

Mobile Technologies: Participation and Surveillance

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Introduction

Mobile phones could become the largest surveillance system on the planet. These ubiquitous devices can sense and record data such as images, sound and location. They can automatically upload this data via wireless connections into systems for aggregation and analysis. But unlike traditional surveillance devices, phone sensors can be controlled by billions of individuals around the world. Are emerging mobile technologies platforms for citizen participation in research and discovery? Or new tools for mass surveillance?

Location-based technologies and mobile phone applications like carbon footprint calculator *Ecorio* and Google's *Latitude* are attracting attention and raising new questions for engineers, policy makers, and users. These systems collect and combine data in new ways, and their effects cross political boundaries. Who will build and control processes such as data storage, aggregation, sharing, and retention? What policies are required to control this data, and who sets them? And to what purposes will these systems be deployed?

Humanists, social scientists, and technologists all have tools and perspectives to investigate these questions and contribute to a discussion of social issues in mobile sensing. This course brings together students from across campus to use some of those disciplinary tools and explore ethics and social challenges engendered by new technologies. Readings, discussion, design exercises and assignments will provide methods, tools, and contexts for unpacking the social issues embedded in emerging technologies. We will concentrate on the features of mobile technologies and how our worldview – specific cultural lenses, research practices, political orientations, economic pressures, popular narratives and fiction – influences how these features are imagined and built.

Objectives

By the end of the course, students will:

1. Comprehend cross-disciplinary debates about emerging technologies
2. Apply concepts and critiques from technology studies to emerging mobile technologies
3. Evaluate both opportunities and risks for emerging technologies

4. Analyze new technologies from policy and ethical perspectives
5. Propose both policy and technical solutions to social challenges posed by new technologies

Requirements

1. Assigned reading and class participation: 20%
2. Final paper abstract and bibliography (due Week 3): 10%
3. Debate paper (due Week 7): 30%
4. Final paper (due Week 10): 40%

Assignments

1. Debate Paper

With a partner, choose a social issue related to the introduction and use of a location-based or personal sensing technology. Each partner should choose a “side” in the debate – you may advocate for either the social potential of the technology, or the social problems the technology will engender. Compose an 8-10 page paper in an argument-and-response style, as if you were having a debate on paper. One of you should begin the paper by laying out your argument for a technology’s potential or problems. The other should then respond to that argument from the opposite viewpoint. You should build the paper by going back-and-forth multiple times to revise and polish your arguments. The format should be as follows:

- A. Partner #1: Initial argument (e.g. Location-based advertising is good for consumers and the marketplace)
- B. Partner #2: Response and counter-argument (location-based advertising hurts consumers and/or the marketplace)
- C. Partner #1: Rejoinder from the initial point of view
- D. Partner #2: Closing argument from the opposing point of view

To write the paper, one partner should start a draft of their initial argument and then pass it to the other. Passing the paper back-and-forth multiple times will strengthen both of your arguments. All students should be prepared to explain and discuss their work on this paper in class. The Debate Paper will be due in **Week 7**.

2. Final Paper

The final paper should be a critical analysis of a location-based or personal sensing technology that takes into account both the potential and problems of an emerging technology and proposes technical or policy solutions to make a technology workable

and socially acceptable. You may choose a technology that demonstrates the social issues you chose for the Debate Paper, or choose a new topic. An abstract and a sample bibliography for your final paper will be due in **Week 3**. You will therefore need to begin thinking about your topic and sources right away.

The final paper should be 10-12 pages, and will be due in **Week 10**.

3. Final Paper Presentation

You will formally present your final paper during the last class. Please prepare a 5-minute presentation summarizing the topic you chose, the social issues raised by the technology, and your suggestions for policy or technical solutions.

Required Text:

Sismondo, S. (2004). *An Introduction to Science and Technology Studies*. Malden, MA: Blackwell.

We will read chapters from Sismondo throughout the class. This will introduce you to an interdisciplinary approach to thinking through the social problems of technology, and to give you background in methods you might use to attack those problems. Think of Sismondo as providing a history of ways of looking at technology, and background and tools with which to think through new problems. All other readings will be provided on the course website.

