

MEHMET YANILMAZ, Ph.D.

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PROFESSIONAL SUMMARY

Mehmet Yanilmaz, Ph.D. is a hands-on technologist with an engineering, manufacturing and IT background. He expanded his focus to capital markets over the last decade. His academic credentials include faculty positions at the Northwestern University (school of engineering and Kellogg School of Management) and the department of computer science at the University of Chicago.

Expert witness experience involves theft of IP, corporate and IP valuations, and determination of reasonable royalties. Dr. Yanilmaz prepared the expert witness reports for his past cases. His testimonies included cross-examination and a debate with the defendants' expert witness. The debate was structured and moderated by the arbitration judge.

1 EXPERTISE

- **Industries:** Automotive, construction equipment, computers, electronics, information technology, energy, pharmaceuticals, ceramics, logistics, capital markets.
- **Analytics:** load balancing & dynamic routing across cloud servers, system throughput optimization, high-speed data analysis, complex event processing, real-time dynamic controls, event-driven scheduling.
- **Product engineering:** electronic and mechanical components design and testing in electronics and engine engineering.
- **Manufacturing & supply chain automation:** supervisory control and data acquisition (SCADA), manufacturing resource planning (MRP II), system simulation.
- **Capital markets:** business models, technologies, trading strategies, algorithms, intellectual property and software development for matching engines, algorithmic and high frequency trading systems (HFT), low latency execution, smart order routing, anti-gaming, exchanges and trading platforms in cash and derivative markets.
- **Information technology:** object-oriented architectures, distributed systems, publish and subscribe architectures; parallel computing, cloud computing, hardware acceleration with FPGA and GPU, ASIC; computer graphics systems.
- **Expert witness:** expert reports and cross-examination in disputes in intellectual property, trade secrets, operating and employment agreements in finance, information technology, engineering, corporate valuations and determinations of reasonable royalties.
- **Worldwide experience:** USA, Puerto Rico, Mexico, Brazil, The United Kingdom, Japan, China, Singapore, India, France, Germany and Turkey.
- **Invited speaker at leading business and technology conferences:** invited speaker and panelist at numerous conferences organized by IOSCO, Futures Industry Association, Taifex, Eurex, Grupo BMV, Princeton Quant Trading, Object Management Group, Society of Manufacturing Engineers, Institute of Electrical & Electronics Engineers, etc.

2 EDUCATION

1986	Syracuse University	Ph.D., Electrical Engineering
1982	Syracuse University	M.S., Computer Engineering
1979	Boğaziçi University, Istanbul	B.S., Electrical Engineering

3 PROFESSIONAL EXPERIENCE

Navus, Inc., President (1992 -)

Business strategy, JVs, operations & technology advisory, expert witness

1. Expert witness for IP litigation (2014 -)

- **My part Software Ltd. vs. Fluent Trade Technologies Ltd. - AAA Case No. 01-16-0004-3815**
 - **Expert witness report delivered on October 13, 2017.**

The report is on testing and performance validation methodologies of Fluent's products for high-speed connectivity to FX markets, and potential performance degradation issues of trading algorithms that operate on Fluent's platform.
 - **Expert witness testimony delivered on November 1, 2017.**

Testimony included direct and cross-examination.
- **Global Liquidity Partners, LLC vs. Jeffrey Wegher - AAA Case No. 01-14-0000-8646**
 - **Expert witness report delivered on March 27, 2015.**

The report is on the valuation of Global Liquidity Partners as a company, the value of its IP, and the determination of the reasonable royalty for this IP.
 - **Expert witness testimony delivered on May 12, 2015.**

Testimony included direct and cross-examination.
- **Global Liquidity Partners, LLC vs. Michael Wojcik and Christopher Taylor - AAA Case No 13 148 01388 13**
 - **Expert witness report delivered on August 29, 2014.**

The report is on the uniqueness of the Global Liquidity Partners' intellectual property, including its logic, software architecture, order processing and event management technology, source code, execution code and library of smart order routing and trade execution algorithms.
 - **Expert witness testimony delivered on September 5, 2014.**

