

KAO KITICHOTKUL

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EDUCATION

Boston University Ph.D. in Electrical Engineering, <i>advised by Vivek Goyal</i>	GPA 4.0/4, Expected Dec 2025
Stanford University M.S. in Electrical Engineering	GPA 4.0/4.3, Jun 2022
Stanford University B.S. in Electrical Engineering, <i>distinction</i>	GPA 4.1/4.3, Jun 2022

RESEARCH INTERESTS

Computational Imaging, Statistical Signal Processing, Machine Learning, Lidar

WORK EXPERIENCE

Mitsubishi Electric Research Laboratories <i>Research Scientist Intern</i>	May - Dec 2024 & Jun - Nov 2025
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- Invent Doppler SPL, enabling direct velocity estimation using single-photon lidar (SPL) for the first time.
- Develop a velocity-aware **probabilistic model** of SPL and design a maximum likelihood algorithm with Fourier analysis to jointly estimate range (sub-centimeter) and velocity (≤ 0.1 m/s) at 50 frames/s under high noise.
- Design research agenda, build codebase, and conduct optics experiments in collaboration with the team.
- Result in first-author publications in [ICASSP 2025](#) and [Optica](#) (12% acceptance rate).

Boston University <i>Teaching Assistant</i>	Sep 2023 - May 2024 & Jan - May 2025
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- Teach “Probability, Statistics, and Data Science for Engineers” for 3 semesters with 200+ students per term.
- Deliver lectures, design exams, facilitate discussions, manage course communications, and grade assessments.

Agoda <i>Data Science Intern</i>	Jun 2021 - Aug 2021
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- Build LLM-based system to generate travel content with text and images, cutting writing time by $\sim 70\%$.
- Finetune language models and design data retrieval and prompting pipeline for multimodal article generation.

RESEARCH EXPERIENCE

Boston University <i>Doctoral Researcher</i>	Sep 2022 - Present
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- Conduct research in **computational imaging** and **statistical signal processing** with 6 publications to date.
- Plan research agenda, collaborate cross-functionally within the lab, and present findings in weekly meetings.

High-flux Free-running Single-Photon Lidar [ICCV 2025]

- Derive estimators and error bounds for high-flux single-photon lidar using **random point process theory**, allowing 4x higher flux than traditional systems with 100x speed-up over previous free-running methods.
- Develop 3D regularization algorithm leveraging pretrained **diffusion models** for point cloud denoising.

Equivariant Self-supervised Learning for Deep Equilibrium Models

- Develop algorithm for training **deep equilibrium models** for imaging inverse problems without ground truths by leveraging data symmetries, achieving performance within 1.3 dB PSNR of supervised learning.
- Mentor an undergraduate student in designing and conducting experiments on CT and MRI reconstruction.

Plug-and-play Particle Beam Microscopy Denoising [IEEE Trans. Comp. Imag.]

- Propose algorithms for particle beam microscopy denoising by combining **convex optimization** algorithms with **deep learning**, achieving 4x reduction in root-mean-square error compared to conventional methods.
- Analyze convergence of proposed methods via monotone operator theory and conduct experiments.

Readout-Multiplexed Single-Photon Detector Arrays [CVPR 2025, highlight]

- Propose probabilistic image reconstruction algorithms for row-column coupled single-photon detector arrays, achieving 4x speed-up without loss of accuracy and enabling scalability to megapixel resolutions.

Stanford Computational Imaging Lab <i>Undergraduate Researcher</i>	Jun 2020 - Jun 2022
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- Develop model-based deep learning algorithms with per-pixel uncertainty quantification using Stein’s unbiased risk estimate for accelerated MRI [[ICASSP 2021](#)], along with self-supervised method for on-the-fly finetuning.

- Investigate effect of topological constraints on bacterial DNA using Monte Carlo simulation and knot theory.
- Contribute to Fortran codebase for molecular dynamic simulation of biological polymers.

PUBLICATIONS

R. Kitichotkul, J. Rapp, Y. Ma, and H. Mansour, “Simultaneous Range and Velocity Measurement with Doppler Single-Photon Lidar,” *Optica*, 12:604-613, 2025. **12% acceptance rate.**

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

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.

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.

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

A. Agarwal, L. Kasaei, X. He, R. Kitichotkul, *et al.*, “Shot noise-mitigated secondary electron imaging with ion count-aided microscopy,” *Proc. Nat. Acad. Sci.*, 121(31):e2401246121, 2024. **14% acceptance rate.**

S. Bharadwaj, R. Kitichotkul, A. Agarwal, and V. K. Goyal, “Mitigating Misattributions in Single-Photon Detector Arrays with Row-Column Readouts” in *CLEO*, 2024.

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.

SKILLS

Programming	Python, Pytorch, C, C++, MATLAB, Linux, Git
Technical Skills	Machine Learning, Generative AI, Convex Optimization, Inverse Problems, Lidar
Languages	Thai (native), Japanese (JLPT N3)

SERVICE AND ACTIVITIES

Boston University RISE High School Program 2023 - 2025

Mentor

- Mentor high school student to conduct research on machine learning and signal processing for electron microscopy.
- Guide development of self-supervised learning algorithms for deep equilibrium models for inverse problems.

Stanford Thai Student Association 2019 - 2020

Financial Officer

- Manage budget and led the organization of high-impact events, such as industry recruiting sessions, meetings with government officials, and cultural gatherings with 400+ participants.

Reviewer for IEEE {TPAMI, TCI, JSTQE}, APL Photonics, and Optics Express.

INVITED TALKS

High-flux Free-running Single-Photon Lidar, *CISE Graduate Student Workshop, Boston University* 2025

Model-based Deep Learning for Imaging Inverse Problems, *Chulalongkorn University* 2025

AWARDS

IEEE Signal Processing Society Travel Grant for ICASSP 2025 2025

Distinguished Fellowship in Intelligent, Autonomous & Secure Systems, Boston University 2022

Terman Scholastic Award (top 5% of graduating class), School of Engineering, Stanford University 2022

Project Design Award, Department of Electrical Engineering, Stanford University 2020

King’s Scholarship, Thai Government 2017

Gold medal, International Chemistry Olympiad 2016

Silver medal, International Chemistry Olympiad 2015