

Darshan Sathish Kumar

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RESEARCH

Adaptive-Regret Bed Allocation

Jan. 2026 – July 2026

Independent Mathematical Research

Python, SimPy, HiGHS

- Formulated bed allocation as a Markov decision process; coupled a Poisson CUSUM change detector with robust optimization and proved a detection-delay bound using Lorden's inequality.
- Built a 20-bed discrete-event simulation and MILP hindsight oracle; reduced cumulative regret 17–29% across four demand scenarios ($p < 0.001$) and 21.5% on a 236-visit MIMIC-IV cohort.

Momentum in Large-Cap Equities

Oct. 2025 – Feb. 2026

Independent Research; single-author SSRN preprint

Python, factor models, Newey–West HAC

- Designed a survivorship-bias-free 12–1 momentum study of S&P 500 constituents from 2005–2024; built a gap-aware return panel and locked train, validation, and test periods before final evaluation.
- Applied CAPM, FF3, FF5+UMD, Newey–West inference, and 10-bps costs; found no positive residual alpha out of sample and released a reproduction pack. Paper reached 4,000+ views and 250+ downloads.

RESEARCH EXPERIENCE

UT Health San Antonio, Lab of Dr. Mengwei Zang

San Antonio, TX

Student Researcher; previously Student Research Assistant

June 2025 – Present

- Lead statistical modeling, longitudinal analysis, and data-pipeline development for preclinical MASLD studies spanning three investigational compounds and three biomarker datasets.
- Evaluate treatment efficacy using GraphPad Prism and Excel; presented findings to the School of Medicine dean and faculty and was promoted to Student Researcher in June 2026.

TECHNICAL PROJECTS

Systematic Trading Framework

July 2025 – Present

Independent Project

Python, Alpaca API, GitHub Actions

- Built a modular six-strategy framework separating signal generation, paper execution, risk controls, and performance analytics across reversal, pairs, low-volatility, options, and composite strategies.
- Automated 100+ paper trades and reproducible reporting for Sharpe, Sortino, drawdown, and OLS alpha/beta versus SPY using Alpaca and GitHub Actions.

Market Microstructure Analysis

Jan. 2026 – Present

Independent Project

Python, Kraken order-book data

- Modeled order-flow imbalance, short-horizon return predictability, signal decay, spread widening, and adverse selection in Kraken limit-order-book data to test whether apparent signals remained executable after frictions.

NetGuard

Apr. 2026 – May 2026

Independent Project

Python, FastAPI, React, PostgreSQL, Redis, Docker

- Engineered a seven-service intrusion-detection platform with Scapy capture, Redis streaming, FastAPI, PostgreSQL, and React; combined five signature detectors with Isolation Forest, autoencoder, and K-Means models.

TECHNICAL SKILLS

Languages: Python, R, SQL, TypeScript

Tools: pandas, NumPy, statsmodels, scikit-learn, SimPy, HiGHS, Git, Docker, FastAPI, PostgreSQL, Redis

Methods: Experiment design, factor models, Newey–West HAC, backtesting, market microstructure, MDPs, robust optimization, MILP

SELECTED PROGRAMS AND HONORS

Programs: SIG High School Discovery (May 2026); RBFCU Youth Ambassador – 1 of 20 selected from 120+

Honors: WKO World Champion, Traditional Forms; Latin Oratory – 2nd National, 1st Texas; National Merit Commended

EDUCATION

The University of Texas at San Antonio, Honors College

San Antonio, TX

Bachelor of Science in Mathematics and Computer Science

Expected May 2029

Northwest Vista College | Dual Enrollment; 45 college credits; GPA: 3.91; SAT: 1580 (Math 800)

May 2026