CURRICULUM VITAE

Alparslan "Emrah" Bayrak

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EDUCATION

2013 – 2015	PhD, Mechanical Engineering **University of Michigan (UM), Ann Arbor, MI** **Dissertation:** Topology Considerations in Hybrid Electric Vehicle Powertrain Architecture Design (Chair: Panos Y. Papalambros)
2011 – 2013	M.S.E. Mechanical Engineering **University of Michigan, Ann Arbor, MI**
2006 – 2011	B.S. Mechatronics Engineering (Major), Mathematics (Minor) **Sabanci University (SU), Istanbul, TR**

WORK EXPERIENCE

2019 –	Assistant Professor School of Systems and Enterprises **Stevens Institute of Technology (SIT), Hoboken, NJ**
2018 – 2019	Research Scientist Department of Mechanical Engineering **Carnegie Mellon University (CMU), Pittsburgh, PA**
2015 – 2018	Post-Doctoral Research Fellow/Adjunct Lecturer Department of Mechanical Engineering **University of Michigan, Ann Arbor, MI**
2010	Summer internship Corporate Manufacturing Engineering Center **TOSHIBA Corporation, Yokohama, JP**

TEACHING EXPERIENCE

Instructor

Spring 2019	Instructor for SYS501 – Probability and Statistics for Systems Engineering at SIT
Fall 2017	Co-instructor for ME455/DESCI501 – Analytical Product Design undergraduate/ graduate course at UM
Winter 2015/2016	Co-instructor for ME555/MFG555 – Design Optimization graduate course at UM

Guest Instructor

Fall 2017	Guest instructor for ISD599-02 – Systems Requirement Development & Verification graduate course at UM

Winter 2017	Guest instructor for ISD599-04 – Systems Architecting, Concept Development & Embodiment Design graduate course at UM

Teaching Assistant

Winter 2013/2014	Graduate Student Instructor for ME555/MFG555 – Design Optimization at UM
Spring 2011	Teaching Assistant for EL308 – Microcomputer Based System Design at SU
Spring 2010	Teaching Assistant for PROJ102 – Project Course at SU

RESEARCH EXPERIENCE

Publications

Journal Articles

[J10] Bayrak A. E., McComb C., Cagan J., and Kotovsky K., "A Strategic Decision-making Architecture Toward Hybrid Teams for Dynamic Competitive Problems". ASME. *Journal of Mechanical Design,* 2019 (under review).

[J9] Kang N., Bayrak A. E., Papalambros P. Y., "Robustness and Real Options for Vehicle Design and Investment Decisions under Gas Price and Regulatory Uncertainties". ASME. *Journal of Mechanical Design*, 140(10): 101404, 2018.

[J8] Li X., Bayrak A. E., Epureanu B., Koren Y., "Real-time Teaming of Multiple Reconfigurable Manufacturing Systems", *CIRP Annals – Manufacturing Technology*, 67(1): 437-440, 2018.

[J7] Bayrak A. E., Egilmez M. M., Kuang H., Li X., Park J. M., Umpfenbach E., Anderson E., Gorsich D., Hu J., Papalambros P. Y., Epureanu B., "A System-of-Systems Approach to the Strategic Feasibility of Modular Vehicle Fleets". IEEE. *Transactions on Systems Man and Cybernetics: Systems,* 2018, doi: 10.1109/TSMC.2018.2827387.

[J6] Bayrak A. E., Collopy A. X., Papalambros P. Y., Epureanu B., "Multiobjective Optimization of Modular Design Concepts for a Collection of Interacting Systems". Springer. *Structural and Multidisciplinary Optimization,* 57 (1): 83-94, 2018.

[J5] D'Souza K., Bayrak A. E., Kang N., Wang H., Altin B., Barton K., Hu J., Papalambros P. Y., Epureanu B., and Gerth R., "An Integrated Design Approach for Evaluating the Effectiveness and Cost of a Fleet". SAGE. *Journal of Defense Modeling and Simulation*, 13 (4): 381-397, 2016.

[J4] Bayrak A. E., Ren Y., and Papalambros P. Y., "Topology Generation for Hybrid Electric Vehicle Architecture Design". ASME. *Journal of Mechanical Design,* 138 (8): 081401, 2016.

[J3] Bayrak A. E., Kang N., and Papalambros P. Y., "Decomposition-Based Design Optimization of Hybrid Electric Powertrain Architectures: Simultaneous Configuration and Sizing Design". ASME. *Journal of Mechanical Design*, 138 (7): 071405, 2016.

[J2] Ren Y., Bayrak A. E., and Papalambros P. Y., "EcoRacer: Game-based Optimal Electric Vehicle Design and Driver Control Using Human Players". ASME. *Journal of Mechanical Design* 138 (6): 061407, 2016.

