Luke Bhan

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Education

University of California, San Diego (UCSD) — La Jolla, CA
Ph.D. Electrical and Computer Engineering — *Sept. 2022 - Present (Anticipated 2027)*

Vanderbilt University — Nashville, TN
M.S. Computer Science — *August 2020 - May 2022*

Vanderbilt University — Nashville, TN
B.S. Computer Science, Physics, Applied Math (3 Majors) — *August 2018 - May 2022*

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 Finalist (Learning for Dynamics and Control Conference 2025 - Top 3/119)
- For the paper titled Neural Operators for Predictor Feedback Control of Nonlinear Delay Systems .

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.

Research Experience (Full publication list)

Ph.D. UCSD | *Machine Learning, Robotics, and Intelligent Systems* — Sept. 2022 - Present
- Developed the first neural network model to achieve *resolution invariant* motion planning for $2D$ and $3D$ robotic systems via operator learning. Achieves approximately $50x$ speedup over numerical solvers and is discretization invariant enabling training on smaller grids with real-world employment on high resolution maps (ICLR 2025).
- 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 10^3x speedup. Recognized in the 2023 CDC Bode Lecture (top plenary lecture in control theory).

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 2018).
- *Physics:* Designed a laser-driven quantum ratchet with applications to single nm sized transistors/processors (Nano Letters). Developed a new approach to *efficiently* simulate electrodynamic scattering using Fortran and an HPC cluster (Phys Rev B, Journal of Chemical Physics).

Intern Experience

Amazon | *Applied Scientist Intern* — June 2025 - Sept 2025
- Fine-tuned and designed custom LLMs to provide adjustments for time-series forecasts predicting demands of over 30+ million Amazon products. Demonstrated that LLMs can effectively identify poor distributional forecasts which led to an internal Amazon Machine Learning Conference (AMLC) paper.

Lawrence Berkeley National Lab | *Research Intern* — June 2024 - Sept 2024
- Developed randomized linear algebra (RandLA) solvers for distributed non-convex optimization (SQP) enabling real-time, parallel optimization (1x speedup per node) for control of dynamical systems.

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 | *Machine Learning Intern* — June 2020 - August 2020
- Created an internal analytics API that visualizes network loads to proactively identify and combat downtime.

Skills

Languages	Python, C++, Julia, Rust, LaTeX
Frameworks	PyTorch, Hugging Face transformers, NumPy, Pandas, TensorFlow, Git
Technical	ML (neural operators), robotics (ROS), optimization, PDEs, control theory, timeseries forecasting