

Mustafa U. Torun

Ph.D. Candidate in Electrical Engineering

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Research Interests

High performance computing, data-intensive research in signal processing, multi-resolution signal analysis, statistical signal processing, pattern classification, neural networks, genetic algorithms; and their applications in quantitative finance, electronic trading, digital communications, digital imaging, and biomedical engineering.

Education

- 2008–Present **Ph.D. in Electrical Engineering**, *New Jersey Institute of Technology*, Newark, NJ.
Expected Graduation: Aug. 2012
Thesis: "High Performance Signal Processing: Theory, Design, and Applications in Finance"
Advisor: Ali N. Akansu, **Co-Advisor:** Marco Avellaneda
- 2005–2007 **M.S. in Electrical & Electronics Engineering**, *Dokuz Eylul University*, Izmir, Turkey.
Thesis: "Complexity reduction of RBF multiuser detectors for DS-CDMA in AWGN and Rayleigh fading channels using genetic algorithms"
Advisor: Damla Kuntalp
- 2001–2005 **B.S. in Electrical & Electronics Engineering**, *Dokuz Eylul University*, Izmir, Turkey.
Thesis: "Speed and distance measurement of an object in motion using stereopsis and digital image processing"
Advisor: Ahmet Ozkurt

Honors / Awards

- Tau Beta Pi, Engineering Honor Society
- GSA Special Achievement Award, NJIT, Fall 2011
- Turkish Higher Education Council, Graduate Study Abroad Scholarship, 2008
- Best Thesis Presentation Award, DEU, 2005

Experience

Academic

- 2008–Present **Researcher in Laboratory for High Performance DSP Research**, *New Jersey Institute of Technology*, Newark, NJ.
- Performing research on cutting-edge electronic trading and risk management algorithms
- 2009 **Visiting Doctoral Student**, *New York University*, New York, NY.
- An active participant of quantitative finance research group of Prof. Marco Avellaneda

- 2005–2007 **Research Assistant in Telecommunications Laboratory / Teaching Assistant, Dokuz Eylul University, Izmir, Turkey.**
- Conducted research on signal processing for wireless communications
 - Assisted teaching in several labs for undergraduate signal processing and telecommunication courses
 - Served as an expert witness in several consumer courts in proceedings related to electrical engineering
 - Participated in "Development of a system that will automatically classify different types of arrhythmia from ECG records" research project
 - Co-built/managed the departmental web, email, printer, file servers all running on Linux

Industry

- 2009–Present **Trading/Engineering Intern, NoHo Investment Group, New York, NY.**
- Developed and back-tested advanced electronic trading algorithms
 - Developed the code for core engine and the graphical user interface of the main high frequency trading platform in Java
 - Responsible for designing, maintaining, and improving the computing systems and infrastructure
 - Developed the code for algorithmic trading of large orders generated by low-frequency strategies in Java
- 2006–2007 **Researcher/Developer in a Sponsored Project, ASELSAN, Traffic Systems Department, Izmir, Turkey.**
- Participated in the development of a proprietary piezoelectric Weigh-in-Motion (WIM) system
 - Participated in field studies, analysed very large data sets with MATLAB, conducted research on state of the art WIM technologies, and trained the development team at ASELSAN upon completion of the project
- 2004 **Engineering Intern, ASELSAN, Traffic Systems Department, Izmir, Turkey.**
- Developed/coded the mid-level interface for pan, tilt, and zoom operations of Pelco brand cameras in C
- 1999 - 2005 **Web Developer, FMD Information Technologies, Izmir, Turkey.**
- Developed/maintained more than fifty commercial web sites including three e-commerce portals
 - Developed code extensively in HTML, CSS, ASP, and JavaScript; graphics in Photoshop; and animations in Flash

Publications

- In Journals
- "Toeplitz approximation to empirical correlation matrix of asset returns: A signal processing perspective," A. N. Akansu and M. U. Torun, *IEEE JSTSP*, *Accepted, to be published.*
- "Portfolio risk in multiple frequencies," M. U. Torun, A. N. Akansu, and M. Avellaneda, *IEEE Signal Processing Magazine, Special Issue on Signal Processing for Financial Applications*, Sep. 2011
- "Optimal design of phase function in generalized DFT," A. N. Akansu, H. Agirman-Tosun, and M. U. Torun, *Physical Communication, Elsevier*, Volume 3, Issue 4, Pages 255-264, Dec. 2010
- In Conference Proceedings
- "Implementation of generalized DFT on field programmable gate array," W. P. Weydig, M. U. Torun, and A. N. Akansu, *IEEE ICASSP 2012*, Kyoto, Japan, Mar. 2012 *Accepted, to be presented.*
- "On Epps effect and rebalancing of hedged portfolio in multiple frequencies," M. U. Torun and A. N. Akansu, *The Fourth International Workshop on Computational Advances in Multi-Sensor Adaptive Processing*, San Juan, Puerto Rico, Dec. 2011
- "On basic price model and volatility in multiple frequencies," M. U. Torun and A. N. Akansu, *IEEE Workshop on Statistical Signal Processing*, Nice, France, Jun. 2011

