

PROMOTION RECOMMENDATION

The University of Michigan
College of Engineering

Approved by the Regents

May 15, 2008

Jing Sun, associate professor of naval architecture and marine engineering, with tenure, Department of Naval Architecture and Marine Engineering, and associate professor of electrical engineering and computer science, without tenure, Department of Electrical Engineering and Computer Science, College of Engineering, is recommended for promotion to professor of naval architecture and marine engineering, with tenure, Department of Naval Architecture and Marine Engineering, and professor of electrical engineering and computer science, without tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Academic Degrees:

Ph.D.	1989	University of Southern California, Electrical Engineering, Los Angeles, CA
M.S.E.	1984	University of Science and Technology of China, Automatic Control, China
B.A.	1982	University of Science and Technology of China, Electrical Engineering, China

Professional Record:

2006-present	Associate Professor (with tenure), Department of Naval Architecture and Marine Engineering, University of Michigan
2003-2006	Associate Professor (without tenure), Department of Naval Architecture and Marine Engineering, University of Michigan
2004-present	Associate Professor (without tenure), Department of Electrical Engineering and Computer Science, University of Michigan
2001-2003	Staff Technical Specialist (Project leader), Powertrain Control Research & Advanced Engineering Department, Ford Research Laboratories
1996-2001	Senior Technical Specialist, Powertrain Control Systems Department, Ford Research Laboratories
1993-1996	Technical Specialist, Powertrain Control Systems Department, Ford Research Laboratories
1989-1993	Assistant Professor, Electrical and Computer Engineering Department, Wayne State University

Summary of Evaluation:

Teaching: Professor Sun's teaching role is extremely important to both the department and College, and she has been effective in this undertaking. Upon arrival in 2003, she undertook two separate initiatives. The first was to develop a required, three-credit undergraduate course in electrical engineering for naval architecture and marine engineering undergraduates that was introduced as NA332; the second was to undertake the revitalization of the College-wide graduate Adaptive Control course that was reintroduced as NA531. The introduction of NA332 Marine Electrical Engineering addressed a serious deficiency that had long existed in the department curriculum. Professor Sun's background as an electrical engineer and controls engineer is perfectly suited to this critical curricular role. Her contributions to graduate classroom teaching in NA531 Adaptive Control have been equally valuable to the department, where the teaching of this course has helped reestablish the marine controls research area. More generally for the College of Engineering, a strong Adaptive Controls course had long been needed. She has shown a serious concern for her teaching and has taken concrete steps to improve its effectiveness. Professor Sun's strongest teaching appears to be within her laboratory group and one-on-one work with Ph.D. student advisees. She has now attracted a large number of excellent Ph.D. students from three departments: NAME, ME, and EECS. Three have graduated in her first four years at Michigan; a total of eight students should graduate in her first six years. It is also a measure of her effective mentoring that

three of her students were awarded best paper or best presentation awards at national and international conferences.

Research: Professor Sun's research has earned her national and international acclaim. She made major theoretical contributions to the field of adaptive control in the late 80's and early 90's. Her work on robustness to model uncertainty and sampling changed the direction of the field of adaptive control. Her co-authored 1996 book entitled *Robust Adaptive Control* is considered one of the most significant books ever written in the field of control. From 1993 to 2003, Professor Sun established herself as an internationally recognized expert in the field of automotive powertrain engineering. Her work at Ford Motor Company led to 34 patents and has been implemented in Ford production vehicles worldwide. During this period, she was elected as fellow of the IEEE and was recognized with the prestigious IEEE Control System Society's 2003 Technology Award. Since joining the Department of Naval Architecture and Marine Engineering in 2003, she has developed major research programs in modeling and analysis of mobile fuel-cell systems and the control of electrical systems onboard ships, with an exceptional level of extramural funding. In addition, Professor Sun has three pending patents for work completed here at the University of Michigan under Toyota sponsorship.

Recent and Significant Publications:

Vasilis Tsouparas, Anna Stefanopoulou, and Jing Sun, "Dynamics, Optimization and Control of a Fuel Cell Based Combined Heat and Power (CHP) System," *IEEE Transactions on Control System Technology*, Vol. 15, No. 2, pp. 233-245, March, 2007.

Amey Y. Karnik, Anna Stefanopoulou, and Jing Sun, "Water equilibria and management using a two-volume model of a polymer electrolyte fuel cell," *Journal of Power Source*, Volume 164, Issue 2, pp. 590-605, 10 February 2007.

