

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Mechanical Engineering

Gabor Orosz, assistant professor of mechanical engineering, Department of Mechanical Engineering, College of Engineering, is recommended for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Academic Degrees:

Ph.D. 2006 University of Bristol, Mechanical Engineering, Bristol, United Kingdom
M.Sc. 2002 Budapest University, Engineering Physics, Budapest, Hungary

Professional Record:

2010-present Assistant Professor, Department of Mechanical Engineering, University of Michigan
2008-2010 Post-Doctoral Fellow, Department of Mechanical Engineering, University of California, Santa Barbara, CA
2005-2008 Post-Doctoral Fellow, College of Engineering, Mathematics and Physical Sciences, University of Exeter, Exeter, United Kingdom

Summary of Evaluation:

Teaching: Professor Orosz is an effective teacher and advisor to our students. Since joining the University of Michigan, he has taught a core undergraduate course (ME360) and three graduate courses (ME540, ME542 and ME548). Professor Orosz is truly passionate about teaching and willing to try new methods to educate our students. Examples include utilizing a large tablet that allows him to make his lectures more interactive, providing his students with high-quality lecture recordings so they can review the class content later, augmenting his lectures with videos from industrial projects and everyday observations, and developing class demonstrations (with a CRLT grant) where students can see and touch the course material in action. Student letters and comments are positive, stating that he is a serious, knowledgeable and passionate teacher. He has supervised many undergraduate and M.S.E. student research projects and has graduated one Ph.D. student and is advising another five (two expected to graduate in 2017). His advisees testify that Professor Orosz is an inspiring, supportive, and helpful advisor. His mentorship is also demonstrated through the papers he has published with his students.

Research: Professor Orosz has been performing scholarly research and is building his reputation in the technical areas of nonlinear dynamics, traffic dynamics and connected vehicles. He currently has four external research grants: three from NSF (including a CAREER Award) and one from Navistar Inc., with another external grant proposal currently under review. Professor Orosz has been publishing research findings in quality refereed journals in his field—over 25 in total (many with his students) accepted/published since joining the university, with several more submitted. In addition, he has been active in presenting his research at conferences and peer institutions. External letters are positive, praising the quality, mathematical sophistication and rigor of his research.

Recent and Significant Publications:

- M. M. Gomez, M. Sadeghpour, M. R. Bennett, G. Orosz and R. M. Murray, "Stability of systems with stochastic delays and applications to genetic regulatory networks," *SIAM Journal on Applied Dynamical Systems*, 15(4):1844-1873, 2016. doi
- L. Zhang and G. Orosz, "Consensus and disturbance attenuation in multi-agent chains with nonlinear control and time delays," *International Journal of Robust and Nonlinear Control*, published online, 2016.
- W. B. Qin, M. M. Gomez and G. Orosz, "Stability and frequency response under stochastic communication delays with applications to connected cruise control design," *IEEE Transactions on Intelligent Transportation Systems*, published online, 2016.
- C. R. He, H. Maurer and G. Orosz, "Fuel consumption optimization of heavy-duty vehicles with grade, wind, traffic information," *ASME Journal of Computational and Nonlinear Dynamics*, 11(6), 061011, 2016.
- G. Orosz, "Connected cruise control: modelling, delay effects, and nonlinear behavior," *Vehicle System Dynamics*, 54(8):1147-1176, 2016.
- L. Zhang and G. Orosz, "Motif-based design of connected vehicle systems in presence of heterogeneous connectivity structures and time delays," *IEEE Transactions on Intelligent Transportation Systems*, 17(6):1638-1651, 2016.
- S. S. Avedisov and G. Orosz, "Nonlinear network modes in cyclic systems with applications to connected vehicles," *Journal of Nonlinear Science*, 25(4):1015-1049, 2015.
- G. Orosz, "Decomposition of nonlinear delayed networks around cluster states with applications to neuro-dynamics," *SIAM Journal on Applied Dynamical Systems*, 13(4):1353-1386, 2014.
- F. Wei, D. Bachrathy, G. Orosz and A. G. Ulsoy, "Spectrum design using distributed delay," *International Journal of Dynamics and Control*, 2(2):234-246, 2014.
- J. I. Ge and G. Orosz, "Dynamics of connected vehicle systems with delayed acceleration feedback," *Transportation Research Part C*, 46:46-64, 2014.

Service: Professor Orosz is a good citizen in serving the Department of Mechanical Engineering (ME). He has been a member of the ME Seminar Committee and the Undergraduate Program Committee, and has coordinated the junior faculty mentoring luncheon. Outside ME, he has served as an organizer of the Connected and Automated Vehicles Seminar Series since 2011, coordinated weekly meetings involving participants from multiple departments and UMTRI, as well as researchers from peer institutions, industry and government. He was a co-organizer of the 2012 U-M Michigan Robotics Day and is a faculty mentor for the Michigan Engineering Zone. He has co-organized symposia at many conferences, and was the co-organizer of the 12th IFAC Workshop on Time Delay Systems, and co-organizer of the Investigating Dynamics in Engineering and Applied Science Workshop. He is a co-editor of a book and a guest co-editor for the *Philosophical Transactions of the Royal Society A*.

External Reviewers:

Reviewer A: "Professor Orosz's group has been making significant contributions to the dynamics and control of connected vehicle systems. ...Gabor was the first one to challenge the traditional way of thinking about vehicle platooning. ...the work of Gabor Orosz is very important to the community, as it is anchored in the very strong foundations of control theory, and has thus revived the field of control and optimization of interconnected vehicles. ...[He]

also has achieved some intriguing results that seemed to advance a two-decade old conflict in transportation modeling... .”

Reviewer B: “Dr. Orosz’s publications appear in journals of strong reputation, and receive attention at a considerable rate. ...His contributions to each of these areas are deep and fundamental, with an original and innovative development and application of sophisticated tools of mathematical analysis and, in the case of control of vehicle networks, with emphasis on practical solutions to pressing problems. ...The level of mathematical sophistication that he brings to the table is very impressive.”

Reviewer C: “I have been particularly impressed with Gabor’s ability to incorporate realistic scenarios in the mathematical framework that he has developed, including taking into account the fact that there will be a mix of computer-controlled and human-controlled drivers in most realistic situations in the coming decades. ...he is certainly one of the leaders in this area of research and one of the few people I can think of who is attacking the problem with a level of breadth and depth that I find quite impressive.”

Reviewer D: “Prof. Orosz has a very compelling research record for his career stage, and has demonstrated that he can conceive, support, and sustain a strong, focused research program, while training graduate students and earning recognition from his community.”

Reviewer E: “Gabor Orosz is a central figure in a research community with interests in mathematical modeling with delay equations, particularly around engineering applications.”

Summary of Recommendation: Professor Orosz is a great asset to the University of Michigan. He is an effective teacher and advisor. He has built a solid research program with outstanding potential, and has been publishing high-quality journal papers. He has been a good citizen in serving Michigan and his technical community. It is with the support of the College of Engineering Executive Committee that I recommend Gabor Orosz for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.



Alec D. Gallimore, Ph.D.
Robert J. Vlasic Dean of Engineering
College of Engineering

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