Schedule

Please read the required readings before the date for which they are listed. In addition, browse through the sensing and location-based applications listed each week, to get a feel for how these technologies work and what they can do. Articles labeled "For Further Investigation" are not required but suggested if you are particularly interested in a topic.

Week 1: Introduction to Mobile Sensing and Location-Based Technologies

What is mobile sensing? What are location-based technologies? Who uses them, and for what? What are the components and how do they work? Who builds and controls infrastructures for sensing? This week's readings will provide both technical and lay descriptions of location-based technologies, and introduce us to some of the concepts and social problems that we'll explore throughout the course.

Applications:

Dartmouth MetroSense projects; Ushahidi, <http://www.ushahidi.com/>;
Ecorio, <http://www.ecorio.org/>; CENS Urban Sensing; Real Time
Rome, <http://senseable.mit.edu/realtimerome/>

Readings:

Sismondo, Chapters 1-3.

Calabrese, F., Kloeckl, K., & Ratti, C. (2007). Wikicity: Real-Time Urban Environments. *Pervasive Computing*, 6(3), 52-53.

Donner, J., Verclas, K., & Toyama, K. (2008). Reflections on MobileActive 2008 and the M4D Landscape. MobileActive.org and Microsoft Research India. http://mobileactive.org/files/DVT_M4D_choices_final.pdf.

Newell, A. (1992). Fairytales. *AI Magazine*, 13(4), 46-48.

Honan, M. (2009, January 19). I am here: one man's experiment with the location-aware lifestyle. *Wired Magazine*, 17(2). http://www.wired.com/gadgets/wireless/magazine/17-02/lp_guineapig.

Weiser, M. (1991). The Computer for the 21st Century. *Scientific American*, 265(3), 94-101.

Week 2: Sensing Everywhere—Consequences of Capture

What does it mean to capture data about ourselves all of the time? What can we discover from data captured from ubiquitous devices? What are new applications for this sort of data capture? What problems might this data raise? What does it mean for individual and group identity, power and equity, and privacy? This week's readings suggest several ways to talk about privacy and other problems in a world of increasing data capture.

Applications:

Yahoo's FireEagle, Google Latitude, <http://www.google.com/latitude/intro.html>,
RescueTime <http://www.rescuetime.com/>, Bedpost <http://www.bedposted.com/>.

Readings:

Sismondo, Chapters 4-6.

Agre, P. E. (1994). Surveillance and capture: two models of privacy. *The Information Society*, 10(2), 101-127.

Bush, V. (1945). As we may think. *Atlantic Monthly*, (July), 101-108.

Foucault, M. (2002). The Eye of Power: A Conversation with Jean-Pierre Barou and Michelle Perrot. In *CTRL [SPACE]: Rhetorics of Surveillance from Bentham to Big Brother* (pp. 94-101). Cambridge, MA and London: The MIT Press.

Mann, S., Fung, J., & Lo, R. (2006). Cyborglogging with camera phones: Steps toward e-surveillance. In *ACM Multimedia 2006*. Santa Barbara, CA: ACM.

For Further Investigation:

Bell, G., & Gemmell, J. (2007). A digital life. *Scientific American*, 58-65.

Marx, G. T. (1998). Ethics for the new surveillance. *The Information Society*, 14, 171-185.

The Quantified Self Blog: <http://www.kk.org/quantifiedself/>

Week 3: Mash-ups and Models; Networks and Flows

****Final paper abstract and sample bibliography due**

What happens when researchers, users, or others combine personal sensing and location data with existing data and models in 'the cloud'? What can we learn? What mash-ups raise new challenges? This week's readings discuss the ways that data is combined to create new knowledge (for researchers, and for marketers), and new awareness of our everyday activities.

Applications:

Outside.in; the Personal Environmental Impact Report (PEIR).

Readings:

Sismondo, Chapters 7-9.

Castells. (1999). *Flows, Networks, and Identities: A Critical Theory of the Informational Society*. Critical education in the new information age. Lanham, MD: Rowman & Littlefield Publishers, Inc.

Curry, M. R., Phillips, D. J., & Regan, P. M. (2004). Emergency response systems and the creeping legibility of people and places. *The Information Society*, 20, 357-369.