Testimony included direct and cross-examination, and a debate on the contents of my report and the report submitted by the defendants' expert witness. The debate's rules were set by the arbitration judge who also moderated the debate.
- Capital markets advisory to leading Economic Advisory firms including **Analysis Group** and **Corner Stone Research** about numerous litigations involving market microstructure, order management and fraudulent trading practices. Cases included:
 - **Securities and Exchange Commission vs. Khaled Bassily, ConvergeX Execution Solutions LLC (2016)**
 - **Allergan vs. Valeant Pharmaceuticals and William Ackman, Pershing Square Hedge Fund (2014)**

2. Advisor to trading platforms, fintech companies, regulators, industry organizations, governments (2007 -)

- **Turkish Government (2016 - 2017):** *project finance strategy*; advising the cabinet on the economic contribution of real estate certificates; the design of the market to trade these certificates at Borsa Istanbul
- **Chicago Mercantile Exchange (2014 - 2016):** *risk analytics advisory*; margin analytics and risk estimates for credit default swaps and structured products; devising market and risk simulation models; conducting scenario analyses to review SEC and CFTC compliance of CME's in-house models (*delivered in collaboration with Numéraire Financial Inc.*)
- **Global Liquidity Partners (2014 - 2015):** *expert witness* for two legal cases involving the protection of the IP of this algorithmic trade execution platform and the computation of reasonable royalties due to unauthorized use of this IP by former employees
- **Dion Global (2011 - 12):** *product and market design & marketing strategy*, devising the OTC market structure, order flow, the cloud-based software architecture, OTC product pricing algorithms, user interfaces for a new inter-bank and inter-dealer options trading platform Dffrentia
- **Istanbul Stock Exchange (2011):** *strategic advisory for joint ventures & capital markets technology*, writing the business plan for the exchange's alternative single stock options trading facility in London; auditing the exchange's system for market manipulation detection; enhancing market microstructure, devising collocated services benchmarked the design and IT capabilities of the exchange's matching engine with those of leading exchange operators
- **U.S. Securities and Exchange Commission and U.S. Commodity Futures Trading Commission (2009-2010):** *capital markets education*; delivered courses to attorneys at divisions of enforcements on market manipulation and fraud by using algorithmic high frequency trading
- **The International Organization of Securities Commissions (IOSCO), Futures Industry Association (FIA), The Institute for Financial Markets (The IFM) and Chinese National Futures Association (2010):** co-organizer, *invited speaker* at numerous conferences worldwide on algorithmic trading, HFT, and regulatory frameworks
- **FX Market Space (2008 - 09):** an inter-bank institutional FX platform and joint venture of Reuters and Chicago Mercantile Exchange; *business development* and algorithmic trading tools to be offered to clients
- **Taiwan Futures Exchange-Taifex (2009):** *growth strategy*; devising algorithmic trading services to increase order flow and market liquidity
- **Mexican Exchange Group - Grupo BMV (2008):** *strategic advisory* to BMV about the launch of a new clearing operation for Mexican Derivatives Exchange (MexDer) in collaboration with major U.S. banks
- **Sif-ICAP (2008):** *strategic and technology advisory*; ICAP's Mexican operation; devising business and operating requirements, IT and performance specifications for selecting suppliers for a new bond trading engine
- **Eurex Exchange (2007):** *business growth and order management advisory*; increasing their trading volumes from United States via algorithmic trading advisory offered to Chicago proprietary trading shops; aligning Eurex's order processing and order matching rules with trading firms' algorithm design objectives
- **Bank Hapoalim (2007):** *business growth and technology advisory*; Israel's largest bank; strategies for incorporating execution algorithms and new software tools to Hapoalim's trading operations

3. Advisor to hedge funds, proprietary trading firms, venture capital funds (2004 -2013)

- *Trading and risk strategies*: Advising a hedge fund that longs and shorts portfolios of distressed residential real estate about streamlining their revenue and risk models, and risk hedging mechanisms (2012 - 2013)

