

Balancing Behavioral Privacy and Information Utility in Pervasive Sensing

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ABSTRACT

Sensors of diverse capabilities and modalities, carried by us or deeply embedded in the physical world, have invaded our personal, social, work, and urban spaces. A big enabler have been mobile phones that we always carry and which have diverse sensors embedded in them or wirelessly connected to them. Our relationship with these sensors is a complicated one. On the one hand, these sensors collect rich data that are shared and disseminated, often initiated by us, with a broad array of service providers, interest groups, friends, and family. Embedded in this data is information that can be used to algorithmically construct a virtual biography of our activities, revealing intimate behaviors and lifestyle patterns. On the other hand, we increasingly depend directly and indirectly on information originating from these sensors for making a variety of decisions, both routine and critical, in our lives. The quality of these decisions and our confidence in them depend directly on the quality of the sensory information and our trust in the sources.

Drawing upon examples of this two-faceted relationship with sensors from our work in applications such as mobile health and sustainable buildings, this talk will discuss the challenges inherent in designing a sensor information flow and processing architecture that is sensitive to the concerns of both producers and consumers. For the pervasive sensing infrastructure to be trusted by both, it must support a privacy-utility trade-off that balances the tension between risk of information sharing to the producer and the value of information sharing to the consumer.

The talk will describe an approach to enabling this trade-off based on interpreting privacy and utility in terms of inferences that are allowed or prohibited, and supported by mechanisms for controlled transformation of the quality of information via selective obfuscation driven by statistical models of individual behaviors, and robust fusion of information of uncertain quality and obfuscation from sensors of varied trustworthiness. The design of a context-aware privacy-preserving sensing stack for Android-based mobile phones will also be presented.

BIOGRAPHY



Mani Srivastava is on the faculty at UCLA where he is a Professor in the Electrical Engineering Department, and is also affiliated with the Computer Science Department. Prior to joining UCLA in 1992, he received his PhD from UC Berkeley in 1992, and worked at Bell Labs Research for a few years. He is a Fellow of the IEEE, and has previously served as the Editor-in-Chief of the IEEE

Transactions on Mobile Computing. His research interests are in embedded wireless systems, power-aware systems, wireless networks, and pervasive sensing. More details can be found on the website of UCLA's Networked and Embedded Systems Laboratory (<http://nesl.ee.ucla.edu>).