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

N.M. Mosharaf Kabir Chowdhury, 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.   2015   University of California, Berkeley, Electrical Engineering and Computer
                   Science, Berkeley, CA
M.S.   2009   University of Waterloo, Mathematics, Waterloo, ON, Canada
B.S.E.   2007   Bangladesh University of Engineering and Technology, Computer Science
                   and Engineering, Dhaka, Bangladesh

Professional Record:
2016 – present   Assistant Professor, Department of Electrical Engineering and Computer
                  Science, University of Michigan

Summary of Evaluation:
Teaching: Professor Chowdhury is an outstanding teacher and advisor. At the University of Michigan, he has taught EECS 489, Computer Networks; EECS 582, Advanced Operating Systems; and two special topics courses (EECS 598) on big data and AI systems, both of which he created. His complete overhaul and long-overdue update of EECS 489 enabled the course to grow and represents a major contribution to the CS curriculum. His student evaluation scores are consistently high, with no course quality or instructor quality score below 4.1 (and that for Q1 on his first offering of redesigned 489). Professor Chowdhury is an engaged mentor to his large group of nine sole-advised Ph.D. students. Three of these are on track to complete their Ph.D. in 2022, following one co-advised student who graduated this year. He has also advised 25 masters and undergraduate students in research, and counseled hundreds as part of his duties as a CS-Engineering program advisor. Many students note Professor Chowdhury's passion for teaching and express appreciation of his active engagement with students, as well as his helpfulness and general subject knowledge.

Research: Professor Chowdhury's research spans the areas of networking and distributed systems, a scope that he labels "network-informed data design." He is credited for a series of specific technical contributions to challenging problems in today's large-scale networked data systems, starting from his well-known Ph.D. work on the *coflow* abstraction which supported application-aware communication scheduling for data centers. A series of papers on his *Infiniswap* system were highly influential in spawning interest and shaping the direction of approaches to memory disaggregation in data center settings. Another category of his work contributes techniques for federated learning and analytics over massive distributed datasets.

Recently, he has focused attention on cloud systems for data science and AI, building practical resource management tools that enable co-optimization of application and network operation even with heterogeneous resource configurations (e.g., clusters with specialized processors). At a time of increasing concern about energy consumption in data centers, Professor Chowdhury is at the forefront of efforts to make these systems sustainable. His new initiatives for infrastructure that exposes software energy consumption may help move advanced computing from a contributor to the menace of climate change to becoming part of the solution. Professor Chowdhury is also regarded as highly influential and an emerging leader in the big data and cloud computing fields. His h-index is 27, including seven papers published in 2016 or later that have over 100 citations. As a faculty PI, Professor Chowdhury has attracted significant funding ($4.1M to date, his share) from governmental entities such as NSF and industry partners including Alibaba, Google, and Cisco. He regularly releases open-source software artifacts for others to build on his work, such as the aforementioned Infiniswap system. Several of these have been widely accessed and can be found throughout data centers worldwide.

Recent and Significant Publications:
F. Lai, X. Zhu, H. Madhyastha, M. Chowdhury, "Oort: Efficient Federated Learning via Guided Participant Selection," *USENIX Operating Systems Design and Implementation* (OSDI), 2021, 17 pages.
P. Yu, M. Chowdhury, "Salus: Fine-Grained GPU Sharing Primitives for Deep Learning Applications," *Machine Learning Systems* (MLSys), 2020, 14 pages.
J. Gu, M. Chowdhury, K. Shin, Y. Zhu, M. Jeon, J. Qian, H. Liu, C. Guo, "Tiresias: A GPU Cluster Manager for Distributed Deep Learning," *16th USENIX Symposium on Networked Systems Design and Implementation* (NSDI), April 2019.
J. Gu, Y. Lee, Y. Zhang, M. Chowdhury, K. Shin, "Efficient Memory Disaggregation with INFINISWAP,"*14th USENIX Symposium on Networked Systems Design and Implementation* (NSDI), March 2017, pp. 649-667.
M. Chowdhury, Y. Zhong, I. Stoica, "Efficient Coflow Scheduling with Varys," *ACM Special Interest Group on Data Communication Conference* (SIGCOMM), August 2014, pp. 443-454.

Service: Professor Chowdhury has also demonstrated excellence in service. Internally, he has served CSE on the Graduate Admissions Committee, the Undergraduate Honors and Awards Committee, and K-12 Outreach Committee. He has also served on the Seminar Committee, this year as the chair. Professor Chowdhury most relishes his work as the CS-Engineering academic advisor, as it involves face-to-face student interaction. Indeed, he excels in advising, having assisted hundreds of CSE students find their way into the computer science field. At the college level, he served on the NextProf Nexus Committee. Externally, Professor Chowdhury has organized and led multiple conference workshops, including the NSF-sponsored Next Generation Cloud Research Infrastructure workshop, which resulted in new commercial cloud priorities and protocols being identified and implemented. He also serves on numerous program and technical program committees at many top venues in his field, including USENIX and SIGCOMM. He co-chaired the Asia-Pacific Workshop on Networking (APNet) in 2018. Additionally, he regularly serves as an external reviewer for many publication venues in his field.

Reviewer A: "Mosharaf is clearly one of the bright young stars working on big data systems. He has been at the very forefront of research in this area for over a decade and has developed many novel systems aimed at improving the performance and efficiency of big data computing."

Reviewer B: "I am also impressed at how Dr. Chowdhury can connect his networking expertise, to work in diverse areas such as federated learning, GPU scheduling in assistance of deep learning systems, and cluster scheduling for deep learning jobs ... it is clear he has established himself as a leading expert in the overall space of what he aptly termed as network-informed data systems."

Reviewer C: "Mosharaf is a star in the truest sense of the word and can walk in with tenure at *any* EE/CS department in the world, and they would be lucky to have him."

Reviewer D: "Mosharaf is [sic] leader in the increasingly important area of networked systems for big-data applications, with a fantastic track-record of influential research results published at the top venues in the field."

Reviewer E: "I give my strongest support to Mosharaf's promotion. His work has a combination of deep insights and practicality that makes it highly impactful. I always keep an eye out for his papers at top conferences since I find them often among the stronger papers at these venues. Overall, I would rank him among the top few networking and systems researchers in his age group."

Summary of Recommendation: Professor Chowdhury is a leader in the field of networked systems for big-data applications and he has demonstrated leadership in teaching, research, and service. It is with the support of the College of Engineering Executive Committee that I recommend N.M. Mosharaf Kabir Chowdhury for promotion to associate 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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