KAO KITICHOTKUL

rkitich@bu.edu | (650) 334-9533 | rkitichotkul.github.io | linkedin.com/in/rkitichotkul | Boston, MA

EDUCATION

Boston University Ph.D. in Electrical Engineering, *advised by Vivek Goyal*   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, *distinction*   GPA 4.1/4.3, Jun 2022

RESEARCH INTERESTS

Computational Imaging, Statistical Signal Processing, Machine Learning, Lidar

WORK EXPERIENCE

Mitsubishi Electric Research Laboratories   May - Dec 2024 & Jun - Nov 2025
Research Scientist Intern

· 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   Sep 2023 - May 2024 & Jan - May 2025
Teaching Assistant

· 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   Jun 2021 - Aug 2021
Data Science Intern

· Build LLM-based system to generate travel content with text and images, cutting writing time by $\sim70\%$.
· Finetune language models and design data retrieval and prompting pipeline for multimodal article generation.

RESEARCH EXPERIENCE

Boston University   Sep 2022 - Present
Doctoral Researcher

· 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   Jun 2020 - Jun 2022
Undergraduate Researcher

· 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.

Spakowitz Research Group   Jun 2019 - Sep 2019
Undergraduate Researcher

· 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, S. Bharadwaj, J. Rapp, Y. Ma, A. Mehta, and V. K. Goyal, "Free-running vs. Synchronous: Single-Photon Lidar for High-flux 3D Imaging" in *ICCV*, 2025.

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, Google Cloud Platform
Technical Skills	Machine Learning, Generative AI, Convex Optimization, Inverse Problems, Lidar
Languages	Thai (native), Japanese (JLPT N3)

SERVICE AND ACTIVITIES

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

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.

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
Gold medal, International Chemistry Olympiad	2016