



FARNAM JAHANIAN

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Farnam Jahanian is the 10th president of Carnegie Mellon University, where he holds the Henry L. Hillman President's Chair. He had served as Carnegie Mellon's provost and chief academic officer as well as vice president for research.

A nationally recognized computer scientist, entrepreneur, public servant and higher education leader, Jahanian brings extensive leadership and administrative expertise to Carnegie Mellon, and has advanced a number of key priorities at the university and in higher education more broadly. He is leading important conversations and initiatives aimed at helping higher education adapt to the future of work in the age of automation and artificial intelligence, and elevating the role of universities in expanding the footprint of U.S. innovation. He has also spearheaded efforts to enhance the overall CMU experience for students, with a focus on student success, holistic health and wellbeing, and support for a diverse and inclusive climate. From 2017 to 2021, CMU's total number of undergraduate applicants increased by approximately 60 percent. In addition, women consistently make up half of the incoming undergraduate population across the university, with enrollment two to three times the national average for women in computer science and engineering. During his tenure, the university has also undergone the largest expansion of campus infrastructure in its history, including significant renovation of education and learning spaces, a re-envisioning of the residential experience, and a new, state-of-the-art maker ecosystem. He has also expanded partnerships that advance the research mission of the university and is leading a \$2B fundraising campaign, the largest in the university's history, which launched in October 2019.

He joined CMU as vice president for research in 2014, where he was responsible for nurturing excellence in research, scholarship and creative activities. In his role as provost and chief academic officer from May 2015 to June 2017, Jahanian had broad responsibility for leading CMU's schools, colleges, institutes and campuses and was instrumental in long-range institutional and academic planning and implementation.

At CMU, Jahanian holds faculty appointments in the School of Computer Science (Computer Science), the College of Engineering (Electrical and Computer Engineering) and the H. John Heinz III College of Information Systems and Public Policy). His faculty page is available at <http://www.cs.cmu.edu/~farnam/>.

Prior to CMU, Jahanian led the National Science Foundation Directorate for the Computer and Information Science and Engineering (CISE) from 2011 to 2014. With the budget of over \$900 million, he was responsible for directing CISE programs and initiatives that support advances in research and cyber infrastructure, foster broad interdisciplinary collaborations, and contribute to the development of a computing and information technology workforce with skills essential to success in the increasingly competitive global market. He also served as co-chair of the Networking and Information Technology Research and Development (NITRD) Subcommittee of the National Science and Technology Council Committee on Technology, providing coordination and oversight of R&D activities of 17 government agencies.

Working closely with the White House Office of Science and Technology Policy, the CISE Directorate developed and led several presidential initiatives under his leadership, including the National Robotics Initiative (NRI), the National Big Data Research and Development Initiative (BIGDATA), and Cyberlearning and Future Learning Technologies. During his tenure at NSF, CISE also launched several cross-disciplinary research and education programs including Secure and Trustworthy Cyberspace (SaTC), Smart and Connected Health (SCH), Algorithms in the Field, Exploiting Parallelism and Scalability (XPS), and more than doubled the budget of Cyber Physical Systems (CPS). He played a major role in the launch of several public-private partnership

programs including US Ignite, which spurs the creation of next-generation applications and services for smart communities, and the highly successful I-Corps program in technology entrepreneurship and research commercialization.

Jahanian was on the faculty at the University of Michigan from 1993 to 2014, where he held the Edward S. Davidson Collegiate Professorship in the College of Engineering and served as Chair for Computer Science and Engineering from 2007 to 2011 and the Director of the Software Systems Laboratory from 1997 to 2000. He co-founded Arbor Networks in 2001 and served as its President and Chief Scientist until 2004. He remained as Chairman of Arbor Networks until its acquisition in 2010. Earlier in his career, he held research and management positions at the IBM T.J. Watson Research Center. Jahanian's research interests span distributed computing, network security and network protocols and architectures. His research has been sponsored by NSF, DHS, DARPA, NSA, ONR as well as companies like Cisco, Intel, Google, Boeing, VeriSign, Hitachi, Hewlett-Packard and IBM.

While at the University of Michigan, Jahanian led several large-scale research projects that studied the growth and scalability of the Internet infrastructure, which ultimately transformed how cyber threats are addressed by Internet Service Providers. In the late 1990s, his research team, including former students, Craig Labovitz and G. Robert Malan, demonstrated fundamental limitations in the core routing architecture of the Internet by uncovering the fragility of the underlying routing infrastructure. The group's seminal work on Internet routing stability and convergence has been highly influential within both the network research community and the Internet operations community. It served as a catalyst for significant changes in commercial Internet routing software implementation and impacted routing policies employed by Internet Service Providers worldwide. The centerpiece of this work was recognized with an ACM SIGCOMM Test of Time Award in 2008. Furthermore, it has inspired significant new endeavors by numerous networking researchers over the last decade.

