

Omer Tanovic
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Education

- **Massachusetts Institute of Technology** Cambridge, MA
Pursuing PhD. in Electrical Engineering and Computer Science Jan. 2019 (expected)
 - Member of the Institute for Data, Systems, and Society (IDSS), Laboratory for Information and Decision Systems (LIDS)
 - Graduate thesis: "Nonlinear Optimal Signal Processing: A Dynamical Systems Approach"
 - Advisor: Professor Alexandre Megretski.
- **University of Sarajevo** Sarajevo, Bosnia-Herzegovina
M.S. in Electrical Engineering and Computer Science June 2011
 - Focus: Automatic Control and Electronics, GPA: 10 (max. 10)
 - Graduate thesis: "Nonlinear System Identification based on Karhunen-Loeve Transform"
- **University of Sarajevo** Sarajevo, Bosnia-Herzegovina
Dipl. Ing. Diploma in Electrical Engineering and Computer Science Class 2006
 - Best student in Automatic Control and Electronics Division, class of 2006, GPA 9.76 (max. 10)
 - Graduate thesis: "Synthesis of Optimal Fuzzy Control System coupled with Neural Network based Road Type Recognition for the Purpose of Car Seat Vibration Isolation"

Experience and Employment:

Industry:

- **MERL, Wireless Communications & Signal Processing Group** Cambridge, MA
Summer Research Intern Summer 2018
- **Mitsubishi Electric Research Labs (MERL), Power & RF Group** Cambridge, MA
Summer Research Intern Summer 2016
- **Shell Global Solutions (US), Inc., AMMI Group** Houston, TX
Summer Research Intern Summer 2015
- **Schlumberger-Doll Research, Math & Modelling Group** Cambridge, MA
Summer Research Intern Summer 2014
- **Bosna-S Oil Services Company** Sarajevo, Bosnia-Herzegovina
Instrumentation and Automation Engineer (part-time position) Apr. 2010 - Apr. 2011

Academia:

- **LIDS, MIT** Cambridge, MA
Research Assistant Sept. 2011 - present
- **EECS, MIT** Cambridge, MA
Graduate Instructor (Instructor-G)
 - *Spring/Fall 2016*: Recitation Instructor, 6.003 Signals and Systems, Teacher: Prof. Alexandre Megretski

Teaching Assistant

- *Fall 2015*: 6.003 Signals and Systems, Teacher: Prof. Jae Lim.
- *Spring 2015*: 6.003 Signals and Systems, Teacher: Prof. Qing Hu.
- *Fall 2014*: 6.251 Intro to Mathematical Programming, Teacher: Prof. Asuman Ozdaglar.
- *Spring 2014*: 6.241 Dynamic Systems and Control, Teacher: Prof. Alexandre Megretski

- **Department of Electrical Engineering, University of Sarajevo** Sarajevo, B&H
Research and Teaching Assistant (full-time position) Jan. 2007 - Sept. 2011

- *Courses TAed*: Linear Algebra and Geometry, Complex Analysis, Modeling and Simulation, Automatic Control, System Identification, Principles of System Engineering, Intro to Electronic Circuits, Digital Electronics, Electronics for Communications.

- **Department of Electrical Engineering, University of Sarajevo** Sarajevo, B&H
Undergraduate Teaching Assistant June 2005 - Jan. 2007

- *Courses TAed*: Linear Algebra and Geometry, Calculus I, Calculus II, Complex Analysis.

Research and Study interests

- Nonlinear dynamical system analysis and control
- Algorithms for linearization and performance enhancement of RF circuits
- Applications of optimization in signal processing, control and systems theory
- Signal Processing/Machine learning/System identification

Awards and Honors

2018 MIT School of Engineering Graduate Student Extraordinary Teaching and Mentoring Award - An annual teaching award in MIT SoE; selectivity: 1 graduate student in the MIT School of Engineering chosen per year

2017 MIT EECS Carlton E. Tucker Teaching Award - for excellence in teaching, The top departmental teaching award; selectivity: 1 graduate student in the EECS Department chosen per year

2017 Nominated for the Goodwin Medal, the highest teaching award across all departments at MIT

2000 Bronze Medal at the 41st International Mathematical Olympiad, IMO 2000, in Taejon, South Korea, as a member of Bosnia-Herzegovina team

2007 Golden Ring of Faculty of Electrical Engineering prize (awarded every year to a graduate student with the top cumulative GPA in particular area)

2005-2006 DAAD (German Academic Exchange Service), Grant BiHSP Program Fellowship (this yearly program takes the three most research oriented and academically successful final year students from Automatic Control and Electronics Division, of School of EE, and places them in an industrial/academic internship in Germany)

2001-2007 7-time recipient of a Scholarship awarded by the Ministry of Education and Science, Canton Sarajevo (awarded every year to undergraduate students with the top GPA in current year and to high school students that have achieved extraordinary results at competitions in mathematics, physics or programming)

2000-2007 8-time recipient of a Scholarship awarded by the JP Elektroprivreda Bosne i Hercegovine (the largest utility/energy company in Bosnia-Herzegovina)

Patents

- (1) R. Ma, O. Tanovic, "Noise Mitigating Quantizer for Reducing Nonlinear Distortion in Digital Signal Transmission", U.S. Patent 10 177 776, Jan 8, 2019.
- (2) Y. Li, Z. Li, A. Megretski, V. M. Stojanovic, O. Tanovic, Y. Avniel, "Hardware-Efficient Compensator for Outphasing Power Amplifiers", U.S. Patent 9 595 920, March 14, 2017.

