Approved by the Regents
May 16, 2019

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

Kathleen H. Sienko, 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:

Ph.D.	2007	Massachusetts Institute of Technology and Harvard University, Division of Health Sciences and Technology, Medical Engineering and Bioastronautics, Cambridge, MA
M.S.	2000	Massachusetts Institute of Technology, Aeronautics and Astronautics, Cambridge, MA
B.S.	1998	University of Kentucky, Materials Engineering, Lexington, KY

Professional Record:

2014 - 2017	Co-Founder and Co-Director, Center for Socially Engaged Design (C-SED), University of Michigan
2013 – present	Associate Professor (tenure), Department of Mechanical Engineering, University of Michigan
2013 – 2015	Associate Professor (without tenure), Department of Biomedical Engineering, University of Michigan
2007 – 2013	Assistant Professor, Department of Mechanical Engineering, University of Michigan
2007 – 2013	Assistant Professor, Department of Biomedical Engineering, University of Michigan

Summary of Evaluation:
Teaching: Professor Sienko has attained teaching excellence, as recognized internally by her Thurnau Professorship Award, and externally, with her ASME Engineering Education Donald N. Zwiep Innovation in Education Award. Her groundbreaking experiential learning approach to education, which has had a significant impact on her students, has resulted in her being named the recipient of the UM Undergraduate Teaching Award and the UM Provost's Teaching Innovation Prize. She has exemplified a commitment to engineering endeavors serving the common good via her Global Health Design Initiative, which challenges students by immersing themselves in the communities they serve to develop appropriately attainable and sustainable global health solutions.

Professor Sienko's advising and mentoring has been described as "transformative" by her students. She has served as the chair or co-chair for nine Ph.D. students, five of which have graduated. She has also advised over 20 M.S. students, and numerous undergraduate students.

She is teaching, advising, and mentoring undergraduate students to a degree and depth that is unprecedented for a Mechanical Engineering faculty member. Her dedication to mentoring extends globally, beyond the university's campus. She has mentored over 50 students from mechanical engineering and biomedical engineering programs at the University of Ghana and Kwame Nkrumah University of Science and Technology, since 2011.

Research: Professor Sienko's research focuses on human balance with emphasis on balance rehabilitation through sensory augmentation and global health design. She has published over 40 full articles in prominent journals including the *International Journal of Engineering Education*, the *Journal of Applied Biomechanics*, the *ASME Journal of Medical Devices*, the *Journal of Neuroscience*, and *Gait and Posture*. Her funding sources are just as impressive as the journals she has published in and include the National Science Foundation, the National Institutes of Health, the National Collegiate Inventors and Innovators Alliance, and Intel.

Professor Sienko's multidisciplinary research efforts are centered on developing novel methodologies to create technological solutions that address pressing societal needs at the intersection of health care and engineering. Her work has also had impact in rehabilitation engineering, wearable devices, front-end design methodologies, engineering education, and human physiology and behavior. She is well-regarded internationally for her work developing wearable devices for persons experiencing balance deficits for myriad reasons including vestibular and neurological disorders. Her 'vibro-tactor' eliminates the need for a physical therapist, can be used by patients in their homes, and is the first to show the persistence of training effects after the training period ends.

Recent and Significant Publications:

K. H. Sienko, M. R. Young, E. E. Kaufmann, S. Obed, K.A. Danso, H.S. Opare-Addo, A.T. Odoi, C. A. Turpin, T.O. Konney, Z. Abebe, I. Mohedas, A. Huang-Saad, T.R. B. Johnson, "Global Health Design: Clinical Immersion, Opportunity Identification and Definition, and Design Experiences," *International Journal of Engineering Education*, 34(2(B)): 780-80, 2018.

B.C. Lee, S. Chen, K.H. Sienko, "A wearable device for real-time motion error detection and vibrotactile instructional cuing," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 19(4): 374- 381, 2011.

B.C. Lee, J. Kim, S. Chen, K.H. Sienko, "Cell phone based balance trainer," *Journal of NeuroEngineering and Rehabilitation*, 9:10. 2012.

B.C. Lee, B.J. Martin, A. Ho, K.H. Sienko, "Postural Reorganization Induced by Torso Cutaneous Covibration," *The Journal of Neuroscience*, 33(18):7870 –7876. 2013.

