

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

Ehsan Afshari, 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:

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| Ph.D. | 2006 | California Institute of Technology, Electrical Engineering, Pasadena, CA |
| M.S. | 2003 | California Institute of Technology, Electrical Engineering, Pasadena, CA |
| B.S.E. | 1998 | Sharif University of Technology, Electrical Engineering, Tehran, Iran |

Professional Record:

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| 2016 – present | Associate Professor (with tenure), Department of Electrical Engineering and Computer Science, University of Michigan |
| 2012 – 2017 | Associate Professor (with tenure), Department of Electrical and Computer Engineering, Cornell University, Ithaca, NY |
| 2006 – 2012 | Assistant Professor, Department of Electrical and Computer Engineering, Cornell University, Ithaca, NY |

Summary of Evaluation:

Teaching: Professor Afshari has made significant contributions to the three most important aspects of teaching during his time at Cornell and Michigan. These include 1) formal classroom teaching of both undergraduate and graduate courses, 2) development and enhancement of graduate and undergraduate courses, and 3) mentoring of graduate and undergraduate students. In his short time at Michigan, Professor Afshari has demonstrated excellence in teaching. He has taught a key undergraduate course (EECS 413) which is a major design experience and at the core of our circuits curriculum. He has also taught a core graduate course (EECS 522). His teaching scores are extremely strong with Q1/Q2 averages of 4.66 and 4.75, respectively. He has also introduced a special topics course on mm-wave and terra-Hz circuits (EECS 598). In addition, Professor Afshari taught a wide range of graduate and undergraduate level courses at Cornell before coming to Michigan. These include a first-year, general introductory course for electrical engineers and several courses he introduced there for the first time. Student letters attest that his lectures are very clear, and he comes well prepared. It is also evident from their comments that he is approachable, friendly, and creates a good atmosphere in his class room. Professor Afshari has also shown that he is a dedicated and successful mentor of graduate student research. He has successfully graduated 13 Ph.D. students and is currently advising seven others. In addition to Ph.D. students, Professor Afshari has advised a large number of master's degree students and post-doctoral scholars.

Research: Professor Afshari's research is in the field of radio frequency circuit design, with a focus on millimeter-wave and terahertz (MMW/THz) circuits and systems. He has established himself as a prominent and leading authority in this field. He has made fundamental contributions and published influential papers on the theory and implementation of silicon based

(CMOS and BiCMOS) novel circuits and subsystems at very high MMW frequencies. He is widely recognized for development of novel approaches in circuit designs inspired by physics and realized through in-depth knowledge of circuit theory in order to achieve very high frequency performance out of the standard CMOS or BiCMOS technologies. Professor Afshari's research in this area has produced many firsts, giving him world-wide recognition and respect in his research community. Unlike many circuit designers, who simply follow the known design procedure and standard processes, Professor Afshari has spent significant effort in establishing fundamental limits for power generation at any desired frequency of operation for any given fabrication process. Then through systematic and meticulous processes he has been able to develop a design procedure for sources to achieve performances very close to the predicted best performance limits. His accomplishments have been recognized both nationally and internationally with many prestigious awards and recognitions including the NSF CAREER Award, Defense Advanced Research Projects Agency Young Faculty Award, and the IEEE Solid State Circuit Society Distinguished Lecturer. His students have also received many noteworthy awards.

Professor Afshari has an outstanding publication record. His research results have been published in top-rank scientific journals. He has published over 45 papers and letters in refereed journals. He also has over 35 refereed conference papers. In addition, he has authored a book chapter and holds nine US patents, with another one under review. The journals and conference proceedings in which Professor Afshari publishes are of high quality and selectivity.

Recent and Significant Publications:

- A. Mostajeran, A. Cathelin, E. Afshari, "A 170GHz Fully Integrated Single-Chip FMCW Imaging Radar with 3D Imaging Capability," *IEEE Journal of Solid-State Circuits*, 10/2017.
- C. Jiang, A. Cathelin, E. Afshari, "A High-Speed Efficient 220-GHz Spatial-Orthogonal ASK Transmitter in 130-nm SiGe BiCMOS," *IEEE Journal of Solid-State Circuits*, 09/2017.
- C. Jiang, A. Mostajeran, R. Han, M. Emadi, H. Sherry, A. Cathelin, E. Afshari, "A Fully-Integrated 320-GHz Coherent Imaging Transceiver in 130-nm SiGe BiCMOS," *IEEE Journal of Solid-State Circuits*, 11/2016.
- Y. Tousi, E. Afshari, "A High-Power and Scalable 2-D Phased Array for Terahertz CMOS Integrated Systems," *IEEE Journal of Solid-State Circuits*, 02/2015.
- O. Momeni, E. Afshari, "A Terahertz Broadband Traveling-Wave Frequency Multiplier on CMOS," invited to special issue of *IEEE Journal of Solid-State Circuits*, 12/2011; 46(12): pp. 2966-2976.

Service: Professor Afshari is active in service activities and demonstrates excellent academic and professional citizenship. At Michigan, he has served as an undergraduate advisor since 2017. At Cornell, he served on several committees involved in policy, searches, and admissions. Professor Afshari continues to build a very strong record of service in the Institute for Electrical and Electronic Engineers (IEEE). He has participated in many technical program committees of major conferences in his field. He also has offered nine short courses to benefit his scientific community.

External Reviewers:

Reviewer A: “Ehsan possesses important skills in leading-edge mirco/nanoelectronics research, and has helped pioneer the use of Si/SiGe microelectronics foe emerging Terahertz THz electronic systems.”

Reviewer B: “Many of his students have now become leaders in their field, and such success is the ultimate measure of the impact of a faculty member.”

Reviewer C: “Ehsan has led the charge in THz power generation. His research work, based on harmonic oscillators, voltage controlled oscillators and distributed multipliers have led to the highest power produced in a silicon chip. *This was not done once and at a single frequency, but it was done year after year after year, and at different frequencies...*Ehsan now leads in THz power generation from silicon.”

Reviewer D: “Ehsan is, in a word, terrific. He is one of a small handful of faculty in his [generation] doing strong silicon work in very high frequency design, in particular, millimeter wave (mmwave) and especially terahertz (THz) design.”

Reviewer E: “Given his outstanding research record, high standing in the technical community, and a recognized leader in the exciting field of integrated terahertz electronics, I strongly support Ehsan Afshari for the promotion to Professor in the EECS Department at the University of Michigan.”

Summary of Recommendation: Professor Afshari has an excellent record of research, teaching and service to both the IEEE and the EECS department, which speaks well to his dedication to education, the well-being of students, and his commitment to research and service. It is with the support of the College of Engineering Executive Committee that I recommend Ehsan Afshari 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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