <i>Graduate Teaching Assistant</i>	Sep 2023 - May 2024 & Jan - May 2025
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- Contribute to instruction in “Probability, Statistics, and Data Science for Engineers,” with 200+ students enrolled. Responsibilities include conducting lectures, crafting examination materials, facilitating discussion sections, holding office hours, managing course announcements, and grading exams.

Stanford Computational Imaging Lab <i>Undergraduate Researcher</i>	Jun 2020 - Jun 2022
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- Develop model-based deep learning algorithms with uncertainty quantification using Stein’s unbiased risk estimate for compressive MRI reconstruction, along with a self-supervised method for on-the-fly finetuning.

Agoda <i>Data Scientist Intern</i>	Jun 2021 - Aug 2021
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- Designed, prototyped, and tested an automatic content generation system based on large language models.

Spakowitz Research Group <i>Undergraduate Researcher</i>	Jun 2019 - Sep 2019
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- Investigate the effect of topological constraints on bacterial DNA using Monte Carlo simulation.

SELECTED PUBLICATIONS

R. Kitichotkul, J. Rapp, Y. Ma, and H. Mansour, “[Doppler Single-Photon Lidar](#),” in *ICASSP* 2025.

- Develop a velocity-aware forward model of SPL and design a Fourier-domain method for jointly estimating distance and velocity with high accuracy across all velocity ranges.

R. Kitichotkul, J. Rapp, and V. K. Goyal, “[The Role of Detection Times in Reflectivity Estimation With Single-Photon Lidar](#),” *IEEE J. Sel. Topics Quantum Electron.*, 30(1):1-14, Jan-Feb 2024.

- Derive the maximum likelihood estimator and the Cramér-Rao bound for estimating distance and reflectivity using single-photon lidar. Show that the fast time-censoring estimator is statistically efficient.

R. Kitichotkul, C. A. Metzler, F. Ong, and G. Wetzstein, “[SUREMap: Predicting Uncertainty in CNN-Based Image Reconstructions Using Stein’s Unbiased Risk Estimate](#)” in *ICASSP* 2021.

- Develop a ground-truth-free per-pixel uncertainty quantification method for denoising approximate message passing, a signal recovery method that can leverage learned image denoisers.

S. Bharadwaj, R. Kitichotkul, A. Agarwal, V. K. Goyal, “Image Reconstruction from Readout-Multiplexed Single-Photon Detector Arrays,” in *CVPR 2025*. (Highlight: 13.5%)

- Derive an image formation model for a single-photon detector array with coupled rows and columns. Propose image reconstruction methods and analyzed their statistical properties.

A. Agarwal, L. Kasaei, X. He, R. Kitichotkul, O. K. Hitit, M. Peng, J. A. Schultz, L. C Feldman, and V. K. Goyal, “Shot noise-mitigated secondary electron imaging with ion count-aided microscopy,” *Proc. Nat. Acad. Sci.*, 121(31):e2401246121, 2024.

- Develop state-of-the-art per-pixel estimator for secondary electron imaging inspired by MLE by mitigating nonidealities in the image formation model, leading to 3x dose reduction while maintaining image quality.

M. Peng, R. Kitichotkul, S. W. Seidel, C. Yu, and V. K Goyal, “Denoising Particle Beam Micrographs With Plug-and-Play Methods,” *IEEE Trans. Comput. Imaging*, 9:581-593, 2023.

- Propose algorithms for particle beam microscopy denoising by combining convex optimization algorithms with deep learning. Achieve 4x reduction in root-mean-square error compared to conventional methods.

TALKS

High-flux Free-running Single-Photon Lidar, <i>CISE Graduate Student Workshop, Boston University</i>	2025
Model-based Deep Learning for Imaging Inverse Problems, <i>Chulalongkorn University</i>	2025

CLASS PROJECTS

Training Input-Convex Neural Networks using Convex Optimization	2021
<i>Signal Processing for Machine Learning Class Project</i>	<i>Individual project</i>

- Propose an approach to train two-layer input-convex ReLU networks using convex optimization. Our approach allows for training neural networks to global optimality in polynomial time. Input-convex neural networks can be optimized with respect to the input for applications such as model-based control and imaging.

Text-guided Image Generation using Score-based Model	2021
<i>Deep Generative Models Class Project</i>	<i>Group of 2</i>

- Proposed a method for generating images that align with the semantic meaning of text captions by leveraging a CLIP-based loss to guide the diffusion model’s generative process.

Real-time Classification of Musical Chords with Non-Negative Least Squares	2020
<i>Digital Signal Processing Class Project</i>	<i>Group of 2</i>

- Propose an approach for musical chord detection based on digital signal processing and optimization.
- Implement the detection system for real-time chord classification in C and C++ on the iOS platform.

SKILLS

Technical Tools	Python, Pytorch, MATLAB, C, C++
Languages	Thai (native speaker), Japanese (JLPT N3)

AWARDS

IEEE Signal Processing Society Travel Grant for ICASSP 2025	2025
Distinguished Fellowship in Intelligent, Autonomous & Secure Systems, College of Engineering, Boston University	2022
Terman Scholastic Award, School of Engineering, Stanford University Awarded to top 5% of the graduating senior class	2022
Project Design Award, Department of Electrical Engineering, Stanford University	2020
King’s Scholarship, Thai Government	2017
First-ranked recipient of the full-ride merit-based scholarship for undergraduate studies	
Gold medal, International Chemistry Olympiad	2016

SERVICE AND ACTIVITIES

Reviewer for TPAMI, JSTQE, and Optics Express	
Boston University RISE High School Program, Mentor	2023
Stanford Thai Student Association, Financial Officer	2019 - 2020
Stanford Splash, Teacher	2019