- Mortgage portfolio valuation: Evaluation of portfolios of mortgage-backed securities by using LoanPerformance's mortgage analytics and database, which is now part of First American Mortgage, on behalf of a proprietary investment group (2007)
- Corporate debt portfolio valuation: assessment of return and risk profiles of portfolios of collateralized debt obligations -squared marketed by Bank of America by employing novel analytics for structured finance on behalf of a proprietary investment group (2006 - 2007)
- Trading technology and operations advisory: Advising a proprietary trading firm in Chicago to launch its algorithmic trading operation in futures contracts by using CME products as its initial portfolio; devised algorithms to trade e-mini S&P, Euro/FX, corn, U.S. treasury contracts to jump start this business line (2006 - 2007)
- Start-up evaluations: business strategy and valuation reviews, risk analyses for start-ups in IT, b2b products for Intersouth Partners in Research Triangle Park (1997 - 1999) and KB Partners in Chicago (2007 - 2009)

4. Advisor to automotive, pharmaceutical, electronics, energy, computers, appliances companies (1992 -)

Solutions delivered in business strategy, market research, finance, product engineering, IT, manufacturing automation, supply chain deployment, and operational risk management

- **Austral Dutch Kaolin Pty Ltd (2017 -)**: Advising the company about selection of mining and oil shale processing technologies, IP licensing, strategic partnerships and securing financing for the development of their oil shale in Queensland, Australia, in concert with Queensland Government and Queensland Resources Council for environmental compliance
- **Istanbul Chamber of Industry (2003 - 04)**: growth and competitiveness advisory; advising the chamber's board on devising strategies for sector-focused international competitiveness for their member firms
- **WMS Gaming (2001)**: product portfolio advisory; a game software company; a coherent financial system for integrating revenue and loss models of their product portfolios with their development and engineering operations to enable continuous tracking of corporate performance
- **Neoliner - now Cadence Design Systems (2000)**: new market channel development; dynamic generation of licensable IP databases for analog chip designs that are by-products of Neoliner's design automation software across compute grids
- **International Truck & Engine - Navistar (1993 - 2000)**: product strategy: economic life cycle models of truck components and fleets for revenue and warranty modeling; these models were delivered as a web-based, real time financial analytics system linked to **IdeaLease**; the truck leasing subsidiary;
- Market research: Devised and executed a market research and customer survey project that covered over one hundred major truck fleets in the U.S.; secure agreements from fleet operators for real time data feeds to the economic performance analytics system;
- Warranty systems: Proprietary financial analytics models that cast portfolios of trucks as portfolios of options for better risk and return analyses for optimizing warranty packages;
- CRM: Audited Navistar's customer relationship management (CRM) processes; devised improvements following benchmarking the existing system with those of competitors'; designed the web-based, object-oriented software architecture of the new system with emphasis on emerging mobile technologies;
- Product Engineering: Numerous engineering, reverse-engineering, component design, simulation, and testing projects for the launch of the Next Generation Engine