Projects and Studies

- (1) "EAGER: Feedback optimization of dynamic nonlinear signal processing systems", Massachusetts Institute of Technology, supported by National Science Foundation (NSF) under award number 1743938 (2017-2019)
- (2) "Asymmetrical Multilevel Outphasing", Massachusetts Institute of Technology, supported by Defense Advanced Research Projects Agency (DARPA) ELASTx program, and the US Army Research Office under award number W911NF-10-1-0088 (2011-2014)
- (3) "Research, Development and Implementation of on-line internet Laboratories, Faculty of Electrical Engineering, Sarajevo; Design and implementation project under the auspices of Ministry of Education and Science of Sarajevo Canton. Project No. 11-14-21634 (2007-2009)
- (4) "The application of HP mobile tablet PC technology in the design of interactive laboratory experiments in physical and virtual labs", Hewlett-Packard Technology for Teaching grant (2008)
- (5) "Intelligent methods for control of vehicles and vehicle components (Intelligente Verfahren zur Regelung von Fahrzeugen und Fahrzeugkomponenten)". Department for Control Techniques (Lehrstuhl fuer Regelungstechnik), Friedrich-Alexander Universitaet Erlangen-Nuremberg, Germany, via the DAAD (German Academic Exchange Service) - 2005/2006, Grant BiHSP Program run by the Friedrich-Alexander Universitaet, Erlangen-Nuremberg, Germany, in cooperation with Faculty of Electrical Engineering Sarajevo (2005-2006).

Publications

- (1) O. Tanovic and A. Megretski, "Causally Stable Approximation of Optimal Maps in Maximal Value Constrained Least-Squares Optimization", accepted for publication in *2019 European Control Conference (ECC)*, Naples, Italy, 2019.
- (2) O. Tanovic, A. Megretski, Y. Li, V. M. Stojanovic and M. Osqui, "Equivalent Baseband Models and Corresponding Digital Predistortion for Compensating Dynamic Passband Nonlinearities in Phase-Amplitude Modulation-Demodulation Schemes," in *IEEE Trans. Signal Process.*, vol 6, no. 22, pp. 5972-5987, Nov. 2018.
- (3) O. Tanovic and A. Megretski, "Real-Time Realization of a Family of Optimal Infinite-Memory Non-Causal Systems", *6th IFAC Conference on Nonlinear Model Predictive Control (NMPC)*, Madison, WI, 2018, pp. 168-173.
- (4) O. Tanovic, R. Ma, and H. Sun, "Compact Analytical Description of Digital Radio-Frequency Pulse-Width Modulated Signals," *2018 IEEE International Symposium on Circuits and Systems (ISCAS)*, Florence, Italy, 2018, pp. 1-5.
- (5) O. Tanovic and R. Ma, "Truly Aliasing-Free Digital RF-PWM Power Coding Scheme for Switched-Mode Power Amplifiers," *2018 IEEE Radio and Wireless Symposium (RWS)*, Anaheim, CA, 2018, pp. 68-71.

