Approved by the Regents
May 17, 2018

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF COMPUTATIONAL MEDICINE AND BIOINFORMATICS
DEPARTMENT OF EMERGENCY MEDICINE
COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

Kayvan Najarian, Ph.D., associate professor of computational medicine and bioinformatics, with tenure, Department of Computational Medicine and Bioinformatics, associate professor of emergency medicine, without tenure, Department of Emergency Medicine, Medical School, 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 computational medicine and bioinformatics, with tenure, Department of Computational Medicine and Bioinformatics, professor of emergency medicine, without tenure, Department of Emergency Medicine, Medical School, and professor of electrical engineering and computer science, without tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Academic Degrees:

Ph.D.	2000	University of British Columbia
M.Sc.	1994	Amirkabir University of Technology
B.Sc.	1990	Sharif University of Technology, Tehran, Iran

Professional Record:

2013-present	Associate Professor of Computational Medicine and Bioinformatics, Associate Professor of Emergency Medicine, Associate Professor of Electrical Engineering and Computer Science, University of Michigan
2007-2013	Associate Professor of Computer Science, Adjunct Associate Professor of Emergency Medicine, Virginia Commonwealth University
2001-2007	Assistant Professor of Computer Science, University of North Carolina, Charlotte, NC
2000-2001	Visiting Professor, Computer Science Department, University of North Carolina, Charlotte, NC

Summary of Evaluation:

Teaching: Dr. Najarian has graduated 11 Ph.D. students as the main advisor and two as the co-advisor. He has been the advisor for three post-doctoral researchers, and many M.S. and B.S. students. At the present time, he is currently advising seven Ph.D. students. During his career, he has taught over 28 different courses at four universities, at both graduate and undergraduate levels, and designed over 12 new courses. This experience has helped him to effectively communicate

complex scientific ideas with students, postdocs and clinical researchers. At the University of Michigan, Dr. Najarian has taught in BIOINF 525 (Foundations of Bioinformatics and Systems Biology), BIOINF 580 (Biomedical Signal and Image Analysis), and is the course master for BIOINF 585 (Biomedical Signal and Image Analysis). Dr. Najarian has received glowing feedback on all of the courses he has taught since he arrived at Michigan. Going forward, we are counting on Dr. Najarian to further improve the design of the two courses he began at Michigan. These courses are focused on machine learning and signal/image processing for computer aided clinical decision support systems. He will work with other faculty in the department to revive/redesign an introductory course in the mathematical techniques for bioinformatics students as well as submit educational grants that would further support his educational activities.

Research: Dr. Najarian's main research focus has been creating computer-aided decision support systems for complex clinical problems, and in particular designing automated trauma decision support systems. Within the framework of Michigan Center for Integrative Research in Critical Care (MCIRCC), he has conducted research on clinical decision support systems within the framework of this interdisciplinary research center. He collaborates with numerous researchers in engineering, basic sciences, and life sciences as well as clinicians. His current laboratory has 25 members.

Dr. Najarian has two types of peer-reviewed publications; journal papers and conference papers. He has published 25 peer-review journal papers since arriving at Michigan. He is first author on eight and last (senior author) on 49 papers in the field of computational medicine and bioinformatics. As to his conference publications, since arriving in Michigan, he has also published 36 tier-1 conference proceeding papers, largely in the biomedical engineering, signal processing, and electrical engineering communities. Added to his conference papers prior to arriving in Michigan, he has a total of 112 peer-reviewed conference papers. Besides his peer-reviewed publications, Dr. Najarian has nine US patents issues, eight pending, and six provisional patents. He currently is very well funded from NIH, NSF, DOD, the Craig H. Neilson Foundation, Toyota Motor Company, Denso International America, Inc. and the American Heart Association. He has also had internal funding over the past several years from the FFMI Kickstart Program, the Massey Foundation and M-cubed. Dr. Najarian is the recipient of the 2016 Military Health System Research Symposium (MHSRS) team award for outstanding research accomplishment in the research category of health information technology/informatics.

Going forward, it is his plan to create a unique and comprehensive biomedical signal and image data repositories from a variety of signal monitoring and imaging sources, for applying towards a wide range of computer aided clinical applications and to develop and apply advanced computational methodologies for processing and mining of such data, which can potentially allow MCIRCC to become a national resource for both data and algorithm. He hopes to use the data and algorithms to form partnerships with internal and external collaborators, in particular industrial partners such as Toyota, Denso (several already established) and to use his research results to make invention disclosures and US/International patents, while working closely with Technology Transfer Office towards licensing of these technologies to industrial partners.