- **Baxter Healthcare (1993 - 2000):** *Plant optimization*: automated generation of factory layouts, manufacturing, assembly and distribution operations, and production schedules (MRP) that are directly connected to shop-floor machines (PLCs and SCADAs)
- *Real time scheduling*: Simulation-driven scheduling for factories in Latin America and East Asia; the simulator reacts to real time data feeds from the shop-floor and continuously monitors its own performance;
- *Integrated quality control* deployment at Baxter Japan by implementing Kaizen as Total Quality Management (TQM);
- *Product distribution chains*: Architectures of web-driven product distribution and truck tracking systems for renal therapy delivery in Latin American markets;
- *Process engineering*: AI Processes for converting batch manufacturing to continuous systems;
- **Caterpillar (1993 - 99):** *product engineering*: tensor modeling, analytics for structural and computational fluid dynamics, prototyping and testing support for Caterpillar's diesel injector products; conversion of Fortran code from University of Wisconsin's Engine Research Center to object oriented C++ code for incorporation in Caterpillar's own CAD systems
- **Chevron (1998):** *process engineering*: object-oriented, simulation-driven scheduling of refineries in collaboration with Aesop GmbH (now Siemens) and Neuron Data (now FICO)
- **Ford Motor Company (1997 - 98):** *manufacturing automation*: software audits and architecture enhancements for shop floor automation at Ford's transmission assembly plant in Livonia, Michigan; redesign of plant-wide event management layer and the control logic of automated part delivery vehicles;
- *Process tracking*: Process modeling and continuous tracking of productivity metrics for a major aluminum smelter in Essex County, Canada
- **Daimler AG (1994):** *product engineering*: vector-optimization in C programming language of event-driven algorithms for simulated test tracks and vehicle dynamics for new car designs on Cray II computers, with Mercedes Benz A series as the pilot project
- **Detroit Diesel (1993 - 94):** *reverse engineering*: devised an integrated library of solid meshing algorithms, b-spline based surface generation algorithms, deformable parametric surface algorithms for 3D scanning, digitization and reverse engineering of solid component prototypes for engines
- **Motorola (1993):** *cellular network design*: object and event architecture, simulation and stress testing, and performance metrics for Motorola's land mobile communication product in collaboration with Motorola's corporate R&D
- **Chicago Manufacturing Center (1993):** *strategy and technology advisory*: a former initiative of the State of Illinois to increase the competitiveness of midsize manufacturers in Illinois; advised numerous 2nd and 3rd tier component manufacturers in productivity, supply chain integration and concurrent engineering
- **Hart Shaffner and Marx (1992 - 93):** *product portfolio optimization*: integration of market research data with custom-designed revenue analytics with predictive and corrective functions for portfolios of products and retail channels by using SAS; implementation of Bayesian statistics for improved causality and correlation analyses across product types and customer segments
- **Oki Microelectronics (1990 - 91):** *CAD software development*: distributed and concurrent algorithms to solve algebraic-differential equations across networks of workstations for applications in electronic and mechanical CAD; the distributed system was deployed over the Linda network from Yale University and by optimizing concurrent execution features of Intel i860 chip sets.

- **Sequent Computer Systems (1990):** *CAD software development*; now IBM; coarse parallelism of Fortran and C libraries of linear and nonlinear solvers on Sequent Symmetry's shared memory architectures for delivering mathematics libraries to end users

Similar projects were delivered to **BMW, JI Case (now Iveco), Lockheed Martin, Intel, Klein Tools. Whirlpool**, Solutions have been implemented in **Brazil, China, Germany, Ireland, Japan, Mexico, Puerto Rico, Singapore, Turkey and USA.**

5. **Corporate and IP Valuations for M&A, Investments and Litigation (2004 -)**

Valuations for an aggregate value of over USD 4BN; examples:

- Financial and risk analytics platform: **Numeraire Financial (2014)**
- Market data analytics supplier: **Myra Data (2014)**
- Multi-lateral trading facility: a London-based multilateral trading facility - a joint venture between **Istanbul Stock Exchange** and **NASDAQ OMX (2011)**
- Proprietary trading firm: **Harrison Trading Group (2007)**
- Trade execution platform: **Global Liquidity Partners (2015)**
- Engineering CAD: **Varimetrix (1997)**
- Energy: **Alterna Energy Systems (2014)**
- Steel manufacturer: **Çel-Mer Çelik (2014)**
- Factoring services: **Destek Factoring (2013)**
- Retail chain: **Boyner Holding (2015)**
- Ceramics manufacturer: **Toprak Holding (1994-95)**
- Placement services: **Banner Personnel (2004)**

The Institute for Financial Markets, Washington D.C., Associate (2007 -)

- *Executive Training*: Designed and has delivered courses on trading strategies, IT technologies and the trading platforms for cash and derivative products, and algorithmic and HFT trading via the IFM in Chicago, New York, London, Mexico City and Tel-Aviv.
- The courses focus on institutional participants to capital markets. Attendees have included traders, technologists, executives of proprietary trading firms, hedge funds, software and market data providers, brokers, exchanges and banks. The courses are hosted by CME, NYMEX, Eurex, ICAP, National Futures Association, Options Clearing Corporation and Interactive Brokers.

Myra Trading, Myra IP, Myra Data LLCs, Chicago, Partner/CTO (2008 - 2017)

- *Trading strategist*: Designer of trading strategies and algorithms, the software architecture, the publish and subscribe operation of an automated high frequency trading system (HFT) to trade equities across more than forty liquidity pools in the U.S;
- *CTO*: Selected the software development tools, the middleware, the programming languages to implement the system; Deployed project management and quality control tools and managed the implementation team; devised the architecture of the cloud-based market analytics feeds;
- *Product engineering*: The system is completely implemented in house and with ownership of the whole source code that exceeds 1.5 million lines of C++, Python and Java code.

