

BROADER IMPACTS

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My contributions and plans related to broader impacts fall under the categories of involvement in initiatives related to diversity and inclusion, ongoing and planned industry engagements, and plans to transform organizational practices with the developments in the Internet of Things.

Diversity and Inclusion Initiatives

I actively promote diversity and inclusion in my research group and within the broader scientific and technical communities, contributing to and leading multiple related initiatives. **Aspects of my contributions to diversity have been recognized with a Google Anita Borg USA Fellowship**, which is awarded yearly to only 25 students across all levels of studies and across all computing-related disciplines nation-wide, based on academic performance, leadership, and **impact on the community of women in technology**.

I am contributing to and leading initiatives that create strong wide-reaching support networks between the members of under-represented groups. For instance, I was an invited participant in the **MIT Rising Stars in EECS** event that created a network of top graduate and post-doctoral women in Electrical Engineering and Computer Science. I also participated in the Google Graduate Researchers of Diverse Backgrounds CS Forum, which brought together graduate students of diverse backgrounds from different parts of United States and Canada. I am also currently serving on the board of the field-specific Networking Networking Women (N² Women) organization that develops and strengthens the community of female researchers in communications and computer networking.

Near-term I will lead the development of networks between the members of under-represented groups who work in my core research areas, Internet of Things and fog and edge computing. Over the last three years I have been chairing the Internet of Things track of the ABI Grace Hopper Celebration of Women in Computing, which is attended by over 15,000 female students and professionals (**the Internet of Things track I chair is attended by more than 5,000 women**). I will leverage the diverse global network of female professionals that I have formed via chairing this track, as well as via my other activities, to form and grow a community that will involve faculty, students, and leaders of the industry. Longer-term I will also actively contribute to and lead the development of programs that help economically disadvantaged students and students with non-technical backgrounds retraining for careers in technology, many of whom belong to under-represented groups.

Industry Engagements

I am involved in a wide range of industry-related initiatives. For example, I have been serving as an Innovation Award Judge for the prestigious Consumer Electronics Show (CES) Innovation Awards. I am also currently managing Princeton University EDGE Lab engagements with Comcast Corporation, BAE Systems, and LGS Innovations, and have previously advised two startups developing IoT technology related to smart fitness and wellness. Further developing and strengthening ties to industry and working across the industry-academia divide are important elements of my near-term and long-term research agenda.

Over the last year at Princeton University I have been working on enabling technology transfer to industry via the Princeton University EDGE Lab engagement with the OpenFog Consortium that accelerates the development of fog computing architectures. The OpenFog Consortium, which Princeton EDGE Lab co-founded, includes over 50 leading industrial members, such as Intel, CISCO, Microsoft, ARM, Dell, Hitachi, Schneider Electric, Fujitsu, and Foxconn. As the 2016-2017 Co-chair of the OpenFog Consortium Communications Working Group (**elected position**), I contributed to the recently published OpenFog reference architecture [1], and led the development of OpenFog communications and networking APIs. The reference architecture we released is **expected to be adopted as a new IEEE standard** by April 2018 via the efforts of the newly formed IEEE Standards Working Group P1934 on Fog Computing and Networking Architecture Framework, on which I serve as a Princeton University EDGE Lab representative. I also co-led the development of a framework outlining edge and fog computing support for autonomous driving [2], and contributed to 5+ educational events organized by the OpenFog Consortium, including

the New York City IoT Central OpenFog Meetup, OpenFog Forum Atlanta, OpenFog Forum Denver, and the IEEE Fog World Congress.

Near-term I expect this ongoing work to lead to multiple additional educational whitepapers that further integrate academic and industry viewpoints in the emerging areas of edge and fog computing. Longer-term this work will result in the development of multiple avenues for transferring research insights to industry-standard architectures, pioneering technology deployments, and exciting technology commercialization opportunities.

Organizational Practice Transformation with the IoT

I am interested in modeling, measuring, and ultimately improving organizational practices via the developments in cutting-edge multi-modal IoT technology – the work that I intend to carry out in collaboration with researchers, educators, and practitioners in the fields of economics, business management, and organizational analysis and design.

Over several years that I have spent in industry, at D. E. Shaw Research and at IBM, I was in a unique position to observe the decision-making and the day-to-day practices of large organizations as seen from a central cross-departmental office, the Office of the Head of Engineering at D. E. Shaw Research and the Office of the Chief Economist at IBM. At IBM I carried out high-priority multinational sales oversight improvement projects with contributors from a broad range of technical and non-technical teams: IBM Research, analytics, IT, legal, software sales, hardware sales, and offshore sales support. My IBM projects were deployed in multiple countries worldwide, and have directly contributed to multimillion dollar savings for IBM. At D. E. Shaw Research I orchestrated the design and development of a new generation of custom supercomputers. This effort involved 40+ contributors from 8+ in-house technical teams in areas ranging from ASIC development to supercomputer mechanicals, and to firmware and embedded software. It also involved several non-technical in-house teams (such as business development and datacenter operations) and dozens of external parties. My work at D. E. Shaw Research laid the foundation for 5+ year development plans for 100+ million dollar sets of custom supercomputing systems. This hands-on work and the associated formal training in strategy consulting, product management, and project management made me realize the need for quantitative in-context understanding of *human interactions* (as opposed to tracking physiological states of individuals, as provided by existing IoT systems), and the potential of such understanding to transform core organizational practices and approaches that are currently largely based on practitioners' intuition.

Near-term I will focus on developing multi-modal IoT technologies that can be used to inform studies of organizational and group dynamics, and on initiating collaborations with researchers in these areas. Longer-term this work will result in new IoT-based instrumentation for researchers who study organizational practices, and will lead to transforming these scientific fields via IoT-based quantitative insights and large-scale measurement studies, ultimately improving day-to-day organizational practices throughout multiple industries.

[1] “OpenFog Reference Architecture”, www.openfogconsortium.org/ra/, Feb. 2017.

[2] H. Moustafa, **M. Gorlatova**, C. Byers, E. Schooler, K. Walcott, J. Acharya, A. Mosenia, B. Murthy, C. Vasters, S. Kambhatla, “OpenFog Consortium Fog Use Case Scenarios: Autonomous Driving”, www.openfogconsortium.org/new-use-cases/, Oct. 2017.