"Risk management for trading in multiple frequencies," M. U. Torun, A. N. Akansu, and M. Avellaneda, *IEEE ICASSP 2011*, Prague, Czech Republic, May 2011

"Genetic algorithm assisted radial basis function multiuser detector for DS-CDMA," M. U. Torun and D. Kuntalp, *In Proceedings of IEEE 15th Signal Processing and Communications Applications Conference*, Eskisehir, Turkey, Jun. 2007

"Classification of branch block beats using higher order spectral analysis and neural networks," M. U. Torun, Y. Isler, D. Kuntalp, and M. Kuntalp, *In Proceedings of IEEE 14th Signal Processing and Communications Applications Conference*, Antalya, Turkey, Apr. 2006

"Distance and speed measurement using stereo analysis," M. U. Torun and A. Ozkurt, *In Proceedings of IEEE 14th Signal Processing and Communications Applications Conference*, Antalya, Turkey, Apr. 2006

Other "Graduate laboratory manual for high performance digital signal processing," A. N. Akansu and M. U. Torun, *NJIT*, Newark, NJ, USA, Jan. 2012

"Graduate laboratory manual for digital signal processing with field programmable gate arrays version 3," A. N. Akansu and M. U. Torun, *NJIT*, Newark, NJ, USA, Jan. 2011

"Introduction to Macromedia Flash", M. U. Torun, *PC Magazine Turkey*, Istanbul, Turkey, Feb.-Jun. 2001

Other Professional Activities

Reviewer

- Special Issue on Signal Processing Methods in Finance and Electronic Trading, *IEEE Journal of Selected Topics in Signal Processing*, 2012
- The Fourth International Workshop on Computational Advances in Multi-Sensor Adaptive Processing, San Juan, Puerto Rico, Dec. 2011
- The 19th European Signal Processing Conference, EUSIPCO-2011, Barcelona, Spain, Aug. 2011
- IEEE ICASSP, Signal Processing Methods in Finance Applications Session, Prague, Czech Republic, May 2011

Presenter

- IEEE CAMSAP, San Juan, Puerto Rico, Dec. 2011, Oral Presentation
- NJIT GSA Research Day, Newark, New Jersey, Nov. 2011, Poster Presentation
- IEEE ICASSP, Prague, Czech Republic, May 2011, Oral Presentation
- IEEE 15th Signal Proc. and Comm. App. Conf., Turkey, Jun. 2007, Oral Presentation
- IEEE 14th Signal Proc. and Comm. App. Conf., Turkey, Jun. 2006, Oral/Poster Presentation

Attendee (Selected)

- Winning Strategies for Deploying Low-Latency Technologies, New York, NY, USA, Nov. 2011
- Mathematical Finance and Partial Differential Equations Conference, New Brunswick, NJ, Nov. 2011
- 18th Annual Workshop on Financial Engineering, New York, NY, USA, Oct. 2010
- Conference on Modelling High Frequency Data in Finance III, Hoboken, NJ, USA, Jul. 2011
- Myron Scholes, Finance and Computer Intensive Models, New York, NY, Apr. 2011
- HPC and GPU Supercomputing in Finance, Hosted by Microsoft, New York, NY, Jan. 2011
- 17th Annual Workshop on Financial Engineering, New York, NY, USA, Nov. 2010

- Conference on Modelling High Frequency Data in Finance II, Hoboken, NJ, USA, Jun. 2010
- 2nd Annual Algorithmic Trading Conference, New York, NY, USA, Feb. 2010
- High-Frequency Finance and Quantitative Strategies, New York, NY, USA, Jun. 2009
- Algorithmic Trading Conference, New York, NY, USA, Oct. 2008
- Using MATLAB to Develop and Deploy Financial Models, New York, NY, USA, May 2008

Skills

OS	Windows, Linux
Development	Java, C++, C, VB.NET, SQL, VB6, CVS, Subversion
Java Specific	Swing, Toplink Essentials, Hibernate, JDBC, UJMP, JGAP, JPPF, JFreeChart, Interactive Brokers API, QuickFIX/J
C++ Specific	POSIX Threads, QuickFIX
Scripting	MATLAB, Python
Hardware	VHDL, Quartus II
HPC	CUDA C
Web	ASP, PHP, HTML, CSS, JavaScript, ActionScript
Documentation	LaTeX, LyX, MS Office
Design	Photoshop, Flash, AutoCAD
Languages	English, Turkish (Native)

Professional Memberships

- IEEE, Institute of Electrical and Electronics Engineers
- SIAM, Society for Industrial and Applied Mathematics
- IAFE, International Association of Financial Engineers
- SQA, Society of Quantitative Analysts
- HPC & GPU Supercomputing Group of New York
- DEMUFDER, Alumni Association of Engineering Faculty of Dokuz Eylul University

Extracurricular Activities

- Volunteer MATLAB/Mathematics Tutoring, CAPE, NJIT, 2011