T. Bao, W.J. Carender, C. Kinnaird, V.J. Barone, G. Peethambaran, S.L. Whitney, M. Kabeto, R. Seidler, R.D., K.H. Sienko, "Effects of long-term balance training with vibrotactile sensory augmentation among community-dwelling healthy older adults: a randomized preliminary study," *Journal of Neuroengineering and Rehabilitation*, 15(1): 5. 2018.

I. Mohedas, S.R. Daly, K.H. Sienko, "Design Ethnography in Capstone Design: Investigating Student Use and Perceptions," *International Journal of Engineering Education*, 30(4): 888-900. 2014.

Service: Professor Sienko's commitment to service is comprehensive, visible, and extensive, and goes beyond the department, the college, and the university levels. She is currently performing leadership service on the ME Advisory Committee and has served on several other departmental committees. Her service to the college includes the Center for Socially Engaged Design (C-SED) among others, and she has served on various Provost Office committees. Her commitment to DEI is impressive, as indicated by her service as a member of the Dean's Advisory Committee for Female Faculty, and her mentoring of multiple Sarah Marian Parker Scholars, African post-doctoral fellows, and female and underrepresented minority undergraduates and graduate students. She is clearly dedicated to DEI globally, as demonstrated by the fact that more than 100 of her students (majority female) have worked in Africa identifying technology needs and more than 300 students from the U.S., Ghana, Ethiopia, and Uganda have worked under her guidance on solutions. She has made significant contributions to the scientific community with her service to the World Health Organization's (WHO) Global Forum on Medical Devices and other initiatives, the American Society of Mechanical Engineers' (ASME) Design of Medical Devices Conference Committee, and the Institute of Electrical and Electronics Engineers, to which she served as an associate editor.

External Reviewers:
Reviewer A: "Dr. Sienko's research is world renown and she has an impressive number of worldwide collaborations. ... Dr. Kathleen Sienko has superior communication, teaching and mentoring skills. ... Dr. Sienko has a stellar record of service to the profession and with industry … Dr. Kathleen Sienko is clearly an international leader in the fields of global health and socially-engaged design…"

Reviewer B: "Dr. Sienko's research is well-known and highly regarded. She is considered one of the top experts in her field ... Dr. Sienko's dedication to teaching has been recognized by many awards for education and teaching innovation. ... Dr. Sienko's service record shows clear evidence of leadership and impact globally…"

Reviewer C: "She is one of the most active and inspiring leaders [of her cohort] harnessing the promise of engineering in the service of improved health in places where is it most needed…. Dr. Sienko is one of the stars...she is also having an impact on the educational and entrepreneurial environment of the countries where she works."

Reviewer D: "Dr. Sienko's research, teaching, and outreach focus on design for global health is unique and important. ... Dr. Sienko has a truly impressive resume that displays the top scholarly activities, educational innovation, professional influence and social responsibility."

Reviewer E: "She is an excellent scientist/engineer, a teacher dedicated to training students with original ideas, and a colleague who advances the mission of her department, university and field."

Reviewer F: "…she presented a talk providing an overview of all her work on posture and gait. It was a masterpiece of thoroughness and ingenuity. She was clearly recognized as a pioneer and leader ... Professor Sienko is the best in her peer group."

Reviewer G: "Dr. Sienko has an exceptional record in establishing a vibrant and successful research and educational program in global health technologies… By any metric – funding, publications, external impact, student and faculty interest – her program has been extraordinarily successful."

Reviewer H: "An individual who…is making a difference in the world…. Kathleen literally blew us away with her global health project … Kathleen Sienko is a productive scholar who is making a major impact…"

Reviewer I: "…I consider her to be an important role model in the area I work in – viz. invention and testing of biomedical technologies. ... Prof. Sienko is one of the real pioneers of needs-centered design training in the biomedical technology space ... Prof. Sienko stands out to me as one of the top two or three faculty in the country in the area of closed loop, immersion-based design for global contexts."

Summary of Recommendation: Professor Sienko is providing excellent service and leadership to the UM and to the technical community. Her research in the area of global health design is impactful and path breaking. It is with the support of the College of Engineering Executive Committee that I recommend Kathleen H. Sienko for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Alec Gallimore

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

May 2019