DARPA's Information Awareness Office

Khan, V., & Markopoulos, P. (2009). Busy families' awareness needs. *International Journal of Human-Computer Studies*, 67(2), 139-153.

For Further Investigation:

Bell, G. (2006). No More SMS from Jesus: Ubicomp, Religion and Techno-spiritual Practices. In P. Dourish & A. Friday (Eds.), *UbiComp 2006: Ubiquitous Computing* (Vol. 4206, pp. 141-158).

Chew, M., Balfanz, D., & Laurie, B. (2008). (Under)mining Privacy in Social Networks. In *W2SP 2008: Web 2.0 Security and Privacy 2008*.

Week 4. Making Sense of the Data

Mobile sensing produces more data than a human can easily parse. Sensors might collect hours of latitude and longitude readings. These data streams must be interpreted using calculations, models, maps, and other techniques. This week's readings discuss tools and techniques for making these interpretations and drawing sense from copious data. They also explore whether data interpreted through models ever be *objective*, or whether making sense of data depends upon points of view, standpoints, and social or political contexts.

Applications:

Your Street <http://www.yourstreet.com/>, Datascape, MIT Reality Mining visualizations <http://reality.media.mit.edu/viz.php>, Bricolage Labs <http://www.bricolagelabs.com/>

Readings:

Sismondo, Chapters 10-12.

Borgman, C. L. (2007). *Data: Input and Output of Scholarship. Scholarship in the digital age: information, infrastructure, and the internet*. Cambridge, MA and London: The MIT Press.

Corburn, J. (2003). Bringing local knowledge into environmental decision making: Improving urban planning for communities at risk. *Journal of Planning Education and Research*, 22, 120-133.

David, S. (2007). Toward participatory expertise. In Structures of participation in digital culture (pp. 176-196). New York: Social Science Research Council.

Eagle, N. (2008). Behavioral Inference across Cultures: Using Telephones as a Cultural Lens. *Intelligent Systems, IEEE*, 23(4), 62-64.

Lefebvre, H. (2004). Chapter 2. *Rhythmanalysis: space, time, and everyday life*. London and New York: Continuum.

For Further Investigation:

Elwood, S. (2006). Critical issues in participatory GIS: Deconstructions, reconstructions, and new research directions. *Transactions in GIS*, 10(5), 693-708.

Gray, J., Liu, D. T., Nieto-Santisteban, M., Szalay, A., DeWitt, D. J., & Heber, G. (2005). Scientific data management in the coming decade. *SIGMOD Rec.*, 34(4), 34-41.

The Critical Spatial Practice blog: <http://criticalspatialpractice.blogspot.com/>

Week 5. Persistent Memory and the Data Commons

What are the consequences of creating a data commons full of personal sensing data? What does it mean to create an archive of personal data? This week's readings discuss the benefits of this new conception of an archive, as well as the problems the totalizing nature of this memory might raise.

Applications:

Microsoft's MyLifeBits, <http://research.microsoft.com/en-us/projects/mylifebits/default.aspx>

Readings:

Sismondo, Chapters 13-16.

Blanchette, J., & Johnson, D. (2002). Data retention and the panoptic society: the social benefits of forgetfulness. *The Information Society*, 18(33-45).

Borges, Jorge Luis. Funes the Memorious.

Hunter, D. (2003). Cyberspace as Place and the Tragedy of the Digital Anticommons. *California Law Review*, 91.

For Further Investigation:

Bannon, L. (2006). Forgetting as a feature, not a bug: the duality of memory and implications for ubiquitous computing. *CoDesign*, 2(1), 3-15.

Ketelaar, E. (2005). Recordkeeping and societal power. In *Archives: Recordkeeping in Society* (pp. 277-298). Wagga Wagga, New South Wales, Australia: Centre for Information Studies, Charles Stuart University.

Week 6. What Must We Do? Law and Personal Sensing

What laws currently apply to personal sensing data? Where is new legislation needed? This week's readings from legal and policy forums discuss both the present state of U.S. data legislation, and new directions that lawyers and policymakers might take.

Readings:

Cohen, J. E. (2008). Privacy, Visibility, Transparency, and Exposure. *University of Chicago Law Review*, 75(1).

