

## Privacy and Participation in Ubiquitous Information Systems: Information Ethics when Mobile Phones are Sensors

Ubiquitous information systems hold increasing promise for widespread participation in data collection and dissemination. Common and abundant devices such as mobile phones can sense and record data such as location, sound, and images. These systems can facilitate community participation in basic and applied research, improvement of quality of life, social change, self-reflection, and creative expression. But the design and use of these tools also pose new challenges for privacy, data security, and ethics.

This paper explores responsible approaches to the design of systems for ubiquitous digital capture. The authors include an Information Studies researcher working alongside computer scientists and engineers from the Center for Embedded Networked Sensing (CENS). This ongoing partnership pairs ethical frameworks developed within Information Studies and Science and Technology Studies with system design expertise and concrete, real-world challenges. For example, CENS is developing a platform to share activity inferences generated with geospatial data from mobile phones to assess personal environmental impact. CENS is also exploring systems for capturing and sharing data about neighborhood walkability and other community assets. The ongoing research detailed in this paper investigates how such ubiquitous sensing projects can conscientiously collect personal data for social science and participatory research applications.



Figure 1: A CENS project tracks and shares users' movements.

### **Background**

Previous research has proposed a variety of technical approaches to privacy protection in a world of increasing information capture. These include encryption, privacy-enhancing technologies (PETs), and statistical anonymization of data (Burkert, 1998). While these approaches to privacy protection are important in human-embedded sensing systems, we argue that privacy requirements for networks of sensitive personal data extend beyond such measures.

Individuals experience privacy as a fluid concept. Privacy concerns extend beyond anonymity or data protection; privacy can be a process of regulating boundaries or a method of portraying particular personal identities (Palen & Dourish, 2003). Privacy expectations are shaped by social conventions (Waldo, Lin, & Millett, 2007) and by places and spaces of data capture (Cohen, 2008). Individuals may feel threats to privacy during data collection, during data sharing, or if data remains accessible indefinitely.

### **Designing for Privacy and Participation**

This paper details design considerations and practices that promote a balance between participation and privacy. An interdisciplinary team hosted by CENS has iteratively developed design principles that respect a multi-faceted definition of personal and social privacy. The paper will detail design guidelines such as targeted capture, data retention policy, and methods

for identification of privacy pressure points in a ubiquitous information system. It will emphasize techniques for responsive system design based upon user-specified privacy needs. Finally, we will emphasize participation over restriction as a response to privacy ethics. We argue that by finding a balance between privacy and participation, embedded network sensing systems can reach their research, empowerment and documentary potential while respecting participant privacy concerns.



Figure 2: CENS interns participate in cooperative data gathering and analysis.

## References

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