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

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

Academic Degrees:
Ph.D.   2007   University of California, Computer Science, San Diego
M.S.   2005   University of California, Computer Science, San Diego
B.E.   2001   Anna University, Computer Science and Engineering, Chennai, India

Professional Record:
2017 – Present   CEO and Co-founder, Sequal, Inc., Ann Arbor, MI
2015 – 2015   Consultant, Microsoft Research, Bangalore, India
2014 – Present   Associate Professor (with tenure), Department of Electrical Engineering and Computer Science, University of Michigan
2013 – 2013   Visiting Researcher, Microsoft Research, Redmond, WA
2008 – 2014   Assistant Professor, Department of Electrical Engineering and Computer Science, University of Michigan
2007 – 2007   Visiting Researcher, Microsoft Research, Redmond, WA

Summary of Evaluation:
Teaching: Professor Narayanasamy has a record of excellence in the classroom, combined with significant curricular improvement and innovation. His teaching activity spans required and elective undergraduate and graduate offerings. He has significantly improved existing courses in this portfolio and developed or co-developed several new courses at the senior undergraduate and graduate levels. Most notably, this includes co-development of a course examining hardware/software co-design of systems for processing genomic and health data. He has supervised 18 masters and undergraduate students in research activity and advised six Ph.D. students to completion (one as co-chair). Professor Narayanasamy's ratings are consistently strong in both instructor and course quality categories (above 4.0 since Fall 2012), and student letters provide a uniformly positive view of his role as an instructor and mentor.

Research: Professor Narayanasamy's research program attacks the problem of parallelism from a holistic view, incorporating languages, systems software, and architecture. He regularly publishes in the top venues in his area, and his work is well-cited (h-index of 30 according to Google Scholar). Over the past decade or two, systems have had to embrace parallel computation, but writing parallel software that is correct is notoriously difficult. In particular, the semantics of memory accesses as seen from different processors is complex. Professor Narayanasamy has shown how to construct a parallel system that provides *sequential consistency*—a model in which all processors agree on the order in which updates occur—with

extraordinarily modest overhead. This result is both unexpected and important, and viewed as seminal. Professor Narayanasamy has extended this approach to consider persistent memory, an influential and novel result. More recently, he has considered the problem of specialized architectural designs, targeted at specific application domains including genetic sequencing, which has led to a startup company for technology transfer. Professor Narayanasamy's work has received many awards and most recently received a 2019 IEEE MICRO Top Pics Award.

Recent and Significant Publications:
S. Aga, S. Narayanasamy, "InvisiPage: Oblivious Demand Paging for Secure Enclaves," *International Symposium on Computer Architecture (ISCA)*, 372-384, 2019.
S. Banerjee, D. Devecsery, P. M. Chen, S. Narayanasamy, "Iodine: Fast Dynamic Taint Tracking Using Rollback-free Optimistic Hybrid Analysis," *IEEE Symposium on Security and Privacy (S&P)*, 490-504, 2019.
A. Singh, S. Narayanasamy, D. Marino, T. Millstein, M. Musuvathi, "A Safety-First Approach to Memory Models," *IEEE Micro Special Issue: Top Picks from Computer Architecture Conferences*, 33(3): 96-104, 2013.
S. Narayanasamy, G. Pokam, B. Calder, "BugNet: Recording Application Level Execution for Deterministic Replay Debugging," *IEEE Micro Special Issue: Top Picks from Computer Architecture Conferences*, 26(1): 100-109, 2006.
D. Fujiki, A. Subramaniyan, T. Zhang, Y. Zheng, R. Das, D. Blaauw, S. Narayanasamy, "GenAx: A Genome Sequencing Accelerator," *International Symposium on Computer Architecture (ISCA),* 69-82, 2018

Service: Professor Narayanasamy has been a guiding force in both the CS community at Michigan as well as the broader community in his area of scholarship. The CSE Division has long sought to build a Programming Languages (PL) group, and with continued focus and attention; Professor Narayanasamy has helped recruit and establish an excellent nucleus of PL faculty. Externally, his sustained participation in editorial and program committee roles for top venues in his field speak to the high regard in which others hold him, as does his upcoming service as the general chair of ASPLOS in 2021. He is devoting time to the Committee on the Economic Status of the Faculty, a group examining racially- and gender-based wage gaps in the compensation structure of the university, important work for our diversity, equity, and inclusion activities.

External Reviewers:
Reviewer A: "He made seminal contributions during his tenure to end-to-end sequential consistency with award winning results."

Reviewer B: "Dr. Narayanasamy's research record is outstanding and his research contributions in the areas of Computer Architecture and Compilers are widely recognized."

Reviewer C: "His recent work on security clearly shows his ability to enter a new area and still drive new state-of-the-art techniques … One such foundational effort has also influenced our research discussions internally…"

Reviewer D: "…Satish has continued on a very impressive trajectory, making a major impact on the systems field. He is clearly a star researcher, and I enthusiastically support his promotion to the rank of full Professor with tenure without any reservations. Any top university would be proud to have Satish among their faculty."

Reviewer E: "Satish is internationally recognized as a leading researcher in inter-disciplinary approaches that span compliers, system software, and hardware, so as to obtain novel and innovative solutions to challenging problems …"

Reviewer F: "Prof. Narayanasamy has kept up a very active service profile in our community. He has been serving in the program committees of many conferences and served in NSF panels. He is Associate Editor of two visible journals, namely the IEEE Computer Architecture Letters and the ACM TOCS. Such service shows both his dedication and the fact that his technical expertise is valued by our community."

Summary of Recommendation: Professor Narayanasamy is an established leader in computer architecture and programming languages and has demonstrated that through accomplishment in teaching, research, and service. It is with the support of the College of Engineering Executive Committee that I recommend Satish Narayanasamy for promotion to professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

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

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