Approved by the Regents
May 20, 2021

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

Shorya Awtar, associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering, is recommended for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Academic Degrees:

D.Sc.	2003	Massachusetts Institute of Technology, Mechanical Engineering, Cambridge, MA
M.S.	2000	Rensselaer Polytechnic Institute, Mechanical Engineering, Troy, NY
B.Tech.	1998	Indian Institute of Technology, Mechanical Engineering, Kanpur, India

Professional Record:

2013 – present	Associate Professor (with tenure), Department of Mechanical Engineering, University of Michigan
2007 – 2016	Assistant Professor, Department of Mechanical Engineering University of Michigan
2004 – 2006	Mechanical Engineer, Energy and Propulsion Technology Organization, General Electric - Global Research Center, Niskayuna, NY
2003 – 2003	Visiting Scientist, Manufacturing Engineering Laboratory, National Institute of Standards and Technology, Gaithersburg, MD

Summary of Evaluation:

Teaching: Professor Awtar has a strong record as a teacher, advisor, and mentor. He is a previous recipient of the Mechanical Engineering (ME) Achievement Award, which recognizes excellence in teaching, research and service. He teaches several courses at the graduate and undergraduate levels, including ME 350, Design and Manufacturing II. His continuous updates and enhancements to the ME design and manufacturing sequence is a key factor in keeping our department nationally competitive and highly ranked. His highly rated teaching evaluation scores for his courses are a clear indicator of his exceptional classroom leadership. Professor Awtar has an extensive advising and mentoring record, indicating his dedication to his students. He has mentored seven Ph.D. students, three of which have graduated to date, as well as several M.S. and undergraduate students on special projects. His students consistently praise his rigor, approachability, contagious passion, and deep support.

Research: Professor Awtar's research focuses on machine and mechanism design, system dynamics and controls, mechatronics, and precision engineering, and he has gained an international reputation for this work. He has published over 35 full-length archival journal articles in prominent journals, including the *ASME Journal of Dynamic Systems*, *ASME Journal of Mechanisms and Robotics*, *Journal of Laparoendoscopic & Advanced Surgical Techniques*, among others. He has over 50 refereed conference papers and summaries of abstracts. These

publications have garnered more than 2500 citations (H-index of 25 and i10-index is 47). He has 33 issued patents, and a number of pending. Professor Awtar's funding is robust, with his award of over 30 grants or contracts totaling approximately $4.3M directly supporting his lab. These include awards from the National Science Foundation, the US Department of Transportation, and the Michigan Economic Development Corporation. Professor Awtar is considered a nationally and internationally known leader in the field of flexible mechanism, machine design, and mechatronics, whose research is exceptional and impactful. Evidence of his impact on research can be found in the numerous awards he has received, which include the ASME Thomas Edison Patent Award, which is ASME's highest award for "eminent creative achievement in the form of a patented invention." He also received the ASB Goel Award for translational research in biomechanics and the ASME Leonardo da Vinci Award for "eminent achievement in the design of a product serving as an important advance in machine design."

The impact of Professor Awtar's research work in machine and mechanism design, system dynamics and controls, mechatronics, and precision engineering are groundbreaking and formative. Notably, he has established major academic contributions and real-world impact in the study of non-linear dynamics of flexible systems. His development of an articulating needle-holder for laparoscopic procedures (FlexDex) is now being utilized in surgeries around the world.

Recent and Significant Publications:

Awtar, Shorya, Alexander H. Slocum, and Edip Sevincer, "Characteristics of beam-based flexure modules," *ASME Journal of Mechanical Design* (2007): 625-639.

Awtar, Shorya, and Alexander H. Slocum, "Constraint-based design of parallel kinematic XY flexure mechanisms," *ASME Journal of Mechanical Design* (2007): 816-830.

Cui, Leqing, Chinedum Okwudire, and Shorya Awtar, "Modeling complex nonminimum phase zeros in flexure mechanisms," *Journal of Dynamic Systems, Measurement, and Control* 139.10 (2017).

Awtar, Shorya, and Dhanushkodi D. Mariappan, "Experimental measurement of the bearing characteristics of straight-line flexure mechanisms," *Precision engineering* 49 (2017): 1-14.

Parmar, Gaurav, Kira Barton, and Shorya Awtar, "Large dynamic range nanopositioning using iterative learning control," *Precision engineering* 38.1 (2014): 48-56.

Service: Professor Awtar is a productive and collaborative leader within the department, the college, and the university. He has a sustained record of quality leadership as the department's Design and Manufacturing area lead, and currently as the x50 Resources Faculty Coordinator. In 2019, he took over as the chair of the ME Honors and Awards Committee, overseeing the nomination of over 150 awards annually within and outside the University of Michigan. Professor Awtar is committed to upholding UM's mission on diversity, equity, and inclusion. His service for his scientific community includes his role as the associate editor for the *ASME Journal of Mechanical Design* and the *Journal of Dynamic Systems, Measurement and Control* and he has also taught short courses in flexure mechanisms, mechatronics, and precisions engineering for multiple professional societies. He has been actively engaged in outreach, bringing awareness and interest to the broader community through his role on the Board of Trustees of the Ann Arbor Hands-on Museum.

External Reviewers:
Reviewer A: "I continue to be impressed with Shorya's creativity with continuous contributions to the engineering profession."

Reviewer B: "Professor Awtar's research contributions and their impact are exceptional. ... Dr. Awtar has an impressive record of achievement, and he has demonstrated produced scholarship that is respected and impactful."

Reviewer C: "In my opinion, Prof. Awtar has achieved a level of distinction in research and service that is among the best of his peers, and in fact is among the best in the [sic] our design engineering research community."

Reviewer D: "His standing is among the highest. His publications are highly regarded, his technical talks are excellent and, in his field, he is recognized as one of the leading figures of [his cohort]."

Reviewer E: "While there have been numerous papers published in this field, those produced by Dr. Awtar consistently stand-out in terms of quality, scope, and novelty."

Summary of Recommendation: Professor Awtar is a dedicated and ambitious teacher and mentor, who is making ground-breaking impact with his research. It is with the support of the College of Engineering Executive Committee that I recommend Shorya Awtar for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering.

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

May 2021