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Ubiquitous Sustainability

Technologies for Green Values

Abstract This workshop will explore the ways in which research within the Ubicomp community intersects with values and practices linked to environmental sustainability. Growing concern about resource depletion, global warming, and environmental degradation have led increasing numbers of people to reconsider their actions and the impact they have on the planet. This upswing in public interest in making positive change for the environment has substantial implications for how the Ubicomp community frames and executes the design of technologies in realms as diverse as energy conservation, healthcare, home systems monitoring and automation, environmental monitoring, community planning, and social networking. The goals of the workshop are to gain an understanding of emerging practices in which technologies align with environmental values, and to distill a set of challenges for the Ubicomp community that are synchronous with those developments.

1 Introduction

Growing concern about resource depletion, global warming, and environmental degradation have led increasing numbers of people to reconsider their actions and the impact they have on the planet. This upswing in public interest in making positive change for the environment has substantial implications for how the Ubicomp community frames and executes its work. These concerns affect the design of technologies in realms as diverse as energy conservation, health care, home systems monitoring and automation, environmental monitoring, community planning, and social networking. Opportunities abound in a range of areas (see e.g., [6]), from technologies to support personal actions by end users to development of sustainable systems and infrastructure. At the same time, some areas of Ubicomp development may need to be critically examined, reconsidered, or even abandoned.

2 Workshop Goal and Topics

Our goal is to work together to develop a better understanding of the roles Ubicomp can play in the future

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of green (environmentally conscious and environmentally responsible) technologies. The workshop will be an opportunity to explore ideas for innovative design and implementation strategies and principles, as well as to identify relevant areas of synergy within the Ubicomp community. We encourage submissions from participants interested in the relationship between Ubicomp and sustainable technologies. Examples of research topics include, but are certainly not limited to, the following:

- *Product design*. How can Ubicomp designers better incorporate sustainable practices in the design process? What new design paradigms might emerge from reconsidering products from the sustainability perspective (e.g., Value Sensitive Design [1], Sustainable Interaction Design [2])? How can Ubicomp enable cradle-to-cradle [4] design of products, and how do cradle-to-cradle principles change Ubicomp?

- *Systems*. How can we design more sustainable Ubicomp technologies? How can infrastructure be designed to maximize its reusability? Can the energy requirements of Ubicomp systems be dramatically reduced? Can Ubicomp technologies serve as a substitute for more energy-intensive alternatives? Can we develop criteria for accurately evaluating the environmental impacts of a new Ubicomp system before beginning its development?

- *Home technologies*. In what ways does Ubicomp research in the home intersect with the green home phenomenon, and how can Ubicomp support issues such as monitoring, reconfiguration, and co-evolution of residents and home technologies?

- *Monitoring technologies*. How can Ubicomp help people better understand energy consumption? What sorts of sensors might be useful for this purpose? To what extent can studies of how technology is used help identify opportunities for changing personal behavior related to energy consumption?

- *Social networking technologies*. In what ways might social networking technologies motivate

sustainable behavior (e.g., RideNow [5])? What paradigms are likely to be most effective?

- *Persuasive technologies*. In what ways might Ubicomp be used to encourage more sustainable behaviors? How can people be supported in their efforts to change their daily practices and reduce resource consumption (e.g., Footprints [3])?
- *Personal action technologies*. How can Ubicomp support personal actions such as protest or subversive resistance to affect change? For example, can Ubicomp sensor networks or social sensing be used to support the environmental justice movement by documenting developing problems or potential misdeeds?

3 Workshop Format and Activities

The workshop will be highly interactive, and activities will be designed to stimulate discussion and creativity. The workshop will be an opportunity to explore ideas for innovative design and implementation strategies and principles, as well as to identify relevant areas of synergy within the Ubicomp community. Throughout the day, the organizers will draw on concepts from human-computer interaction, anthropology, and design to guide and facilitate discussion. Sessions will cover topics such as themes that emerged from the participants' position papers, brainstorming, exploration of the interactions between technological interventions and environmental values, and identification of key outcomes and research challenges.

Workshop Organizers

Jay Hasbrouck is an anthropologist in Intel's Digital Home Group. His research interests include sustainability and social networks, visual culture, and cultural landscape. He has conducted fieldwork in Mexico, Egypt, Germany, South Korea, Brazil, and the United States. Prior to joining Intel, he was a research fellow at USC's Center for Sustainable Cities. Hasbrouck holds a Ph.D. in Social Anthropology and an M.A. in Visual Anthropology, both from the University of Southern California.

Tom Igoe teaches courses in physical computing and networking, exploring ways to allow digital technologies to sense and respond to a wider range of human physical expression. Coming from a background in theatre, his work has centered on physical interaction design. His current research focuses on ecologically sustainable practices in technology development. He has consulted for The American Museum of the Moving Image, EAR Studio, Diller + Scofidio Architects, Eos Orchestra, and others. He is a contributor to MAKE magazine and a collaborator on the Arduino open source microcontroller project. He hopes someday to work with monkeys, as well.

Jennifer Mankoff is an assistant professor in the Human Computer Interaction Institute in Carnegie Mellon's School of Computer Science. Her interests include the development of tools, applications, and techniques for conducting iterative design of Ubicomp and assistive technologies. After reading an issue of Time Magazine last year that focused on the coming challenges of climate change, she made the leap from individual action to research and innovation, and has been working for the last year on issues of sustainability.

Allison Woodruff is a researcher at Intel Research Berkeley. Her primary research interests include sustainable technologies, technologies for domestic environments, computer-mediated communication, and ubiquitous computing. Her current research focuses on green homes and green lifestyles. Woodruff holds a Ph.D. in Computer Science from the University of California, Berkeley; an M.S. in Computer Science and an M.A. in Linguistics from the University of California, Davis; and a B.A. in English from California State University, Chico.

References

1. Friedman, B., Kahn, P., Borning, A., Value Sensitive Design and Information Systems. In P. Zhang & D. Galletta (eds.): Human-Computer Interaction and Management Information Systems: Foundations, pp. 348-372. M.E. Sharpe, Armonk, New York (2006)
2. Blevis, E., Sustainable Interaction Design: Invention & Disposal, Renewal & Reuse, Proc. CHI 2007, pp. 503-512 (2007)
3. Mankoff, J., Matthews, D., Fussell, S. R., Johnson, M., Leveraging Social Networks to Motivate Individuals to Reduce Their Ecological Footprints, Proc. HICSS 2007 (2007)
4. McDonough, W., Braungart, M., Cradle to Cradle: Remaking the Way We Make Things. North Point Press, New York (2002)
5. Wash, R., Hemphill, L., Resnick, P., Design Decisions in the RideNow Project, Proc. SIGGROUP 2005, pp. 132-135 (2005)
6. Mankoff, J., Blevis, E., Borning, A., Fussell, S.R., Hasbrouck, J., Woodruff, A., Sengers, P., Environmental Sustainability and Interaction, CHI 2007 Special Interest Group, Extended Abstracts, pp. 2121-2124 (2007)

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