

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

Rajesh Nadakuditi, assistant professor of electrical engineering and computer science, Department of Electrical Engineering and Computer Science, College of Engineering, is recommended for promotion to associate professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Academic Degrees:

- Ph.D. 2007 Massachusetts Institute of Technology, Electrical Engineering and Oceanographic Engineering, Cambridge, MA  
S.M. 2002 Massachusetts Institute of Technology, Electrical Engineering and Computer Science, Cambridge, MA  
B.S. 1999 Lafayette College, Electrical Engineering, Easton, PA

Professional Record:

- 2009 – present Assistant Professor, Department of Electrical Engineering and Computer Science, University of Michigan  
2006 – 2009 Post-Doctoral Research Associate, Department of Mathematics and the Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA

Summary of Evaluation:

Teaching: Professor Nadakuditi has been a stimulating and inspiring teacher as can be inferred from his student letters. He has taught two undergraduate and two graduate courses since his appointment. In each course Professor Nadakuditi has shown consistent improvement in his teaching performance. Professor Nadakuditi has introduced two new courses in the department and made substantial revisions to another. These courses introduce the concepts and techniques of random matrix theory to students at multiple levels starting from senior undergraduate to the graduate students pursuing research. He also has been instrumental in introducing a seminar course (EECS 500) in the department, which exposes the graduate students to the research done by the faculty. Professor Nadakuditi is an effective student mentor, having graduated two Ph.D. students, and currently is advising another six in progress. He actively collaborates with faculty from other areas and co-advises graduate students.

Research: Professor Nadakuditi's research area lies at the interface between the theory and the application of random matrix theory. Random matrix theory was developed over 50 years ago by mathematicians interested in the behavior of very large matrices with random entries. It is only recently that random matrix theory has begun to have impact outside of mathematics, e.g., in engineering fields of wireless communications, non-destructive testing, and packet switched networks. As pointed out by several of his letter writers, he is a leading researcher at this interface

and he has made numerous significant research contributions to both the theory and the application of random matrix theory. These contributions have been published in a remarkable array of the most selective disciplinary journals in mathematics, information theory, operations research, physics, statistics, and signal processing. Furthermore, Professor Nadakuditi has been instrumental in building a broader community in random matrix theory by engaging new research collaborations across disciplines, by organizing several inter-disciplinary research workshops, and by training several Ph.D. students at this interface.

Professor Nadakuditi's research has a very high level of visibility. His research is funded by an extraordinarily broad range of sponsors including NSF, ARO, DARPA, AFOSR, and ONR. The latter three awarded him the Young Investigator Awards. His success at securing such a high level of research support is a measure of his reputation and skill at marketing his research ideas. He has been invited to speak at several top schools in the U.S. and abroad. His published work has resulted in over 1000 citations according to Google scholar. His work is cited by leading researchers in random matrix theory and its applications. It is clear that Professor Nadakuditi has become a strong and unique research leader within a broad research community.

#### Recent and Significant Publications:

- R. T. Suryaprakash and R. R. Nadakuditi, "Consistency and MSE Performance of MUSIC-based DOA of a Single Source in White Noise with Randomly Missing Data," *IEEE Transactions on Signal Processing*, To Appear 2015
- R. R. Nadakuditi, "OptShrink: An algorithm for improved low-rank signal matrix denoising by optimal data-driven singular value shrinkage," *IEEE Transactions on Information Theory*, pp. 1-17, May 2014.
- C. Jin, R. R. Nadakuditi, E. Michielssen and S. Rand, "Iterative, backscatter-analysis based algorithms for increasing transmission and focusing light through a highly scattering random medium," *Journal of the Optical Society of America A*, vol. 30, no. 8, pp. 1592-1602, July 2013.
- R. R. Nadakuditi and M. E. J. Newman, "Graph spectra and the detectability of community structure in networks," *Physical Review Letters*, 108, 188701 (2012).
- F. Benaych-Georges and R. R. Nadakuditi, "Eigenvalues and eigenvectors of finite, low rank perturbations of large random matrices," *Advances in Mathematics*, vol. 227 (1), pp. 494-521, May 2011.

Service: Professor Nadakuditi has an exceptional record of service to the EECS department and he has contributed significant service to the research community in general. He single-handedly revived the EECS 500 seminar series for first-semester graduate students (that had been dormant for over a decade). He served on several committees in the department such as faculty liaison for the Engineering Graduate Symposium, ECE Graduate Affairs Committee, Admissions Committee, and EECS Undergraduate Advising. He led a number of initiatives especially for graduate students in the department. He launched a student-run, student-organized seminar series (SPeecs) for signal processing students, and he originated the idea of fostering community between alums and current Ph.D. students by inviting the Ph.D. alumni to serve as judges in the Engineering Graduate Symposium.

Outside the university, Professor Nadakuditi made contributions to the research community by serving as a reviewer for multiple journals, as a review panel member for the NSF Graduate Research Fellowship Program, and as a member of Governing Council of the Society of the Foundations of Computational Mathematics. He also co-organized 13 conferences and workshops. He has shown his leadership in building research communities and improving the graduate student climate. He is highly involved in his committee works. His service is also clearly visible in the research community.

External Reviewers:

Reviewer A: "I consider Raj to be a singular individual, both in the breadth of his research interests and accomplishments and also in his work as a community builder."

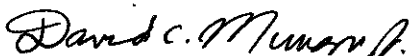
Reviewer B: "...Raj is clearly among the leaders [in his cohort] at the interface between random matrix theory and its engineering applications. Raj is both mathematically strong and able to interact and understand the challenges in various applications."

Reviewer C: "...what impresses me about Nadakuditi's work is not only its theoretical depth and mastery of that field but the very impressive array of applications that he has pursued in quite some depth."

Reviewer D: "To sum up, Dr Nadakuditi's choice of research areas is superb: strategic, long lasting, challenging and of wide applicability. His work is deep and penetrating and his results are immediately useful ... he has demonstrated his ability to mentor, to collaborate, to get grants and to contribute to the profession."

Reviewer E: "Given his track record, I am confident that he will continue to be extremely successful, and establish himself in the future as a leader in the field ... I believe the faculty would vote to tenure him at [my institution]."

Summary of Recommendation: Professor Nadakuditi has established a highly successful record of scholarly research, teaching, and service at the University of Michigan. It is with the support of the College of Engineering Executive Committee that I recommend Rajesh Nadakuditi for promotion to associate professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering of Computer Science, College of Engineering.



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

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