Recent and Significant Publications:

Ansari S, Ward KR, Najarian K: Epsilon-tube filtering: reduction of high-amplitude motion artifacts from impedance plethysmography signal. *IEEE Journal of Biomedical and Health Informatics* 19:406-417, 2015.

Ansari S, Belle A, Ghanbari H, Salamango M, Najarian K: Suppression of false arrhythmia alarms in the ICU: A machine learning approach. *Physiological Measurements* 37:1186-1203, 2016.

Belle A, Ansari S, Spadafore M, Convertino V, Ward KR, Derksen H, Najarian K: A signal processing approach for early detection of hemodynamic instability. *PloS ONE* 11(2), DOI: 10.1371/journal.pone.0148544, 2016.

Shandilya S, Kurz MC, Ward KR, Najarian K: Integration of attributes from non-linear characterization of cardiovascular time-series f:r prediction of defibrillation outcomes. *PLoS ONE* 11(1): e0141313, 2016.

Biwer C, Rothberg A, IglayReger H, Derksen H, Burant CF, Najarian K: Windowed persistent homology: A novel signal processing algorithm applied to analyze clinical obesity data. *PLoS ONE* 12(5): e0177696, 2017.

Service: Nationally, Dr. Najarian was a member of the program committee for the GLBIO/CCBC 2016 Conference and the 10th and 11th Great Lakes Bioinformatics Conferences. For several years, he has been a member of the Technical Committee of The IEEE International Conference on Bioinformatics and Biomedicine, a member of the program committee of IEEE Biomedical Health Informatics Workshop, a member of the Technical Committee of The IEEE Symposium on Computational Intelligence in Bioinformatics, member of the Program Committee of International Workshop on Bioinformatics Research and Applications, a member of the International Program Committee of International Congress on Cardiovascular Technologies, a member of the Program Committee of International Conference on Biomedical Engineering and a member of Technical Committee of the International Conference on Dynamical Systems and Differential Equations. He has also served on the Program Committee of the 4th FTRA International Conference on Information Technology Convergence and Services, the Program Committee of the 5th International Conference on Biomedical Engineering and Informatics and the Program Committee for the International Joint Conference on Biomedical Engineering Systems and Technologies. He is also editor-in-chief of the *Journal Biomedical Engineering and Computational Biology*, a member of the editorial board of *BMC Medical Imaging*, emergency medicine associate editor of *BMC Research Notes*, and member of editorial board of the *International Journal of Systems, Signal, Control and Engineering Application*. He has served as a reviewer for 21 well-respected journals and 22 conferences. He has served on numerous NIH study sections and NSF review panels.

Locally, in the Department of Computational Medicine and Bioinformatics, Dr. Najarian is a member of the Chairs Advisory Committee, the Bioinformatics Graduate Education Committee and our Industry Liaison and Relations. For the Michigan Center for Integrative Research in Critical Care Director of Data Sciences Program (MIRC), he is the director of the Data Science

Program and for the Medical School; he is a FFMI Faculty Champion for the Fast Forward Medical Initiative.

External Reviewers:

Reviewer A: "His accomplishments are many, especially in the realm of signal/image processing and machine learning methods to create computer assisted clinical decision support systems that improve patient care."

Reviewer B: "It is crystal clear that he is an outstanding researcher, well funded with external projects, and is productive....There are well over 30 patents from 2005 through 2017 on which he is listed as one of the inventors. These patents are relevant because it is an indicator that his research leads not only to academic papers but to techniques that can, as well, be put into commercially built instrumentation for the biomedical field."

Reviewer C: "Dr. Najarian has listed several awards and recognitions of which at least half are obtained by the students advised by Dr. Najarian, including the 2016 Military Health System Research Symposium (MHSRS) team award. The fact that he has helped his students achieve such significant recognitions only speaks to the quality and reputation of Dr. Najarian's research work."

Reviewer D: "...Dr. Najarian is a leading researcher in the application of analytics and advanced processing to the analysis of medical data."

Reviewer E: "I can safely state that from the viewpoint of securing competitive research grants Dr. Najarian deploed a truly outstanding research activity during the last decade."

Summary of Recommendation:

Dr. Najarian is an internationally known expert in signal/image processing and machine learning methods to create computer assisted clinical decision support systems. He has an excellent record of funding, service and mentoring and we, therefore, enthusiastically recommend Kayvan Najarian, Ph.D. for promotion to professor of computational medicine and bioinformatics, with tenure, Department of Computational Medicine and Bioinformatics, professor of emergency medicine, without tenure, Department of Emergency Medicine, Medical School, and professor of electrical engineering and computer science, without tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Marschall S. Runge, M.D., Ph.D.
Executive Vice President for Medical Affairs
Dean, Medical School

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