# Varun Budati

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## EDUCATION

**Virginia Tech**, Blacksburg, Virginia — Aug 2023 – May 2027
B.S. in Computer Science, Minor in Mathematics & Finance — GPA: 3.67/4.0

## RESEARCH EXPERIENCE

**Quantitative Research**, Dataism Lab for Quantitative Finance, Blacksburg, Virginia — October 2024 – Present

- Created an end-to-end algorithmic execution framework in **Python** (**PyTorch**, **NumPy**, **Pandas**), developing a Mixture of Experts (MoE) architecture that routes high-frequency limit order book data into specialized **Double Deep Q-Learning (DDQL)** optimal liquidation agents.
- Programmed custom feature extraction pipelines using **Scikit-learn** and **SciPy** to cluster non-stationary market regimes based on rolling realized volatility, bid-ask spread compression, and order book volume imbalances ($Q, T, S, BA$), reducing implementation shortfall by 59% against baseline TWAP benchmarks.

## PROJECT WORK

**ShadeFinder | Software Engineering Project** — December 2025

- Designed a full-stack **Python** and **React** application utilizing OpenStreetMap and Pysolar to dynamically calculate and project 3D shadow polygons based on solar physics, building metadata, and Earth's curvature.
- Developed a high-performance **FastAPI** backend to serve real-time OpenWeatherMap data to a **Mapbox GL JS** frontend, enabling users to render interactive, hourly shade simulations for geospatial analysis.

**Undergraduate Commodities Competition | Houston, TX** — October 2025

- Set up a quantitative pricing engine in **Python** (**NumPy**, **Pandas**, **SciPy**) to back a multi-leg trade thesis (Short Jan '26 Waha Basis), calibrating a modified **Ornstein-Uhlenbeck (OU)** stochastic process to model structural temperature mean-reversion ($\kappa = 0.2905$) and local price drivers ($R^2 = 0.40$).
- Programmed a time-varying seasonal volatility matrix using an integrated **Cubic B-Spline (BSpline)** smoothing model and ran 10,000 high-dimensional Monte Carlo path simulations to accurately price complex winter Heating Degree Days (HDD) exotic call options for weather risk derivatives hedging.

**IMC Prosperity 3** | Top 0.005% — April 2025

- Ranked **15th in the US out of 12,600 teams** in IMC's Prosperity 3 algorithmic trading competition, designing automated strategies across multi-asset markets.
- Developed signal-driven market-making algorithms in **Python** by identifying mean-reversion patterns and synthetic mispricing via rolling z-scores, spread compression, and correlation clustering.

## PUBLICATIONS

**Publication:** Budati, Varun et al. "Bridging the code gap: Understanding pedagogical patterns in CS1 programming courses." *Proceedings of the 57th ACM Technical Symposium on Computer Science Education V.2*, pp. 1561–1562. — Feb 2026

**Working Paper:** Budati, Varun et al. "Order Execution for Cryptocurrency using Mixture of Experts" *In Progress* — Aug 2025 – Present

## LEADERSHIP

**President, FinTech Club**, Virginia Tech, Blacksburg, Virginia — October 2024 – Present

- Managed financial operations and a comprehensive budget for 100+ members, while organizing high-profile speaker events to drive networking and quantitative finance career development.
- Spearheaded a faculty-advised quantitative research initiative replicating the foundational Evans & Archer (1968) paper; created an interactive **Streamlit** dashboard in **Python** to programmatically isolate systematic risk via high-dimensional random asset sampling and hyperbolic curve-fitting (**NumPy**, **Pandas**, **SciPy**).

**Student Summer Ambassador, MAOP**, Virginia Tech, Blacksburg, Virginia — October 2025

- Advocated for undergraduate research and enrollment at university career fairs, serving as the primary liaison for the Mentorship & Academic Outreach Programs (MAOP).
- Delivered actionable seminars to incoming engineering cohorts in partnership with CEED, providing peer mentorship on securing faculty research roles and navigating project selection.