Quantum supremacy and its applications

Thursday, September 27, 2018
Lecture: 10:30 AM
Hackerman B-17

Scott Aaronson
David J. Bruton Centennial Professor of Computer Science
University of Texas at Austin

THE NATHAN KRASNOPOLER MEMORIAL FUND

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NATHAN KRASNOPOLER

Nathan Krasnopoler ’13, a computer science major, was severely injured in February 2011 when he was struck by a car while bicycling near the Homewood campus. Although he was wearing a helmet, Nathan suffered irreversible brain damage and passed away from his injuries in August 2011. A student of great promise and a leader in the Johns Hopkins chapter of the Association for Computing Machinery (ACM), Nathan was an active and valued member of the Johns Hopkins community. As a result of the crash and to prevent future injuries and loss of life caused by medically-impaired older drivers, Nathan's family formed Americans For Older Driver Safety, a nonprofit organization with a national focus. Since 2012, AFODS has promoted education of older drivers using research-based best practices. AFODS has created a curriculum for educating older drivers, has worked on public policy changes in Maryland, Missouri, and Kansas, and is currently developing an educational program for health care providers on medical conditions that affect driving and giving providers printed information for their patients on local mobility programs and driving evaluation programs.
Abstract: In the near future, there will likely be special-purpose quantum computers with 50-70 high-quality qubits and controllable nearest-neighbor couplings. In this talk, Dr. Aaronson will discuss general theoretical foundations for how to use such devices to demonstrate “quantum supremacy”: that is, a clear quantum speed-up for *some* task, motivated by the goal of overturning the Extended Church-Turing Thesis (which says that all physical systems can be efficiently simulated by classical computers) as confidently as possible. This part of the talk is based on his joint work with Lijie Chen, https://arxiv.org/abs/1612.05903. Then, in a second part of the talk, he’ll discuss brand-new work on how these experiments could be used to generate cryptographically certified random bits.

BIO: Scott Aaronson is the David J. Bruton Centennial Professor of Computer Science at the University of Texas at Austin. He received his bachelor’s from Cornell University and his PhD from UC Berkeley, and did postdoctoral fellowships at the Institute for Advanced Study as well as the University of Waterloo. Before coming to UT Austin, he spent nine years as a professor in Electrical Engineering and Computer Science at MIT. Aaronson’s research in theoretical computer science has focused mainly on the capabilities and limits of quantum computers. His first book, Quantum Computing Since Democritus, was published in 2013 by Cambridge University Press. He’s received the National Science Foundation’s Alan T. Waterman Award, the United States PECASE Award, the Vannevar Bush Fellowship, the Tomassoni-Chisesi Prize, and MIT’s Junior Bose Award for Excellence in Teaching.