Investimizer, Chicago, Partner (2015 - 2016)

Co-founder of this robo advisory platform for retail investors. Sold shared back and exited in 2016:

- CTO: Designer of the cloud-based IT architecture, the back-office process flow, the concurrent data streaming and real time analytics engine;
- Business strategist: Responsible for selecting the technology suppliers and strategic alliances for the rapid deployment of the service.

Numéraire Financial & Numéraire Technology, Chicago, Partner (2012 - 2016)

Co-founder of this risk analytics advisory to clearing corporations. Sold shared back and exited in 2016:

- CTO: Responsible for and hardware and software engineering of a cloud-based, high throughput, big-data appliance for coherent pricing and risk analytics products;
- The appliance addresses banks' and centralized counter party (CCP) clearing facilities' needs in stress testing, collateral computations for FX, swaps, options, fixed income and credit;
- High computational performance with concurrent algorithms mapped on graphical processing units (GPU) and field programmable gate arrays (FPGA).

Stock Exchange of the Caribbean, Nassau, Director of Algorithmic Trading (2007 - 2008)

- Market designer: Devised the market microstructure to attract volume and to generate liquidity; designed the auction rules, order types, liquidity rebate models, order cancellation and execution rules, while remaining compliant with U.S. market regulations.
- CTO: Selected the software and hardware technologies to implement the matching engine and collocation services for market participants.

Northwestern University & the University of Chicago, Faculty Member (1986 - 1990 & 1997 - 2001)

- Teaching: Served as faculty of Electrical Engineering and Computer Science (Assistant Professor); Industrial Engineering, Computer Science, Engineering and Manufacturing Management (Kellogg School of Management) at Northwestern University; Computer Science at the University of Chicago (Adjunct Professor)
- Research in concurrent computer architectures, microchip design, event-driven computer animation, nonlinear algebraic-differential equations, deformable solid and surface modeling

RIT Research Corporation & Chipware Tools, Inc., Architect (1984 - 85)

- **General Electric (1984)**: design of scalable, high-speed signal processing arrays (ASICs) for radar applications; the design achieves sustained throughput by integrating bit-serial, word-parallel algorithms in systolic arrays with high levels of functional granularity to deliver linear scalability in data bandwidth
- **Kodak & Xerox (1984 - 85)**: mapping copier functions' logic to a family of proprietary FPGAs; circuit level design, and simulation testing of these FPGAs prior to chip layout generation

FINANCE CONFERENCES, SEMINARS & COURSES (2010 TO DATE INCLUDED)

- **8 & 9 May 2019 - The Trading Show Chicago 2019**
(Chicago) Speaker at the panel titled "Maximizing your profitability in a market with reduced inefficiencies"
- **9 & 10 May 2018 - The Trading Show Chicago 2018**
(Chicago) Speaker at panel titled "Next-Generation Connectivity - How are you Balancing Latency & Bandwidth in 2018?"
- **25 April 2018 - QA Financial Forum**

(Chicago) Speaker at the panel titled "Embedding regulatory compliance into software development"

- **11 July 2017 - MarketsWiki Education - World of Opportunity**

(Chicago) Delivered a presentation titled "Best Order Execution."; a cohesive assessment of managing order complexity, anti-gaming, the impact of recent and upcoming regulation in the U.S. and the E.U. about disclosures of order flow & source codes of trading algorithms on the competitiveness of trade execution services, the operation of dark pools, the convergence of buy and sell side tools, and trading firms' intellectual properties

- **17 & 18 May 2017 - The Trading Show Chicago 2017**

(Chicago) Delivered a presentation titled "Accelerating blockchains' performance - current limitations and promising directions"; participated in the panel titled " Best execution standards - what is the buy- side looking for from brokers?"

- **19 July 2016 & 2 February 2017 - The Institute for Financial Markets**

(New York, Chicago) Deliveries of a live course titled "The Latest in Algo Trading: Technologies, Regulations and Legal Pitfalls."

