

# LAKSHAY GARG

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## EDUCATION

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- Expected 12/23 **NEW YORK UNIVERSITY** New York, NY  
**The Courant Institute of Mathematical Sciences**  
**M.S. in Mathematics in Finance**
- **Coursework:** stochastic optimal control, market impact model, linear regression, PCA, active portfolio management, random matrix theory, dynamic programming, random forest, xgboost, OpenMP, MPI, optimization
- 07/13 - 07/17 **INDIAN INSTITUTE OF TECHNOLOGY** Guwahati, India  
**B.Tech in Mathematics and Computing**
- **Coursework:** linear algebra, numerical methods, stochastic calculus, time series analysis, linear regression, SVM, PCA, data structures and algorithms, Monte Carlo simulation

## EXPERIENCE

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- 06/23 - 08/23 **MORGAN STANLEY** New York, NY  
**Equity Desk Quant, Summer Associate (C++, Python)**
- Improved Cliquet pricing model; developed tools that investigated calibration accuracy/stability
  - Analyzed calibration outliers and identified market conditions in which model performed poorly
  - Fixed model by improving optimizer for fast and robust calibration
  - Presented to Institutional Equity Derivatives leaders and teams; pushed changes into production
- 11/18 - 06/22 **NOMURA SERVICES INDIA PVT. LTD.** Mumbai, India  
**Model Risk Associate (C++, Python)**
- Validated new products and model changes in FX/IR; evaluated ad hoc trade approvals
  - Approved American barriers for scripted FX options in local vol and local stochastic vol
  - Validated cap floor for risk-free rates (e.g., SOFR, OIS) as part of IBOR migration
  - Created restriction monitoring functionality for FX
- 07/17 - 11/18 **FIDELITY INVESTMENTS** Bengaluru, India  
**Software Engineer**
- Developed multiple APIs and web services for brokerage firm with SOAP and WSO2
  - Built on Ethereum platform to develop DApps for reconciliation problems of transfer agents

## PROJECTS

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- 08/22 - Present **NEW YORK UNIVERSITY** New York, NY  
**DNN for Stochastic Optimal Control Problem in Finite Horizon (Python)**
- Created performance iteration (NNContPI) and hybrid iteration (Hybrid-Now) algorithms
  - Analyzed performance of algorithms for 10-D linear quadratic and 1-D call option hedging cases
  - Compared results with analytic solutions by solving Riccati equations and Black-Scholes price
  - Tuned hyper-parameters for stable and fast convergence
- FlashAttention and Extensions (C++)**
- Implemented FlashAttention algorithm; “fused” dot-product attention algorithm
  - Improved run time by ~ 2.5x over standard attention for backward and forward passes
  - Leveraged max cache utilization to overcome technical challenge of quadratic memory access
  - Developed parallel version with OpenMP; improved performance by factor of ~20 with 48 cores
  - Extended algorithm to develop bespoke sparsity patterns (block-sparse and circulant-sparse)

## COMPUTATIONAL SKILLS / OTHER

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**Programming Languages:** Python, C++, SQL

**Languages:** English (fluent), Hindi (native)