[J1] Ahn, K., Bayrak A. E., and Papalambros, P. Y. "Electric Vehicle Design Optimization: Integration of a High-fidelity Interior Permanent-Magnet Motor Model". IEEE. *Transactions on Vehicular Technology*, 64 (9): 3870-3877, 2015.

Book Chapters

Partially contributed to Chapter 3 and Chapter 8 in *Principles of Optimal Design: Modeling and Computation*, 3rd Edition by P. Y. Papalambros and D. J. Wilde, Cambridge University Press, 2016.

Conference Publications

[C13] Bayrak A. E., McComb C., Cagan J., and Kotovsky K., "A Differential Game Approach to Dynamic Competitive Decisions Toward Human-Computer Collaboration", *ASME 2019 International Design Engineering Technical Conferences*, Anaheim, CA, August 18-21, 2019.

[C12] Grogan P., and Bayrak A. E., "Operational and Strategic Decisions in Engineering Design Games", *ASME 2018 International Design Engineering Technical Conferences*, Quebec City, CN, August 26-27, 2018.

[C11] Mitra M., Bayrak A. E., Zucca S., and Epureanu B., "A Sensitivity Based Heuristic for Optimal Blade Arrangement in a Linear Mistuned Rotor", *ASME Turbo Expo*, Oslo, Norway, Jun 11-15 2018.

[C10] Gärtner, A. C., Ferriero, D., Bayrak, A. E., and Papalambros, P. Y., "Integrated System Design of a Modular, Autonomous, Aerial and Ground Vehicle Fleet for Disaster Relief Missions - A Case Study". *15th International Design Conference*, Dubrovnik, Croatia, May 21-24 2018.

[C9] Beernaert, T. F., Bayrak, A. E., Etman, L. F. P., and Papalambros, P. Y., "Framing the Concept of Autonomy in System Design". *15th International Design Conference*, Dubrovnik, Croatia, May 21-24 2018

[C8-J6] Bayrak A. E., Collopy A. X., Epureanu B., and Papalambros P. Y., "An Optimal Modular Design Concept Generation Method for Interacting Systems". *12th World Congress of Structural and Multidisciplinary Optimization*, Braunschweig, Germany, Jun 5-9 2017. (See journal version J6)

[C7] Egilmez M. M., Park J. M., Bayrak A. E., Epureanu B., and Papalambros P. Y., "Effects of Supply Route Characteristics on Modular Military Fleet Operations", *2016 International Conference on Production Research Regional Conference Africa, Europe and the Middle East and 4th International Conference on Quality and Innovation in Engineering and Management*, Cluj-Napoca Romania, Jul 25-30, 2016.

[C6-J9] Kang, N., Bayrak, A. E., and Papalambros, P. Y., "A Real Options Approach to Hybrid Electric Vehicle Architecture Design for Flexibility", *ASME 2016 International Design Engineering Technical Conferences*, Charlotte, NC, August 21-24, 2016. (See journal version J9)

[C5] Bayrak, A. E., Collopy, A. X., Epureanu B., and Papalambros, P. Y., "A Computational Concept Generation Method for a Modular Vehicle Fleet Design", *2016 IEEE International Systems Conference*, Orlando FL, Apr 18-21, 2016.

[C4-J3] Bayrak, A. E., Kang, N., and Papalambros, P. Y., "Decomposition Based Design Optimization of Hybrid Electric Powertrain Architectures: Simultaneous Configuration and Sizing Design", *ASME 2015 International Design Engineering Technical Conferences*, Boston, Aug 2-5, 2015. (See journal version J3)

[C3-J2] Ren Y., Bayrak A. E., and Papalambros, P. Y., "EcoRacer: Optimal Design and Control of Electric Vehicles Using Human Game Players", *ASME 2015 International Design Engineering Technical Conferences*, Boston, Aug 2-5, 2015. (See journal version J2). **Received Ford best paper award in 2015 ASME Design Automation Conference.**

[C2] Bayrak, A. E., Ren, Y. and Papalambros, P. Y., "Optimal Dual-Mode Hybrid Electric Vehicle Powertrain Architecture Design for a Variety of Loading Scenarios", *ASME 2013 International Design Engineering Technical Conferences*, Buffalo, Aug 17-20, 2014.

[C1-J4] Bayrak, A.E., Ren, Y., and Papalambros, P.Y., "Optimal Design of Hybrid-Electric Vehicle Architectures Using Auto-Generation of Feasible Driving Modes", *ASME 2013 International Design Engineering Technical Conferences*, Portland, Aug 4-7, 2013. (See journal version J4)

Select Presentations

[P6] Bayrak A.E., Egilmez M.M., Li X., Koutsellis T., Collopy A.X., Papalambros P.Y., Epureanu B., Zissimos M., Seifeldin R., and Gerth R., "Case Study: Finding the Marvel in the Haystack" Presented at *23rd University of Michigan Automotive Research Center Annual Program Review*, Ann Arbor, MI, 2017.

