

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Electrical Engineering and Computer Science

Heath F. Hofmann, associate professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering, is recommended for promotion to professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Academic Degrees:

- Ph.D. 1998 University of California, Berkeley, Electrical Engineering and Computer Science, Berkeley, CA
M.S. 1997 University of California, Berkeley, Electrical Engineering and Computer Science, Berkeley, CA
B.S. 1992 University of Texas, Electrical and Computer Engineering, Austin, TX

Professional Record:

- 2010 – present Associate Professor (with tenure), Department of Electrical Engineering and Computer Science, University of Michigan
2005 – 2009 Associate Professor (with tenure), Department of Electrical Engineering, Pennsylvania State University, PA
1999 – 2005 Assistant Professor, Department of Electrical Engineering, Pennsylvania State University, PA
1992 – 1993 Associate Design Engineer, Fluor Daniel, Sugarland, TX, USA

Summary of Evaluation:

Teaching: Professor Hofmann's arrival at the University of Michigan signaled a new beginning for the areas of electrical machines and drives, and power electronics. To maximize the opportunity for students to gain knowledge and skills in this area, Professor Hofmann created two new courses: 1) EECS418 - Power Electronics; and 2) EECS419 - Electric Machinery and Drives. Both of these courses incorporate hands-on laboratories. He was instrumental in every aspect of the development of these state-of-the-art laboratories. Professor Hofmann is nearing completion of a textbook for his course on electric machines and drives.

Professor Hofmann founded the Michigan Hybrid Racing Team where he serves as faculty advisor. He has used this as an opportunity to help and encourage students as they address multidisciplinary engineering challenges. In addition, he is frequently called upon to help other student projects, including the UM Solar Car Team and the MiTEE satellite project.

Teaching opportunities for Professor Hofmann extend beyond the traditional classroom. As part of the Ethiopia-Michigan Platform for Advancing Collaborative Engagement (EM-PACE) initiative, Professor Hofmann taught a compact version of his Electric Machines and Drives course at the Addis Ababa Institute of Technology (AAIT) in Ethiopia. He created the "Power

Up” Electrify Tech Camp, a summer camp that introduces high school students to energy conversion concepts through hands-on experiences with simple power electronic circuits, electric motors and solar cells.

Research: Professor Hofmann is a leader in electromechanical energy conversion, having made highly respected contributions in electrical machines and drives, and in energy harvesting. Both areas are multidisciplinary, involving electromechanical devices, power electronic circuits and control systems. He takes a holistic view across these fields, and in doing so has achieved performance outcomes and efficiency levels that have set new standards. Professor Hofmann has published over 40 journal papers in the field’s highest quality publications and has received two best-paper awards. He has also published over 40 refereed conference papers. Professor Hofmann has graduated 12 Ph.D. students (four at Michigan), with three more students scheduled to defend by the end of this academic year. He has an excellent track record of technology transfer, having been awarded 13 patents. He has submitted a further five invention disclosures.

With his systems-oriented approach and hardware innovation experience, Professor Hofmann has been a great colleague and vital contributor to many collaborative research programs across the College. His research complements many other members on the faculty, particularly those in the control and systems area, and he has elevated the College’s research portfolio on all-electric automobiles and ship power systems to another level.

Recent and Significant Publications:

- A. Stein and H. Hofmann. “Autonomous Wideband Piezoelectric Energy Harvesting Utilizing a Resonant Inverter,” *IEEE Transactions on Power Electronics*, DOI: 10.1109/TPEL.2016.2616301.
- Z. Wang, T. Henneron and H. Hofmann, “Space-Time Field Projection: Finite-Element Analysis Coupled Between Different Meshes and Different Time-Step Settings,” *IEEE Transactions on Magnetics*, Vol. 52, No. 3, March 2016, Article #7002004.
- F. Lu, H. Zhang, H. Hofmann and C. Mi, “A Double-Sided LCLC-Compensated Capacitive Power Transfer System for Electric Vehicle Charging,” *IEEE Transactions on Power Electronics*, Vol. 30, No. 11, Nov. 2015, pp. 6011-14.
- K. Zhou, J. Pries and H. Hofmann, “Computationally Efficient 3-D Finite-Element-Based Dynamic Thermal Models of Electric Machines,” *IEEE Transactions on Transportation Electrification*, Vol. 1, No. 2, August 2015, pp. 138–149.
- Z. Song, H. Hofmann, J. Li, X. Han and M. Ouyang, “Optimization for a hybrid energy storage system in electric vehicles using dynamic programming approach,” *Applied Energy*, Vol. 139, Feb. 2015, pp. 151-162.

Service: Professor Hofmann is actively involved in service to the technical community and the University of Michigan. He has a key leadership role in the SAE-IEEE (Institute of Electrical and Electronics Engineers) Formula Hybrid International Competition. He is an associate editor for two journals. He chairs/co-chairs two technical thrust areas within the IEEE Power Electronics Society and has held leadership roles in international conferences and workshops. Professor Hofmann is very active in reviewing books, journal papers, conference submissions

and proposals for all the major US funding bodies. He has been an undergraduate academic advisor every year since his arrival here. He is the founder and faculty advisor of the Michigan Hybrid Racing Team. Professor Hofmann is also the creator and coordinator of the “Power Up” Electrify Tech Camp for high school students.

External Reviewers:

Reviewer A: “His recent work has a rich level of rigor and represents clear leaps ahead. The paper “Computationally efficient 3D finite-element-based dynamic thermal models of electric machines. ... His scholarship and leadership are well ahead of almost all others at the same career stage. I believe his contributions easily justify promotion, and that he will continue to bring recognition and excellence to Michigan.”

Reviewer B: “Heath is a clear, thoughtful, and exciting speaker, writer, and teacher. ...Heath is a leader and mentor of exceptional caliber to students and junior faculty. ... He is a competitive and successful grant winner. ...He is a ‘star’ and I would be delighted to work with him in the future in any capacity.”

Reviewer C: “Prof. Hofmann’s service record is outstanding. ... His dedication to the profession is admirable.”

Reviewer D: “He has shown himself to be very versatile, doing work in development of new numerical methods as well as very interesting work on the use of active materials, superconductivity, innovative control, power electronics and electromagnetics. He has done excellent work in electromagnetics and in numerical analysis. He is good both on the theoretical front and in applying the best new science and technology to industrial applications.”

Reviewer E: “Two things about Prof. Hofmann’s work stand out most saliently. The first is that he tends to tackle important problems with fresh approaches. This includes new problems that have not yet been adequately addressed, and long-standing problems where he nonetheless finds ways to make important improvements. The second is that his papers are careful, rigorous, and authoritative. This combination has led to his papers becoming widely read standard references.”

Summary of Recommendation: Professor Hofmann has an excellent record in research, inspirational teaching and extensive service. It is with the support of the College of Engineering Executive Committee that I recommend Heath F. Hofmann for promotion to professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.



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

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