Anticipating the emergence of increasingly complex, widely distributed cyber-attacks on IP-based networks, long before terms such as "distributed denial of service" and "zero-day worms" entered the mainstream, his research team led an effort to develop new techniques that combine network topology information and traffic flow statistics to detect, backtrack and filter DDoS attacks. Working from a granular understanding of normal network traffic flows, the anomaly detection technique invented by Jahanian's research team rapidly uncovers distributed attacks, closing a costly gap between the detection of a widely distributed attack and its resolution. This approach, without requiring any changes to the existing Internet routing infrastructure, has transformed how network security is addressed by today's Internet Service Providers.

The impact of Jahanian's contributions to Internet stability and security extends beyond the research community and into industry, as is evident in the successful commercialization of his research through Arbor Networks (www.arbor.net), which Jahanian co-founded with former UM graduate student G. Robert Malan in 2000. Over a 10-year period, Jahanian led the research, co-founded the company, launched its flagship products, and upon his return to the University of Michigan, served as Chief Scientist and Chairman of Arbor Networks setting the strategic direction until its acquisition in 2010. During a three-year leave from the University of Michigan, he led the management team of the company and raised over \$33 million in two rounds of funding from venture capital firms and strategic investors.

At Arbor Networks, Jahanian and his team developed highly scalable, service provider-class solutions for protecting networks against distributed denial of service attacks, zero-day network threats and routing exploits. These Internet security solutions have been widely implemented by hundreds of Internet Service Providers, wireless carriers, cloud service providers and numerous mission-critical networks in leading financial, retail, healthcare and government organizations in 107 countries around the globe, including AT&T, Verizon, British Telecom, Comcast, NTT, Telecom Italia, Vodafone, Internet2, Yahoo and Cisco. In 2010, 70 percent of Internet backbone transit traffic was being protected by their technology. Over the last decade, Arbor Networks' technology has been utilized by the world's leading companies to measure, monitor

and defend networks against attack, including 90% of the world's Tier 1 service providers, 8 of the 10 largest cloud service providers, 9 of the 10 largest managed security service providers, 3 of the 5 largest social media networks, 5 of the 6 largest U.S. cable broadband providers, and 4 of the top 6 U.S. banks based on assets under management. In addition, more than 50 global carriers and cloud service providers offer managed security services to their enterprise customers based on Arbor Networks products. The technology has also been used to protect Web properties for five Olympic Games and two World Cups.

The author of over 100 published research papers, Jahanian has also served on dozens of national advisory boards and panels. He served as chair of the National Research Council's Computer Science and Telecommunications Board (CSTB) from 2015 to 2021. He is a member of the board of directors for Highmark Health, the National Center for Women and Information Technology (NCWIT), and the Allegheny Conference on Community Development, among others. He also sits on the executive committee of the U.S. Council on Competitiveness and is a trustee of the Dietrich Foundation. Dr. Jahanian is active with the World Economic Forum, serving as vice chair of the Global University Leaders Forum (GULF) and as a member of the Global Network Advisory Board for WEF's Centre for the Fourth Industrial Revolution (C4IR). He also serves on C4IR's Internet of Things Council.

Jahanian has testified before Congress on a broad range of topics, including cybersecurity, next generation computing and "big data" analytics. His most recent congressional testimony was on "Reimagining our Innovation Future" before the House Committee on Science, Space and Technology in April 2021. He has been an active advocate for how basic research can be uniquely central to an innovation ecosystem that drives global competitiveness and addresses national priorities, working with entrepreneurs and lecturing on the topic.

He has received numerous awards, including a National Science Foundation CAREER Award (1995), University of Michigan College of Engineering Teaching Excellence Award (1998), Amoco Teaching Award (2000), DARPA Innovation Award (2000), EECS Outstanding Faculty Achievement Award (2005), the State of Michigan Governor's University Award for Commercialization Excellence (2005) and the ACM SIGCOMM Test of Time Award (2008 and 2021). In 2015, he received the Computing Research Association's Distinguished Service Award and in 2016, he was honored in Carnegie Corporation of New York's "Great Immigrants — The Pride of America" campaign.

Jahanian holds a master's degree and a Ph.D. in Computer Science from the University of Texas at Austin. He is a Fellow of the Association for Computing Machinery (ACM), the Institute of Electrical and Electronic Engineers (IEEE) and the American Association for the Advancement of Science (AAAS).