[P5] Bayrak A.E, Burnap A., "Analytical Target Cascading for Coordination of Large-Scale Systems Engineering Problems". Presented at *INCOSE Michigan Chapter,* Southfield, MI, 2017.

[P4] Bayrak A.E., Egilmez M.M., Kuang H., Li X., Park J.M., Hu J., Papalambros P.Y., Epureanu B., Umpfenbach E., Anderson E., and Gorsich D., "MARVEL: A Modular Vehicle Fleet Simulation Tool", Presented at *8th Ground Vehicle Systems Engineering and Technology Symposium (GVSETS)*, Novi, MI, 2015.

[P3] D'Souza, K., Yang, S., Ren, Y., Kang, N., Bayrak, A.E., Lim, I., Pratt, W., Barton, K., Hu, J., Epureanu, B., Papalambros P.Y. "Beyond Modular Vehicles: A Modeling Framework for Assessing Adaptability and Costs of a Modular Vehicle Fleet" Presented at *20th University of Michigan Automotive Research Center Annual Program Review*, Ann Arbor, MI, 2014.

[P2] Bayrak, A.E., Ren, Y., Papalambros, P.Y., "HEV Powertrain Architecture Exploration Using Bond Graphs", Presented at *LMS Americas Vehicle Conference*, Detroit, MI, 2012.

[P1] Bayrak, A.E., Sendur G.K., "Topology optimization of a patch antenna using the level-set method", *Presented at IEEE International Symposium on Antennas and Propagation and UCNS/URSI*, Toronto, ON, Canada, 2010.

RESEARCH PROJECTS

CMU Projects

2018-2019 **Agile Teams**

Development of decision-making processes for hybrid teams that best use the capabilities of both humans and machines and that can achieve enhanced performance in uncertain, dynamic, and co-evolving environments. Project funded by DARPA.

UM Projects

2015-2018 ***Vehicle Agnostic Modularity***. PI: Bogdan Epureanu, Panos Papalambros.
Quantifying the impact of modularity on ground vehicle systems for the future Marine Corps fleets considering the changes in the mission requirements. Project funded by the US Army TARDEC/Office of Naval Research and UM Automotive Research Center.

2014-2015 ***EcoRacer.*** PI: Panos Papalambros.
Using an online game to crowdsource the design and control of electric vehicle powertrain and developing heuristics from the user data to be used with an existing optimization algorithm**.** Project funded by National Science Foundation under Grant No. CMMI-1266184.

2013-2015 ***Strategic in-Theater Modularization and Commonalization of Advanced Vehicle Systems***. PI: Panos Papalambros, Bogdan Epureanu.
Exploration of modular architectures for ground vehicle systems and developing simulation environments to evaluate modular and conventional Army vehicle fleets. Project funded by the US Army TARDEC and the UM Automotive Research Center.

2011-2012 ***Alternative EV Architecture Design***. PI: Panos Papalambros
Design of the mechanical and high-voltage electrical architecture for an electric vehicle. Project funded by General Motors Corporation, R&D Center.

AWARDS

2015	Ford Best Paper Award in 2015 ASME Design Automation Conference for the paper [C3-J2].
2011	1st ranking in Mechatronics Engineering program at SU and SU Certificate of High Honor for 9 semesters.
2011	1st ranking in 20th Japanese Speech Contest (Category A) in Istanbul
2009	2nd ranking in the Nationwide Istanbul Technical University (ITU) Robot Olympics in the fire fighter robot category.
2006	SU Excellence Merit Scholarship for 5 years of undergraduate education covering full tuition, housing and stipend, awarded for 156th ranking out of approximately 1.5 million test takers in the 2006 Nationwide University Entrance Examination.

SKILLS

Language: English (Fluent), Turkish (Native), Japanese (Pre-intermediate)

Software: AMESim, COMSOL, Solidworks, Assembly, Java, Javascript, C++, C18, PIC Basic Pro, PLC Programming, MATLAB, Simulink, Visual Basic, Eagle, Cadence, PSpice, ModelSim/Xilinx.

PROFESSIONAL MEMBERSHIP & SERVICE

Membership

American Society of Mechanical Engineers (ASME). Member
Design Society. Member
Institute of Electrical and Electronics Engineers (IEEE). Member

Workshop/Session Organization

DAC Session on Design of Complex Systems at the International Design Engineering Technical Conferences, Quebec City, CN, August 2018.

DAC Special Session on Gaming Methods for Engineering Systems Design Research at the International Design Engineering Technical Conferences, Quebec City, CN, August 2018.

Games for Design Research and Education Workshop at Design Computing and Cognition Conference, Evanston, IL, June 2016.

Reviewer

ASME Journal of Mechanical Design
Design Science Journal
Design Studies
Structural and Multidisciplinary Optimization
IEEE Transactions on Vehicular Technology
IEEE Systems Journal
ASME Journal of Computational and Nonlinear Dynamics
AIAA Journal
SAGE Advances in Mechanical Engineering

International Journal of Production Economics