From smartphones to wearable fitness trackers to in-car navigation systems, pervasive computing is becoming part of everyday life. Such systems have a great amount of potential benefit. They will help us and society in terms of sustainability, healthcare, transportation, and more. These systems need to work reliably, helping authorized users understand what’s happening with their data and provide them with adequate user controls. It must be easy for authorized users to access data and use services. However, it also needs to be extremely difficult for unauthorized users with bad intentions to do the same.

This special issue offers four articles that help us take a step forward. The first article, “Engineering Gesture-Based Authentication Systems,” looks at the design space for using gestures (both 2D and 3D) as a way to log in to systems. The authors, Gradeigh D. Clark and Janne Lindqvist, map out several dimensions for consideration and also discuss tradeoffs in terms of reliability, usability, and security.

The second article, “Social Access vs. Privacy in Wearable Computing: A Case Study of Autism,” looks at how Google Glass might be used as a social prosthesis to help individuals with high-functioning autism. The authors, Reuben Kirkham and Chris Greenhalgh, use this prosthesis as a lens for discussing tensions that arise when there are conflicting goals and priorities. The right of these individuals to have support for their disability might be seen as conflicting with other people’s right to privacy.

The third article, “Context-Adaptive Privacy: Leveraging Context Awareness to Support Privacy Decision Making,” looks at how sensing capabilities can be used to promote the application of contextually appropriate privacy preferences. In other words, instead of sensing being diametrically opposed to privacy, what if it could be used to improve privacy? The authors, Florian Schaub, Bastian Könings, and Michael Weber, present several prototypes. Examples include blocking the display of photos or a
personal calendar when certain people are in the room.

The final article, “Security and Privacy Implications of Pervasive Memory Augmentation,” is by Nigel Davies, Adrian Friday, Sarah Clinch, Corina Sas, Marc Langheinrich, Geoff Ward, and Albrecht Schmidt. They posit that ubiquitous displays and wearable devices can be used to help improve memory recall. They consider how such a system might be built, and what are the likely privacy and security challenges. For example, if audio and video is captured in a meeting room, how would the user know if it has been tampered with? What if the system tries to prompt selected memories to promote a more positive experience? What about bystanders that are incidentally recorded?

Privacy and security will continue to be thorny issues for pervasive computing. This issue’s articles show that addressing these concerns requires not only efficient algorithms and secure protocols but also usable interfaces and socially compatible designs. Most of all, it will require researchers with a strong interdisciplinary interest to look for the non-obvious solutions. We hope that you find the articles useful, and we hope that they help foster the ongoing discussion in our research community on how best to provide privacy and security in pervasive and mobile computing.

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