- **18, 19 May 2016 - The Trading Show 2016**

(Chicago) Delivered a presentation titled "Evolving regulatory environment & prop trading - How will they impact algorithm design, trading strategies & IP protection?"; Moderated the panel titled "Ultra-Low Latency Connectivity - How is the game of speed changing in today's automated trading environment?".

- **7 November 2015 - Princeton Quant Trading Conference**

(Chicago) Delivered a presentation titled "Concurrent Smart Order Routing and Anti Gaming."

- **1 October 2015 - Chicago Trading and Technology Summit 2015**

(Chicago) Participated in the panel titled "Using regulatory changes to drive improvements in your trading and investment processes."

- **3, 4 June 2015 - The Trading Show 2015**

(Chicago) Delivered a presentation titled "How to sort out the complexities of different order types across trading venues?"; moderated a panel titled " Exchanges and alternative trading systems – comparing and contrasting trading venues in the new market landscape."

- **22 January 2015 - Connectivity: A Discussion on the Latest Initiatives and Technology in Ultra-Low Latency Trading - Panel**

(Chicago) The Mankoff Company, After the Bell Forum

- **7 November 2014 - Princeton Quant Trading Conference**

(Chicago) Delivered a presentation titled "Market Microstructure Dynamics: Quantitative & IT Aspects, their Business Evolution & Future Prospects"

- **10 September 2013 - Inside Market Data 2013 Conference**

(Chicago) Moderated the panel titled "The role of market data management in controlling costs and maximizing profits."

- **17 July 2013 - Low Latency Technology Developments, Innovations, Implementation and Challenges: Build vs. Buy and Beyond - Panel**
(Chicago) The Mankoff Company, After the Bell Forum
- **24, 25 June 2013 - The Trading Show Chicago**
(Chicago) Delivered a presentation titled "High Frequency Trading in an Over-the-Counter framework"; moderated the panel titled "Dark fiber vs. microwave and wireless technologies - joining forces or competing options?"
- **23 April 2013 - North-American Trading Architecture Summit**
(New York) Delivered a presentation titled "Parameterization of trading algorithms according to markets characteristics"; moderated the panel titled "The clash of the algos": real-time decision making and risk"; served as a panelist at the panel titled "Is this the end of OTC trading as we know it?"
- **20 March 2013 - Asia-Pacific: Electronic Trading's New Frontier**
(Global) Aite Group Webinar - Served as panelist.
- **13, 14 November 2012 - FIA/IFM Turkish Derivatives Conference**
(Istanbul) Moderated the panels titled "Strategies for Turkey's Finance Technology for Derivatives Markets" and "Impact of MIFID Integration of Turkish Derivatives Markets."
- **11 October 2012 - High Frequency Trading Webcast**
(Global) Served at this panel organized by Waters Technology and that focused on HFT perspectives by brokers, buy side, sell side and exchange operators.
- **27 September 2012 - Inside Market Data 2012 Conference**
(Chicago) Served on the panel titled " Re-architecting enterprise infrastructure for the "age of big data"
- **27 June 2012 - High Frequency Trading World Conference**
(Chicago) Participated on the panel entitled "Fairness of Outcomes vs. Opportunities: Who Bears the Cost of Market Construction and Is It Fair for Everyone to Access?"
- **19 April 2012 - Syracuse University Center for Advanced Systems Engineering (CASE)**
(Syracuse) Delivered the talk "An Engineering Perspective for Algorithmic Trading" at Syracuse University's Center for Advanced Systems Engineering (CASE).
- **17 April 2012 - North-American Trading Architecture Summit**
(New York) Presented a paper entitled "Integrated Metrics for Cost Management, Design Options and Performance Objectives of High-Frequency Trading Systems." Moderated the panel "Assessing the Continued Viability of High-Frequency Trading." Elected the best speaker of the event by the attendees.
- **7, 8 February 2012; 9, 10 March 2012 - Institute for Financial Markets Curriculum**
(Chicago; New York) Presented the two-day course "Is Algorithmic Trading Within Your Grasp?" The industry-standard program - designed by Yanilmaz and in its fifth year - is targeted to traders, trading desk directors, institutional portfolio managers, asset allocation specialists, high net worth managers, hedge fund managers, analysts, risk managers and regulators.
- **12 January 2012 - Trading Opportunities; Developments in FX and Other Assets Forum**
(Chicago) Served on the panel entitled "Winning the Speed Game While Remaining Compliant: Regulations, Markets and the Impact of HF Trading in FX and Other Asset Classes."