- (6) O. Tanovic, R. Ma, and K. H. Teo, "Simultaneous Power Encoding and Upconversion for All-Digital Transmitters Using Digital PWM," *2017 IEEE Asia Pacific Microwave Conference (APMC)*, Kuala Lumpur, Malaysia, 2017, pp. 837-840.
- (7) O. Tanovic, R. Ma, and K. H. Teo, "Optimal Delta-Sigma Modulation Based Noise Shaping for Truly Aliasing-Free Digital PWM," *2017 47th European Microwave Conference (EuMC)*, Nuremberg, Germany, 2017, pp. 731-734.
- (8) O. Tanovic, R. Ma, and K. H. Teo, "Theoretical Bounds on Time-Domain Resolution of Multilevel Carrier-Based Digital PWM Signals Used in All-Digital Transmitters," *2017 IEEE 60th International Midwest Symposium on Circuits and Systems (MWSCAS)*, Boston, MA, 2017, pp. 1146-1149.
- (9) O. Tanovic, R. Ma and K. H. Teo, "Novel baseband equivalent models of quadrature modulated all-digital transmitters," *2017 IEEE Radio and Wireless Symposium (RWS)*, Phoenix, AZ, 2017, pp. 211-214.
- (10) O. Tanovic, A. Megretski, Y. Li, V. M. Stojanovic and M. Osqui, "Discrete-time models resulting from dynamic continuous-time perturbations in phase-amplitude modulation-demodulation schemes," *2016 IEEE 55th Conference on Decision and Control (CDC)*, Las Vegas, NV, 2016, pp. 6619-6624.
- (11) O. Tanovic and A. Megretski, "Bounding the Number of Non-Zero Coefficients in Minimal Peak-to-Peak Gain Shaping Filters," *American Control Conference (ACC) 2016*, Boston, MA, 2016, pp. 6363-6368.
- (12) A. Abdagic, O. Tanovic, A. Aksamovic, and S. Huseinbegovic, "Counting traffic using optical flow algorithm on video footage of a complex crossroad," *ELMAR, 2010 Proceedings*, Zadar, 15-17 Sept. 2010, pp.41-45.
- (13) S. Huseinbegovic, S. Kreso, and O. Tanovic, "Development of a distributed elevator control system based on the microcontroller PIC 18F458," *Computational Technologies in Electrical and Electronics Engineering (SIBIRCON), 2010 IEEE Region 8 Int. Conf. on*, Listvyanka, 11-15 July 2010, pp.858-863.
- (14) S. Huseinbegovic and O. Tanovic, "Matrix converter based AC/DC rectifier," *Computational Technologies in Electrical and Electronics Engineering (SIBIRCON), 2010 IEEE Region 8 International Conference on*, Listvyanka, 11-15 July 2010, pp.653-658.
- (15) S. Huseinbegovic, S. Kreso, and O. Tanovic, "Design and implementation of the CAN based elevator control system," *Information, Communication and Automation Technologies, 2009. ICAT 2009. XXII International Symposium on*, Sarajevo, 29-31 Oct. 2009, pp.1-6.
- (16) O. Tanovic and S. Huseinbegovic, "Hybrid fuzzy-neural network structure for vehicle seat vibration isolation," *Control and Automation, 2009. ICCA 2009. IEEE International Conference on*, Christchurch, 9-11 Dec. 2009, pp.2354-2359.
- (17) S. Huseinbegovic and O. Tanovic, "Adjusting stiffness of air spring and damping of oil damper using fuzzy controller for vehicle seat vibration isolation," *Control and Communications, 2009. SIBCON 2009. International Siberian Conference on*, Tomsk, Russia, 27-28 March 2009, pp.83-92.
- (18) O. Tanovic, S. Huseinbegovic, and B. Lacevic, "Road Type Recognition Using Neural Networks for Vehicle Seat Vibration Damping," *Signal Processing and Information Technology, 2008. ISSPIT 2008. IEEE International Symposium on*, Sarajevo, 16-19 Dec. 2008, pp.320-323.
- (19) A. Salihbegovic, and O. Tanovic, "Internet based laboratories in engineering education," *Information Technology Interfaces, 2008. ITI 2008. 30th International Conference on*, Dubrovnik, 23-26 June 2008, pp.163-170.

Professional Membership and Service

- 2018-present** *Reviewer* for IEEE Access Journal.
- 2007-present** *Reviewer* for various international conferences: CDC, ACC, MWSCAS, ISSPIT, ICAT, etc.
- 2018** *Member* of the Teaching with Digital Technology Awards Judging Committee, MIT
- 2015** *Co-chair* of the 20th LIDS Student Conference, January 2015
- 2015-present** SIAM Graduate Student Member
- 2015-present** IEEE Member
- 2003-2015** IEEE Student/Graduate Student Member
- 2011-2012** *Secretary* of IEEE Bosnia-Herzegovina Section
- 2007-2011** *Chair* of IEEE Bosnia-Herzegovina Section GOLD Affinity Group
- 2005-2007** *Chair* of IEEE Student Branch Sarajevo
- 2004-2005** *Vice Chair* of IEEE Student Branch Sarajevo
- 2005-present** IEEE Robotics & Automation Society Member
- 2008-present** IEEE Control Systems Society Member
- 2010-present** IEEE Signal Processing Society Member

Community Service and Volunteer Work

- 2018-present** *Member* of the Techmart Advisory Board, MIT Division of Student Life.
- 2015-2016** Parent Resource Coordinator and the Member of Westgate Executive Committee, Westgate Family Housing Residence, MIT.
- 2012-2019** A student liaison for LIDS Seminar Series speakers, LIDS, MIT.
- 2012-2014** *Member* of the LIDS Student Social Committee, LIDS, MIT.
- 2007-2011** Faculty *Member* of the Executive Board of the "Steleks" Students Association (EECS Department Students Association, University of Sarajevo, Sarajevo, Bosnia-Herzegovina).
- 2007-2011** *Member* of the Executive Board of the IGAS (Initiative Group Alpbach in Sarajevo) NGO, Sarajevo, Bosnia-Herzegovina.
- 1998-2001** Math instructor for elementary school students at a local math club, Sarajevo, Bosnia-Herzegovina.