Waldo, J., Lin, H. S., & Millett, L. I. (2007). Chapter 4: The Legal Landscape in the United States. *Engaging privacy and information technology in a digital age*. Washington, D.C.: The National Academies Press.

Weitzner, D. J., Abelson, H., Berners-Lee, T., Feigenbaum, J., Hendler, J., & Sussman, G. J. (2008). Information accountability. *Communications of the ACM*, 51(6), 82-87.

Week 7: Ethics in Design –Investigating Hard Decisions

****Debate paper due**

How do designers make decisions about tradeoffs between accuracy and privacy, ease of use and informed consent, or speedy design and involving users? How can non-designers be influential in this process?

In class, we will do a series of design activities, including constructing value scenarios for a sample technology, and visualizing the dark side of design using “design noir.” We will then spend the second half of class critiquing our design activities.

No readings this week; instead, use the time to polish your debate papers and keep working on your final paper.

Week 8. But What Should We Do? Techniques for Incorporating the Social in Design

Research into decision-making in design is starting to suggest tools and techniques for influencing the design process. This week’s readings and discussion will take the topics we have covered so far and ask what designers and non-designers alike might do to build socially responsible sensing and location-based technologies.

Readings:

Bellotti, V. (1998). Design for privacy in multimedia computing and communications environments. In *Technology and privacy: The new landscape* (pp. 63-98). Cambridge, MA and London: The MIT Press.

Capurro, R. (2006). Intercultural Information Ethics. In *Localizing the Internet. Ethical Issues in Intercultural Perspective*. ICIE Series Vol. 4: Fink.

Friedman, B., Kahn, P. H., & Borning, A. (2006). Value sensitive design and information systems. In D. Galletta & P. Zhang (Eds.), *Human-Computer Interaction and Management Information Systems: Applications* (Vol. 6). New York: M.E. Sharpe.

Kensing, F., & Blomberg, J. (1998). Participatory Design: Issues and Concerns. *Computer Supported Cooperative Work (CSCW)*, 7(3), 167-185.

For Further Investigation:

Medina, E. (2006). Designing freedom, regulating a nation: socialist cybernetics in Allende's Chile. *Journal of Latin American Studies*, 38, 571-606.

Iachello, G., Truong, K. N., Abowd, G. D., Hayes, G. R., & Stevens, M. (2006). Prototyping and Sampling Experience to Evaluate Ubiquitous Computing Privacy in the Real World. In *2006 SIGCHI Conf. Human Factors in Computing Systems (CHI 06)* (pp. 1009–1018). Montreal, Canada: ACM Press.

Suchman, L. A. (2002). Practice-Based Design of Information Systems: Notes from the Hyperdeveloped World. *The Information Society*, 18(2), 139-144.

Star, S. L., & Strauss, A. (1999). Layers of Silence, Arenas of Voice: The Ecology of Visible and Invisible Work. *Computer Supported Cooperative Work (CSCW)*, 8(1), 9-30.

Week 9. So What Can We Do? Imagining Technological and Policy Solutions

What are the next steps for the design and implementation of responsible sensing technologies? How do we create technology or laws that respond to social problems with unique solutions? What are the roles of technical solutions, and what will require policy interventions? This week's readings will suggest both scholarly and fictional imaginings of solutions to many of the data dilemmas we have discussed thus far.

Applications:

P3P <http://www.w3.org/P3P/>, XACML http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=xacml, EPAL <http://en.wikipedia.org/wiki/Epal>

Readings:

Anthony, D., Kotz, D., & Henderson, T. (2007). Privacy in location-aware computing environments. *Pervasive Computing*, 6(4), 64-72.

Byrne, E., & Alexander, P. M. (2006). Questions of ethics: Participatory information systems research in community settings. In *SAICSIT* (pp. 117-126).

Doctorow, C. (2008). *Little Brother*. New York: Tor Teen.

Shilton, K., Burke, J., Estrin, D., Hansen, M., & Srivastava, M. (2008). Participatory privacy in urban sensing. St. Louis, Missouri.

Week 10. Wrap-up and Final Presentations

**** Final paper due**

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