Handa Xi and Jing Sun: "High Speed Planing Hull Vessels: Control-Oriented Modeling and Feedback Stabilization," *IEEE Transactions on Ocean Engineering*, Vol. 31, No.2, pp. 421-431, April, 2006.

Jing Sun and Ilya Kolmanovsky, "Robust Reference Governor for Fuel Cell Starvation Protection," *IEEE Transactions on Control System Technology*, Vol. 13, No. 6, pp. 911-920, November, 2005.

Vasilis Trouparas, Jing Sun, and Anna Stefanopoulou, "Modeling and Dynamics of an Integrated Fuel Cell Stack and Fuel Process System with Catalytic Burner for Marine Applications," *IASME Transactions* Vol. 2, No. 1, pp. 287-293, 2004.

Jing Sun, Yong Wha Kim, and Leyi Wang, "Aftertreatment Control and Adaptation for Automotive Lean Burn Engines with HEGO Sensors," *International Journal of Signal Processing and Adaptive Control*, Vol. 18, No. 2, pp. 145-166, March 2004.

Service: Professor Sun's service record is outstanding and commensurate with her successful research record. She provides service to her profession that raises her visibility internationally. Professor Sun serves on the editorial boards of four journals and one conference. She has served on a NSF review panel four times. Professor Sun has also served on several committees of important conferences in her field, such as the American Control Conference, IEEE Conference on Decision and Control, IEEE Conference on Control Applications, International Federation of Automatic Control. Professor Sun has served on several Departmental committees, College of Engineering Committees, and two Rackham committees. In a small department such as NAME, it is imperative that all faculty members contribute to the service needs of the department. Professor Sun is active in department activities. She introduced a new Ph.D. qualifying exam in the controls area and is presently the chair of that exam committee. She has also served as chair of the department Awards Committee. At the College level, she has been a member of the College Scholastic Standing Committee and the Honors and Awards Committee. On the University level, she was a member of the Pre-Doctoral Awards Committee for Rackham.

External Reviewers:

Reviewer A: "One of the key things that I consider when evaluating promotion to Full Professor is whether the individual has fulfilled their potential and achieved the stature of being a leading figure in their field. I believe that Prof. Sun has. ... It should also be noted that she has been quite a role model and mentor for several of the younger female faculty and graduate students in the controls field. That is something that I am personally appreciative of..."

Reviewer B: "While there are a number of experts who individually understand fuel cells, naval electrical power systems, ship motions, and advanced controls, Dr. Sun is exceptional in her ability to bridge across multiple fields."

Reviewer C: "Dr Jing Sun's research work combines high level theoretical research in nonlinear systems theory and adaptation with real world application including fuel cells, power train control, engine idle speed control, and high speed planing vessels. Her research is characterized by genuine real world applicability."

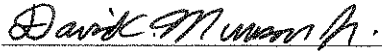
Reviewer D: "With originality and breadth, she made major contributions to virtually every area of adaptive control and then extended some of her results to other control problems."

Reviewer E: "The list of honors and awards she has received is impressive, but what impressed me even more is that at the early stage of her career she wrote jointly with Petros Ioannou the book 'Robust Adaptive Control' which became a basic reference for those researchers and students who work in adaptive control area [sic]."

Reviewer F: "Dr. Sun's technical skills are truly diverse; it is not common to find someone with her level of in-depth experience spanning the diverse topics of modeling, control, optimization and experimental validation, as applied to the complex systems and processes found in marine and automotive engineering applications."

Reviewer G: "What impresses me most from Dr. Sun's work is her ability to model complex electro-mechanical-chemical systems, and then design effective control systems for them. The fuel cell papers, in particular, demonstrate this; this ability makes her unique, as she can turn her attention to a variety of engineering problems and provide innovative solutions."

Summary of Recommendation: Professor Sun is recognized widely among the automotive, aerospace and marine industries as one of the leading experts in the country in the area of adaptive control. She has demonstrated an exceptional capacity and productivity in all areas of teaching, research and service. It is with the support of the College of Engineering Executive Committee that I recommend Jing Sun for promotion to professor of naval architecture and marine engineering, with tenure, Department of Naval Architecture and Marine Engineering, and professor of electrical engineering and computer science, without tenure, Department of Electrical Engineering and Computer Science, College of Engineering.



David C. Munson, Jr.
Robert J. Vlasic Dean of Engineering
College of Engineering

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