Have Faith

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Faith is often described as being sure of what we hope for and certain of what we don’t see. As embedded devices become ever smaller and computers continue to fade into the background or “disappear,” it’s interesting to reflect on the levels of faith or trust we, as users, might place in future systems.

PERSVATIVE TRUST

Trust is a complex concept that affects many areas of human activity. Several factors contribute to an increase in our trust in an entity. For example, openness and transparency or, more accurately, translucency, influence our level of trust. The distinction between transparency and translucency is subtle yet important. Transparency typically involves a “forced” openness in which “everything” is visible, whereas translucency requires an act of sharing, which is usually considered more meaningful and more likely to be reciprocated, leading to increased levels of trust between entities. (More details on translucency appear elsewhere.1)

A second significant factor affecting trust levels is the predictable nature of an entity’s behavior. Of course, predictability relates to many different aspects of observed behavior—for example, reliability, competency, and integrity. Reliability, which is acquired over time by repeatedly delivering on promises, is often used as the basis for recommender systems. Competency means that the people are capable of doing what you’re trusting them to do, and integrity deals with the idea that a person’s actions are in line with his or her beliefs, attitudes, and intentions. Although these concepts typically refer to human aspects of trust, it’s interesting to consider how they can be mapped onto technological systems.

Trust is earned over time but can be quickly destroyed by the simple failure to communicate. Pervasive systems of the future will need to earn users’ trust but will face numerous challenges in doing so. In particular, the context-based behavior of many systems will make it difficult for a user to predict how a system will behave, and the incidence of repeatable experiences might be low. Indeed, for a system that has disappeared into the background, communicating its actions in a calm fashion remains a challenge. Without any form of communication and lacking predictable (or repeatable) behavior, systems are missing many of the drivers for increasing trust. Yet many of the application scenarios for pervasive computing, such as support for assisted living, require users to place a high degree of trust in these systems.

Acceptance of pervasive systems is likely to be much higher if we don’t require users to take “leaps of faith” but rather let them gradually become more trusting, as they determine that the system in question is in fact trustworthy. Therefore, the key to increasing trust with respect to pervasive systems might be to create opportunities for demonstrating trustworthiness. In other words, while striving for invisible systems that fade into the background, we must avoid creating a world in which we’re surrounded by pervasive technologies that we don’t trust simply because they’ve been denied the mechanisms and opportunities to demonstrate trustworthiness.

I thank Bran Richards for her contributions to this discussion and for highlighting some of the challenges of demonstrating trustworthiness in pervasive systems.

IN THIS ISSUE

The guest editors—Ramon Caceres, Tapan Parikh, Lakshmi Subramanian, and Elizabeth Belding—have brought together three excellent articles on the important topic of pervasive information and communication technologies for development (ICTD). In addition to

MISSION STATEMENT: IEEE Pervasive Computing is a catalyst for advancing research and practice in mobile and ubiquitous computing. It is the premier publishing forum for peer-reviewed articles, industry news, surveys, and tutorials for a broad, multidisciplinary community.
these articles, we also have four feature articles.

In “GroupEnergyTable: An Interactive Tabletop for Energy Conservation,” the authors describe an interactive tabletop for exploring shared electricity and transportation data, viewing energy tips, and setting goals. They tested the system over a two-month period with promising results.

The use of pervasive technologies in the medical domain is continuing to increase, and our second article, “A Survey of Feedback Modalities for Wheelchair Power Seat Functions,” considers the design of a new system to assist in training users of powered wheelchairs.

Our final two articles focus on technologies needed to deliver pervasive computing. In “Middleware for Differentiated Quality in Spontaneous Networks,” the authors describe a new approach for managing spontaneous networks that’s easily deployable over existing heterogeneous wireless networks. Their results show that the performance of their prototype offers adaptive and per-application management strategies, even when supporting challenging application scenarios such as multimedia streaming. In “Toward More Secure and Reliable Access Control,” the authors describe a system for distributing users’ private keys among their personal devices.

In addition to our research articles, I’m pleased to say that this issue features four excellent departments: the Conferences department reviews Ubicomp 2012, Innovations in Ubicomp Products explores digitally enhanced food, Smartphones looks to the future of sensor-based applications, and Works in Progress features work on ICTD and on an affective mobile system.

Finally, I’d like to thank Ramón Cáceres. This issue marks his retirement from our editorial board, and I thank him for his work on the magazine and, in particular, for helping to put together this excellent issue on pervasive ICTD.

REFERENCE