2017 Alumni Achievement Awards

The School honored two extraordinarily accomplished alumni — A.J. Brush and Hakim Weatherspoon — during its June 9th graduation ceremony. The Allen School's Alumni Achievement Awards have two purposes: to celebrate the contributions of former students such as A.J. and Hakim, and to affirm to new graduates that they are joining a community of Allen School alumni who are changing the world.

A.J. Brush (Ph.D., '02)

Staying connected

A.J. Bernheim Brush radiates enthusiasm and energy as she describes the power of computing to transform how workers and family members collaborate online. "I have always been drawn to technology for the home and families," notes Brush. "People can immediately see how this technology makes a difference in their lives."

Currently embedded on a two-year rotation in the Cortana (in-home personal digital assistant) product group at Microsoft, Brush works on far-field speech interaction, natural language processing and user interface design. She spent the previous 11 years at Microsoft Research, investigating how technology can help people and families with everyday problems, including coordination and staying connected with their extended families.

She muses that her passion for staying connected may stem from living with her husband and two sons in Seattle, far from her parents' home in Davis, California and her husband's Kansas birthplace. Brush's mother, a college math major, programmed computers for the State of California, providing a strong role model for Brush's undergraduate work at Williams College and eventual move back west to study computing at the graduate level here at the University of Washington.

"Which of my products am I the most proud of?" Brush briefly considers the question, then promptly responds that she's "super proud" of three: LINC, her renowned Lab of Things, and an incubation product, Kids and Phones, which led to the Family Room feature on Windows phones.

Known as an expert in conducting field studies of technology, Brush developed LINC, an inkable, digital family calendar designed for the kitchen, using a participatory design process that involved interviews, paper prototyping, and a formative evaluation. She points out its inking flexibility, which lets family members draw their own icons to represent activities. One of the kids in her study, for example, drew a musical note to remind family members of his music lessons. Building in-home technology, whether to embed in furniture (e.g., EmotoCouch) or in the kitchen, has delighted her own children, notes Brush. "My family has been willing guinea pigs for all that I've built: running into the kitchen to talk to a computer," for example. The LINC project resulted in several high-profile publications, including a ToCHI journal paper and a Best Paper nomination for CHI 2006.

Lab of Things (LoT), a project Brush co-led from 2012 to 2015, offers a flexible platform for experimental research on projects ranging from home healthcare to energy management to home automation. Instead of building the costly infrastructure needed to test concepts in the home, Brush notes that the LoT platform lowers the barrier to evaluating ideas in diverse sets of homes. Users can interconnect devices, implement applications, and conduct field studies in a tightly controlled, repeatable, and transparent manner using the platform.

"We released the LoT SDK in July 2013 for non-commercial use. It has been downloaded more than 9,000 times as of July 2015." Brush continues that "educators around the world have used it for class projects," a gratifying transfer of technology that helps others further her mission of building and testing utilitarian in-home devices.

Brush's interest in cooperative work and field evaluation dates much farther back than her tenure at Microsoft to her time as one the grad students at UW CSE. Her dissertation, *Annotating Digital Documents for Asynchronous Collaboration*, focused on the role of co-author discussions anchored at a particular part of the document vs. the document as a whole.

Her advisor, Alan Borning, recalls that "this pioneering work involved a significant amount of systems building, as well as doing careful user studies of how people actually employed these systems in practice." Borning remembers Brush as "a strong HCI researcher as well as a systems builder, who brought a huge amount of positive energy to the groups .... It's been great to keep in touch with her over the years, and for her to receive this wonderfully deserved recognition."

Speaking of recognition, Brush adds the Allen School's 2017 Alumni Achievement Award to an already

impressive portfolio: Senior Member, ACM; Borg Early Career Award, 2010; 10-Year Impact Award from the ACM Interactive Surfaces and Spaces (2016); Best Paper awards in Pervasive Computing and Pervasive Health; Co-general Chair of UbiComp 2014; and member of the UbiComp Steering Committee.

As one of only 171 women in the United States to receive a Ph.D. in Computer Science in 2002, Brush pays it forward as a current board member and former co-chair of the Computing Research Association's Committee on the Status of Women in Computing (CRA-W). The organization's mission is to increase the success and participation of women in computing research and education at all levels. "It's exciting to see the industry recognize diversity," Brush observes. She has always found computing to be a "wonderful, flexible, intellectually challenging career" and has worked hard to see more women participate in it.

Winning the 2017 Alumni Achievement Award is "a great honor," says Brush. "UW CSE played a huge part in making me the researcher I am. It's very special. And I'm excited to watch the Allen School grow."

Hakim Weatherspoon (B.S., '99)

Head in the cloud; feet firmly on the ground

Don't let Hakim Weatherspoon's soft voice, humility, and reflective demeanor mislead you. Beneath these admirable qualities lies a penetrating intellect, flint-hard determination, and a clear vision of where he and the computing industry are heading.

