Dr. Suneel Sarswat

Formal Verification — Financial Systems — Regulatory Technology

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Professional Profile

Computer scientist and regulatory technology expert with PhD from TIFR specializing in formal verification of financial systems. Led development of the world's first fully verified exchange matching compliance checker with proven detection capabilities on real exchange data. Combines cutting-edge research (6 co-authored publications in premier CS venues, ACM international recognition) with regulatory consulting experience and professional training across India's financial ecosystem.

Core Services & Expertise

Exchange Compliance & Verification Technology

- Led development of world's first fully verified exchange matching compliance checker (collaborative research)
- Automated detection of matching violations with mathematical correctness guarantee
- Custom compliance tools for regulatory bodies and exchanges

Regulatory Technology Consulting

- Market surveillance system design and implementation
- Policy framework development for government bodies (Ministry of Finance, SEBI)
- Regulatory compliance technology assessment
- Advanced detection algorithms for market manipulation and front-running

Executive Training & Professional Development

- Advanced analytics training for financial institutions
- Mathematical foundations of machine learning in finance with implementation and applications
- Fraud detection and market surveillance methodologies

Key Achievements

Research & Innovation Leadership

- **ACM Second Prize** (2020): International Conference on Functional Programming (SRC track)
- **Led World's First Verified Exchange Checker**: Production-ready tool detecting matching violations in real Indian exchange data (collaborative research)
- **Trading Theory Development**: Created foundational theoretical framework for exchange matching formalization (collaborative research)
- **ACM India Recognition** (2024): Invited poster presentation at Annual Event

Government Consulting & Professional Training

- **Ministry of Finance** (2009): Policy report on credit rating agencies with AI recommendations
- **SEBI Market Surveillance** (2011-12, 2024): Advanced detection methodologies for manipulation and front-running
- **Professional Training Impact**: 500+ officers from RBI, SEBI, NSE, BSE, major banks through specialized programs and guest lectures

Education & Qualifications

PhD in Computer Science 2024
Tata Institute of Fundamental Research (TIFR), Mumbai
Dissertation: A Formal Approach to Exchange Design and Regulation
M.Sc. in Computer Science 2015
Tata Institute of Fundamental Research (TIFR), Mumbai
M.Sc. in Applied Statistics 2005
Indian Institute of Technology (IIT), Mumbai

Professional Experience

Adjunct Faculty[1] 2009–2012, 2019–Present
National Institute of Securities Markets (NISM)
Consultant 2020–2024
Decimal Point Analytics (DPA)
Research Scholar 2012–2017
Tata Institute of Fundamental Research (TIFR)
Research Analyst 2006–2009
Bank of America, Mumbai

Publications

Co-authored 6 publications in premier computer science venues including "The Exchange Problem" (AFT 2025), "Double Auctions: Formalization and Automated Checkers" (Journal of Automated Reasoning, 2025), "Efficient and Verified Continuous Double Auctions" (LPAR, 2024), "The Design and Regulation of Exchanges: A Formal Approach" (FSTTCS, 2022), "Verified Double Sided Auctions for Financial Markets" (ITP, 2021), and "Formally Verified Trades in Financial Markets" (ICFEM, 2020) with research collaborators across multiple institutions.

Academic visits

- One week visit to Study Group Mathematics with Industry, Eindhoven University of Technology to work on industrial problems.
- One month visit to Centre for Investment, Indian Schools of Business (ISB), Hyderabad to work on a research project.

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[1] Head of analytics during 2009-2012

Technical Capabilities

- **Formal Verification:** Coq theorem prover, mathematical proof systems, automated checkers (25,000+ lines verified code)
- **High-Frequency Data Analysis:** Orderbook and tradebook data processing, market microstructure analysis
- **Programming:** Python, R, OCaml, large-scale system implementation
- **Financial Systems:** Exchange matching algorithms, trading theory development, regulatory compliance
- **Analytics:** Machine learning, fraud detection, market surveillance, risk management
- **Regulatory Technology:** Policy framework design, compliance automation, surveillance systems

Professional Network & Industry Positioning

- **Government Consulting:** Ministry of Finance, SEBI, RBI
- **Training & Development Clients:** NSE, BSE, major commercial banks (guest lectures and specialized programs)
- **Academic Affiliations:** TIFR, IIT-Mumbai, visiting roles at ISB, IIM-K, IIM-M (NITIE)
- **International Collaborations:** Research partnerships with leading CS professionals.
- **Unique Market Position:** Leading provider globally of mathematically verified exchange compliance technology