

Luke Bhan

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EDUCATION

University of California, San Diego (UCSD)

Ph.D. Electrical and Computer Engineering

La Jolla, CA

Sept. 2022 - Present (Anticipated 2026)

Vanderbilt University

M.S. Computer Science

Nashville, TN

August 2020 - May 2022

Vanderbilt University

B.S. Computer Science, Physics, Applied Math (3 Majors)

Nashville, TN

August 2018 - May 2022

RESEARCH EXPERIENCE ([FULL PUBLICATION LIST](#))

Ph.D. UCSD | Electrical and Computer Engineering

Sept. 2022 - Present

- Introduced neural networks (neural operators) for *provably* stable PDE control with applications to rocket propellant and chemical reactions ([TAC](#), [Automatica](#)). Enabled real-time implementation of a long-standing, but computational prohibitive control algorithm achieving $10^3\times$ speedup. Recognized in the [2023 CDC Bode Lecture](#) (top plenary lecture in control theory).
- Developed the first algorithm to achieve *resolution invariant* motion planning for 2D and 3D robotic systems via operator learning. Achieves approximately $50\times$ speedup over numerical solvers and is discretization invariant enabling training on smaller grids with real-world employment on high resolution maps (To submit ICLR 2025).
- Introduced the the first result applying randomized linear algebra (RandLA) for distributed non-convex optimization (SQP) in long-horizon control problems. This enables *real-time, parallel* optimization ($1\times$ speedup per node) for challenging dynamical systems such as frequency regulation in power systems and robotic manipulators (To submit ICLR 2025, Completed as an intern at UC Berkeley, Summer 2024).

B.S./M.S. Vanderbilt | Computer Science and Physics

August 2018 - May 2022

- Computer Science*: Developed a series of reinforcement learning algorithms for fault-tolerant control (motor/battery damage) of UAVs and the Baxter robot ([ICRA](#)).
- Physics*: Designed a laser-driven quantum ratchet with applications to single nm sized transistors/processors ([Nano Letters](#)). Explored and simulated new nanoscale electrodynamic interactions using Fortran and an HPC cluster ([Phys Rev B](#), [Journal of Chemical Physics](#)).

SOFTWARE EXPERIENCE

Mongo DB | Software Engineering Intern

June 2021 - August 2021

- Designed and coded (C++) the compression algorithm for MongoDB's [time-series database](#). Shrunk memory usage for users by 99%.

T-Mobile | Software Engineering Intern

June 2020 - August 2020

- Created an internal analytics API (JavaScript - NestJS) for visualizing network loads to proactively identify and combat downtime.

Open-source | Memorize Preflop

Dec 2022 - March 2023

- Developed a tool for memorizing preflop ranges in poker. $5k+$ views on [YouTube](#), $500+$ [downloads](#).

SKILLS

Languages	Python, C++, Julia, Rust, \LaTeX
Frameworks	PyTorch, NumPy, Pandas, TensorFlow, Git
Technical	ML (neural operators), robotics (ROS), optimization, PDEs, adaptive control

AWARDS, GRANTS, AND ACHIEVEMENT

Department of Energy, Computational Science Graduate Fellowship (DOE CSGF)

- Full funding for 4 years of Ph.D. ($500k+$, 2022).

Dean Underwood Memorial Award

- Awarded to the top graduating senior in Vanderbilt's Department of Physics and Astronomy.

Best Student Paper Award (Vanderbilt Department of Physics and Astronomy)

- For the paper titled [Signatures of atomic structure in subfemtosecond laser-driven electron dynamics in nanogaps](#).