- **27 December 2011 - Istanbul Stock Exchange**
 (Istanbul) Presented a seminar on "Algorithmic Trading: Opportunities and Challenges" at the Istanbul Stock Exchange. The seminar focused on brokers, banks and trading firms that operate in Turkish securities and derivatives markets.
- **15 November 2011 - Commodities Webcast**
 (Global) Served on a panel that examined the evolution of trading venues and technologies for trading commodities and their derivatives. Similarities and differences among these venues and technologies according to types of commodities were addressed.
- **19,20 September 2011 - FIA/IFM Turkish Derivatives Conference**
 (Istanbul) Chaired the panel on "Evolution of Algorithmic Trading in a High-Frequency Trading World" and moderated the panel; "The Modern Era: High-Frequency and Algorithmic Trading, Direct Access, Colocation, Technology" during the Turkish Derivatives Conference held in Istanbul. The Turkish Derivatives Conference is organized jointly by Futures Industry Association and the Institute for Financial Markets, both based in Washington D.C.
- **13 September 2011 - Inside Market Data Chicago 2011 Conference**
 (Chicago) Served on the panel titled "How do exchanges evolve and keep their market data policies relevant in light of the changing market infrastructure?"
- **8 September 2011 - Mexican Derivatives Exchange**
 (Mexico City) Presented a seminar "Concurrent market simulation and emulation for testing trading algorithms"
- **15 October 2010 - International Organisation of Securities Commissions Conference**
 (Istanbul) Served as a panelist at a session on algorithmic trading at the IOSCO - International Organization of Securities Commissions conference (<http://www.iosco.org>) that was held in Istanbul on October 15, 2010.
- **14 September 2010 - Inside Market Data Chicago 2010 Conference**
 (Chicago) Served on panels titled "Creating the optimal data and trading architecture" and "The evolving marketplace: Exchanges and ECNs as agents and objects of change"
- **February – July 2010 - Algorithmic trading seminars in New York, Chicago and Istanbul**
 7, 8 July 2010, Chicago: Delivered a two-day seminar on algorithmic trading to enforcement attorneys from Commodities Futures Trading Commission (<http://www.cfdc.gov>), on July 7 & 8, 2010. The attorneys, based in Washington D.C, attended the seminar at the headquarters of National Futures Association (www.nfa.futures.org) in Chicago. The seminar was organized by the Institute for Financial Markets (<http://www.theIFM.org>) based in Washington D.C.
 28 May 2010, Istanbul: Delivered an algorithmic trading seminar at Istanbul Technical University's Teknopark.
 29 March 2010, New York: Delivered a seminar titled "Deploying High Frequency Trading Systems" at Ziff Brothers Investments, a proprietary investment firm in New York.
 23, 24 February 2010, New York & 3, 4 March 2010, Chicago: Delivered courses titled "Is Algorithmic Trading Within Your Grasp?". The course in Chicago was hosted by Katten Muchin Rosenman LLP. The course in New York City was hosted by New York Mercantile Exchange (NYMEX).

- **20 January 2010 - High frequency FX trading panel**
(New York) Led a panel titled "Key Considerations in Building a High Frequency Trading Platform" at the forum titled "FX High Frequency Trading: Opportunities Beyond

JOURNAL ARTICLES

- "Numerical Integration Using Bézier Splines," *IEEE Transactions on Computer Aided Design*, Vol 13, No 6, June 1994, pp. 737-745.
- "Application of Multi-Dimensional Bernstein Polynomials to Circuit Simulation," *International Journal of Modeling and Simulation*, Volume 12, No. 2, 1992, pp. 53-67.
- "Numerical Device Modeling for Electronic Circuit Simulation," *IEEE Transactions on Computer Aided Design*, Vol. 10, No. 3, March 1991, pp. 366-375.
- "Implicit Numerical Integration Algorithms with de Casteljau Predictors," *Communications in Applied Numerical Methods*, Vol. 7, No. 8, November 1991, pp. 613-619.
- "Static and Dynamic Numerical Device Modeling for Transient Circuit Simulation," *Journal of Computers and Electrical Engineering*, Vol. 17, No. 4, 1991, pp.267-282.
- "Computationally Simple Functional Reconstruction for Circuit Simulation," *International Journal of Computer Aided VLSI Design*, Vol. 2, No. 1, 1990, pp. 1-16.

