Pranav Rajesh Krishnan

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LinkedIn

Education

University of British Columbia, Vancouver, Canada *2024-Present*
Combined Major in Physics & Computer Science
Full-Ride Scholarship under the Karen McKellin International Leader of Tomorrow Award

Technical Skills

- **Programming Languages:** Python, Julia, Java, C++, JavaScript
- **Julia Ecosystem:** GLMakie, DifferentialEquations.jl, ModelingToolkit.jl, HTTP.jl, BBOptim.jl, Lux.jl, NeuralPDE.jl, StaticArrays.jl
- **Python Libraries:** TensorFlow/Keras, NumPy, Pandas, Magpylib, OpenSeesPy
- **Simulation & Numerical Methods:** Physics-Informed Neural Networks (PINNs), universal differential equations (UDEs), finite element analysis, Boris particle pushing, magnetic field computation, advanced simulation and optimization techniques, ROS2 Reinforcement Learning for Robots using MuJoCo
- **Visualization & Web:** GLMakie animations, Three.js, web-based simulation deployment
- **Tools & Platforms:** Git, ROS2, ANSYS Thermal, Fusion 360, Ubuntu/Linux
- **Spoken Languages:** English (Fluent), Malayalam (Native), Hindi (Proficient)

Research Experience

Research Intern, International and Inter-University Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University *2022*
- Built foundation in nanomaterials research by training on laboratory equipment and assisting with sample preparation under postdoctoral mentorship

- Gained exposure to academic research workflows by attending international conference and observing compound synthesis experiments for SCOPUS-indexed publication summarizing technical presentations into notes for senior researchers.

A Robotic Solution to the CO2 Induced Thinking Epidemic *2021-2023*
- Existing CO capture solutions cost $300+ and required continuous external power, as well as not being very environmentally friendly.

- Conducted research on an eco-friendly device for converting CO_2 emissions into usable calcium carbonate, reducing cost of device by 83% cost reduction with 2+ month self-sufficient operation (requiring a new charge of 2W every 3 months).

- Developed the device to capture CO_2 and convert it into limestone using minimal energy (for later use), leveraging principles of chemistry and green engineering.

- Presented the project at the *International Conference on Theoretical and Condensed Matter Physics, 2023 (TCMP-23)*, and published findings in the SCOPUS Indexed Journal of Harbin Engineering University.

Co-Author, QUBE, Quantum Network Protocol *2024*
- Co-designed QUBE quantum network protocol addressing decoherence through entanglement swapping architecture developing node/routing architecture and simulation framework, presenting research to 40+ quantum computing experts including Xanadu leaders at Q-SITE conference

Earthquake Simulation Research using OpenSeesPy *2024-2025*
- Developing 4 structural prototype models to predict seismic responses using OpenSeesPy finite element analysis, collaborating with Prof. Behtash JavidSharifi on ground motion simulation frameworks, leveraging Python-based finite element analysis using OpenSeesPy.

Leadership & Technical Roles

First Year Representative, UBC Physics Society *Sep 2024 - May 2025*
- Represented the first-year cohort of nearly 300 students in the UBC Physics Society, ensuring their needs were reflected in event planning and advocacy.

- Helped organize events such as the Stewart Blusson QMI visits and attended regular meetings on agendas and plans for the next months events.

Simulations Lead, Research & Development Team, PARSEC *Aug 2025 – Present*
- Lead two-person team on regular projects and currently work alone for a partner agency on another under NDA. Led team to develop successful simulations in 2-day turnovers, while maintaining repository health and organization. Also delegate tasks and projects to specific team members, maintaining strong team cohesion.

- Developing and validating proprietary simulation models using an incompressible fluid dynamics library: Oceananigans.jl, processing JLD2 time-series output into 3D visualizations using GLMakie.jl. Project is under NDA in collaboration with an external partner organization working with PARSEC in the space-technology domain.

Software Developer, RL & Autonomous Navigation, UBC Rover *Aug 2025 – Present*
- Building autonomous arm stack for the 2026 URC/CIRC competition using ROS2, MuJoCo physics simulation, and PyTorch reinforcement learning framework

- Converting ROS2 URDF models to MuJoCo-compatible format through manual data transformation of XML files and integrating RL agents with sensor fusion.

- Collaborating with mechanical and electrical subteams to ensure software-hardware compatibility and field robustness.

- Contributing to the development of a rover to compete as the official UBC team in the University Rover Challenge (URC) and Canadian International Rover Challenge (CIRC) against finalist university rover teams from all over North America in diverse, challenging tasks.

Thermal Simulations & Payload Testing, UBC Orbit *Aug 2025 – Present*
- Develop ANSYS Thermal models for CubeSat subsystems to predict thermal behavior under orbital and launch cycles, using ESA standards and manufacturer datasheets for material requirements.

- Build simplified geometry models and initiate numerical simulations to validate component selection and thermal management for upcoming payload qualification testing (thermal vacuum)

- Support design decisions to ensure payload survival and performance under thermal stress.

UBC Development & Alumni Engagement Ambassador *Aug 2025 – Present*
- Represent international scholarship recipients in donor and alumni communications, delivering presentations and impact reports showcasing student research outcomes and program achievements

Projects

Object Detection for Self-Driving Cars *2023*
- Developed CNN-based object detection model using TensorFlow/Keras and VGG-16 architecture to classify vehicles (cars, trucks, jeeps) and pedestrians from custom Kaggle video dataset during 2-week Inspirit AI program led by Stanford/MIT alumni

- Implemented edge detection and pattern recognition pipeline, training model for 5 hours on Google Colab T4 GPU (16 hours total development time) to identify moving objects in real-time driving scenarios

- Presented model architecture and design decisions to peer review board and mentorship panel, receiving feedback on CNN layer configurations and supervised learning approach for autonomous vehicle applications.

Aegis Active Radiation Shielding, PARSEC (Simulations Lead) *Aug 2025 - Present*
- Developing charged-particle trajectory models using Boris Push Algorithms for active radiation deflection system simulating galactic cosmic ray interactions with magnetic field configurations for spacecraft shielding (testing in a satellite due launch 2027), optimizing magnet configurations through 6+ design iterations using Julia's LinearAlgebra.jl and Python's Magpylib.py, GPU accelerated on CUDA and deploying interactive GLMakie.jl visualizations to communicate particle trajectory results to engineering team, using a Model-Based Systems Engineering- digital twins to inform prototype iteration and design decisions.

- Leading a 2-person team in development. Organize and manage codebases and document important information for the wider team, as well as deconstruct codebase for use by engineering teams.

Electromagnetic Launch System, Olympus Mons Laboratory *Nov 2025 - Present*
- Derived analytical models for electromagnetic power requirements and force dynamics in hybrid railgun-LSM configurations from existing research and derived required equations in collaboration

- Built configurable launch simulation in Julia (StaticArrays.jl) with BlackBoxOptim.jl velocity optimization for orbital delivery prototyping

- Created GLMakie visualization pipeline for trajectory analysis and investor presentations, supporting digital-twin-first design methodology at independent aerospace research company

References

Dr. Kevin Varghese Alex
Scientist (Maire Curie Postdoctoral Fellow)
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