How else would one earn a computer engineering degree with a minor in math while playing varsity Husky football in four consecutive bowl games; obtain a Ph.D. from University of California, Berkeley by writing a dissertation that was later cited by Amazon as helping to lay the groundwork for cloud storage systems; and become an associate professor in Systems and Networking at Cornell, conducting cutting-edge research on building and optimizing cloud networks, storage, and computation?

One might say that overachieving runs in the Weatherspoon family. "My family worked very hard," said Weatherspoon. "Nothing was handed to them." Weatherspoon was raised in Vancouver, Washington. His mother, a math teacher in the Portland, Oregon public school system for 35 years, and father, a scientist with the Department of Natural Resources for the State of Michigan, instilled in Weatherspoon and his six accomplished sisters and brothers a strong work ethic — one shared by his extended family, as well.

"The whole family — aunts, uncles, everyone — has returned to Michigan for a family reunion every year since 1901," he notes with pride, recounting the number of engineers and Ph.D.'s among his relatives. Such solid grounding helped Weatherspoon's career take flight.

Weatherspoon sees a natural transition from his Ph.D. work on peer-to-peer systems, to his Cornell postdoc work on data center design and performance, to his faculty work on disaggregating cloud components to decrease cost and improve latency and performance. Underpinning all his research is a common thread: "How do we store the world's information forever without losing anything?"

Weatherspoon's Berkeley dissertation, *The Design and Evaluation of Distributed Wide-Area Online Archival Storage Systems*, focused on systems that could store global data durably, verifiably, and with minimal maintenance. He and Berkeley colleagues built Antiquity, part of the OceanStore project, which created a simple storage service and interface for applications that used a secure log maintained on multiple servers to ensure data integrity.

As the industry moved from peer-to-peer systems to the increased efficiency and reliability of data centers, Weatherspoon's research migrated in step. "My research empirically measured and created new models of data center networks, allowing higher level applications to match protocols and algorithms to observed network properties." He and his colleagues found that completely wireless data centers — based on emerging radio frequency technology — exhibited substantially improved performance, power consumption and maintenance relative to conventionally wired ones.

One of Weatherspoon's most significant contributions, Supercloud, was built to allay cloud users' fears of being locked into specific vendors, such as Microsoft, Google, or Amazon. If locked in, they risked the loss of physical control over the security and integrity of their computation or data; further, should cloud providers go out of business, they would take with them access to their users' critical data.

Supercloud creates a new cloud model that is independent of the underlying physical infrastructure. "Computation and data can migrate seamlessly between non-cooperating cloud infrastructure providers, giving cloud users unprecedented levels of control and

protection," Weatherspoon explains, while providing them with the illusion of their own homogenized, private clouds.

Weatherspoon's research uniquely examines clouds from both sides: top down and bottom up. While Supercloud "unshackles the cloud" from its infrastructure, Weatherspoon also aims to optimize underlying cloud performance and efficiency. His research lies at the intersection of the networks, storage, and computation required for cloud computing and contributes to the fundamentals of distributed systems that underlie the cloud. For instance, "My research group has shown how a heavily loaded data center can maintain a continuous, remotely-located backup without performance loss."

As one might imagine, Weatherspoon has earned a number of accolades for his many contributions, including an Alfred P. Sloan Research Fellowship (2011); NSF Career Award (2011); and Kavli Fellowship, National Academy of Sciences (2014). He is also Vice President of the USENIX Board of Directors (2016-2017) and Founder and General Chair for ACM SIGOPS/SIGMOD Symposium on Cloud Computing (2017).

Weatherspoon has earned for his diversity work, as well, including Cornell's prestigious Zellman Warhaft Commitment to Diversity Award (2014). Each year since 2011, his SoNIC Summer Research Workshop prepares groups of 15–25 students from underrepresented groups to pursue a Ph.D. in computer science, with encouraging results.

Weatherspoon thinks back fondly on his years at UW for many reasons. He met his wife of 17 years, Makda, with whom he has three children, at the University's Minority Science and Engineering Program (MSEP). Further, "UW's strong undergraduate program inspired me to pursue my graduate work. Now as faculty, I can drive my ideas to the next level. I'm honored and humbled to receive the Allen School's 2017 Alumni Achievement Award."

Ed Lazowska, department chair during Weatherspoon's four years at CSE, sings his praises: "Hakim sets extraordinary goals for himself, and he achieves those goals. I have complete and utter confidence in Hakim to achieve what he sets out to do. He is a striver. He is a leader. He succeeds, and he excels."

Most Significant Bits

Newsletter of the Paul G. Allen School of Computer Science & Engineering
University of Washington

Volume 27, Number 1, Summer 2017