ENGINEERING CONFERENCE PROCEEDINGS

- "On-Line Scheduling: The State of the Art and Future Directions", *Society of Manufacturing Engineers Conference on Simulation for Manufacturing Improvement*, May 12-13, 1998; elected as a "Technical Paper of SME" for "its substantial contribution the advancement of manufacturing engineering"
- "Multi-Block Techniques in Circuit Simulation", *Proceedings of the International Symposium on Computer and Information Sciences VII*, 1992, pp. 113-119
- "Bézier Formulation of Multi-Step Algorithms," *Proceedings of the 1990 IEEE International Symposium on Circuits and Systems*, pp. 2696-2700.
- "Preparing for the Future. Computer Graphics," *ACM SIGGRAPH, Computer Graphics. Vol. 23, No. 5*, pages 295-332, December 1989, pp 295-332.
- "Multi-Dimensional Bernstein Approximation and Its Application to Circuit Simulation," *Proceedings of the 7th IASTED Symposium on Simulation and Modeling*, 1989, pp. 115-118.
- "Multi-Variate Variation Diminishing Approximation," *Proceedings of the IEEE 32nd Midwest Symposium on Circuits and Systems*, 1989, pp. 459-461.
- "Numerical Electronic Device Modeling for Circuit Simulators," *Proceedings of the IEEE 32nd Midwest Symposium on Circuits and Systems*, 1989, pp. 1222-1225.
- "Numerical Integration Methods Based on Variation Diminishing Polynomial Approximation for the Solution of Algebraic Differential Equations in the Context of Circuit Simulation," *Proceedings of the IEEE 32nd Midwest Symposium on Circuits and Systems*, 1989, pp. 454-457.
- "Numerical Integration Formulas Based on Variation Diminishing Polynomials in the Context of Circuit Simulation," *Proceedings of the International Symposium on Computer and Information Sciences IV*, Vol. I, 1989, pp. 143-153
- "Table Look-Up Device Modeling for Electronic Circuit Simulation," *Proceedings of the International Symposium on Computer and Information Sciences IV*, Vol. I, 1989, pp. 255-263

- "Table Look-Up MOSFET Modeling," *Proceedings of the IEEE 30th Midwest Symposium on Circuits and Systems*, 1987, pp. 1074-1077.
- "A Technique for Voice and Data Integration over Packet Radio Channels," *Proceedings of the National Telecommunications Conference*, 1981, pp. 1046-1049

BOOK CONTRIBUTIONS

- "Implementation of Device Models in Circuit Simulators," *Progress in Computer Aided VLSI Design*, Vol. II, 1989, pp. 207-234.

GRADUATE STUDENT SUPERVISION

- Sarah Sandberg, Computer Science, M.S., Northwestern University, March 1988. Thesis title: "The Silicon Compiler in VLSI Design."
- Po Chun Chan, Computer Science, M.S., Northwestern University, April 1990. Thesis title: "Three-Dimensional Piecewise Freeform Curve Fitting Techniques for Computer Animation."
- M. Scott Erickson, Computer Science, M.S., Northwestern University, June 1990. Thesis title: "Educational Applications of Computer Animated Video Tapes."
- Kai-Wen Lo, Electrical Engineering, M.S., Northwestern University, July 1990. Thesis Title: "Globally Convergent Correctors for Circuit Simulation."
- Steven Morley, Computer Science, M.S., Northwestern University, September 1990. Thesis title: "Inbetweening Deformation Techniques for Computer Animation."
- Greg Alexopoulos, Computer Science, M.S., Northwestern University, November 1991. Thesis title: "Inbetweening Techniques with Free-Form Deformations for Computer Animation."
- Sina Balkir, Electrical Engineering, Ph.D., Northwestern University, May 1992. Dissertation title: "Multi-Block Integration Techniques in Circuit Simulation."