TAEMIN KANG

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EDUCATION

Pennsylvania State University University Park, PA *Expected May 2027*

B.S. Computational Data Science & Statistics (Double Major) · Minor in Mathematics · Major GPA 3.54 / 4.0

Coursework: Stochastic Calculus & Derivatives · Probability Theory · Mathematical Statistics · Linear Algebra · Computational Statistics · Stochastic Processes · Applied Data Mining (graduate)

RESEARCH

Undergraduate Researcher — Bayesian Volatility & Tail-Risk Modeling Penn State SURE Program *May 2026 – Jul 2026*

Department of Statistics · Mentor: Dr. ByeongJip Kim · PI: Prof. Xiaoyue Niu

- Implemented GARCH and particle-filter stochastic-volatility models from scratch in four specifications (GARCH / SV × Normal / skewed innovations), validating every variant by synthetic parameter recovery before applying it to market data.
- Designed a pre-registered detection experiment (matched alarm rates, block-bootstrap significance, planted-signal positive controls, and minimum-detectable-effect power analysis specified in advance) to test whether volatility-regime onset is forecastable.
- Falsified my own positive result: decomposed an apparent 42% detection rate ($p < 0.001$) by episode and showed it was driven by mid-episode detections recoverable by a trivial threshold rule, not by onset detection, which failed under the same test.
- Established the mechanism behind the null: return-based conditional forecasts mirror realized past returns, so they track volatility regimes but cannot anticipate their onset at daily frequency, making this a powered negative result rather than an inconclusive one.
- Built options variance-risk-premium infrastructure: an implied-volatility surface across maturities and strikes, realized variance, and VRP extraction by variance-swap-style integration.

Undergraduate Researcher — Power-System Stability & Oscillation Prediction Penn State EECS *Sep 2026 – Present*

EECS Undergraduate Research Program · Advised by Prof. Yan Li

- Funded EECS research award; developing machine-learning models for power-system stability assessment and oscillation prediction from PMU time-series measurements, working toward topology-aware, physics-informed graph neural networks.

EXPERIENCE

Independent Derivatives Trader self-directed *Feb 2026 – Jul 2026*

- Traded KOSPI 200 index options with own capital through an unusually high-volatility regime in the Korean market.
- Learned the market's liquidity structure firsthand: meaningful two-sided depth concentrates in weekly and monthly contracts at 1–5 days to expiry, while the rest of the surface trades at spreads wide enough to dominate expected edge.
- Observed that quoted theoretical values diverged most from tradeable prices at 1–5 DTE, where spreads and jump risk dominated, and moved to pricing from the tradeable quote.

Solo Developer & Product Owner Artemis — AI Career Platform *Mar 2026 – Present*

- Diagnosed fit-score miscalibration by replaying production calls (skill dominance $r = 0.969$, −0.52 pt bias, 8 distinct scores across 23 calls); a weighted rubric, few-shot anchors and a coherence check brought production to −0.08 pt bias across 30 distinct scores ($n = 123$).
- Built an AI career platform as sole engineer and architect; self-host Qwen3.5-9B (4-bit AWQ, vLLM) for nightly batch parsing of 300K+ postings at no marginal cost (318K+ calls versus an estimated $312–513 on a commercial API).

Intelligence Analyst Korea Defense Intelligence Command *Dec 2023 – Jun 2025*

- Built a Python NLP pipeline that classified 150+ unstructured intelligence reports, cutting manual analysis time 60%.
- Developed an anomaly-detection system flagging high-priority events at 85% precision; synthesized findings into executive briefings for senior command.

PROJECTS

Project Eureka — Korean-Market Quantitative Research Infrastructure solo *Feb 2026 – Present*

- Architected and operate a 78 GB PostgreSQL + TimescaleDB platform (~160M rows across 89 tables and 18 hypertables) covering ~21 years of the Korean market: equities from 2005, derivatives from 2010.
- Maintain a survivorship-bias-free dynamic universe (~2,800 active names of 3,900+ ever listed, delistings preserved) by reconciling about 50 status transitions per day across an eight-state trading-status model, rebuilding the eligible universe daily rather than assuming a static ticker list.
- Measured that expiry-week options are the most liquid KOSPI 200 contracts and that 75.7% of option volume sits outside a ±15% moneyness band, reversing two assumptions carried over from US markets.

- Built an event-level corporate-action ledger after finding the vendor's "adjusted" flag was a constant default: market-cap discontinuities above 2× fell from 455/642 (raw) to 4/566, each event measured two independent ways.
- Maintain a ~33M-row survivorship-free KOSPI 200 option chain with 100% daily coverage from 2010, plus 18M+ financial-statement line items from DART (Korea's EDGAR equivalent), 480K analyst reports (mainly Hankyung Consensus), and ~277 macro indicators across 22 sources, including seven central banks.
- Implemented bitemporal point-in-time versioning and an amendment-supersession resolver over 135K filing versions that recovers each disclosure's original publication date, so a later amendment no longer masks when information first became public.

SKILLS

PROGRAMMING & TOOLS Python · SQL · R · pandas · NumPy · SciPy · PyTorch · statsmodels / arch · PostgreSQL · TimescaleDB
STATISTICS Bayesian inference (MCMC, SMC / particle filtering) · changepoint detection · GARCH & stochastic volatility · state-space & regime-switching models · block bootstrap · power analysis · walk-forward validation · forecast calibration
FINANCE derivatives pricing · options Greeks · implied volatility surfaces · variance risk premium · VaR / CVaR · macro & FX (KR / US / CN / JP / EU)
SPOKEN Korean (native) · English (fluent) · Mandarin Chinese (HSK 5, 270/300)

HONORS

Sung and Fumi Lee Scholarship — Penn State (Fall 2026) · Mu Sigma Rho, National Statistics Honor Society · Corps & Division Commander Commendations — Republic of Korea Army