
Responsive Surfaces

The design challenge of ambient information

Position

- Provocation:* Technique as an apparent end in itself does have higher personal and societal rewards. This is one basis for maker culture. But there is something more at stake with ambient digital media: who is in control of which media you are swimming in? Content should be something you do, and not just something you are given. Furthermore there is something especially valuable at stake in getting media out the way and into context. For in an age of superabundant information, what is scarce, and therefore the true basis of economic value, is attention. So what are the roles of periphery and persistence in the economics of attention? What happens when technology becomes more situated, and soft information becomes part of architecture? How does environment restore attention, and not just add to an age of unprecedented distraction? Architecture has always been inscribed, with everything from imperial proclamations to advertising and graffiti; but now this accelerates and becomes sensate. Hence the design challenge of ambient information.
- Technique:* This workshop should help you understand and begin to apply the maker culture of situated information. Here you will get a chance not only to review recent theory and works, but also to build some hands-on skills. Exposure to the basics of electronics and interactivity could be considered a part of any general education. It might change how you see technology. In this experimental offering in the College, you have a chance to become an innovator at what has quickly shaped up as an important complement to related movements in digital fabrication or scripted form, namely physical computing.
- Movement:* Physical computing studios are by now widespread in schools of art and media studies; and the time is right to translate this work into architecture. The embedding of sensors, actuators, tags, and memory into the built environment has accelerated in recent years. In the process, the means for artists and non-programmers to experiment in this field have become much more affordable and usable.
- Discipline:* What is the relationship of architecture to interaction design? Interaction design has become to the age of ambient information what industrial design was to the age of the mass-market machine. Both disciplines study how people deal with technology. Both care about interfaces. Interaction design goes beyond usability, however, in its concern for intent. In other words, it studies not just how efficiently a design operates, but what it suggests to do. Notions of psychological affordance, social convenience, and the bias of media become more prominent. Cultural positions become more important. A culture of criticism becomes necessary.

Course Organization

Format: This is an experimental course with an open workshop format. Much of our session time will be devoted to helping one another with projects. Participants will work to bring one another up to speed on recent works, available technologies, and worthwhile applications. Tutorials will explain basic principles of electronics, and will demonstrate practical technologies. A research & criticism component will be useful toward developing a cultural stance, but this is not a scholarly course nor an established curriculum. Weekly sessions will mix all of these.

Requirements: (each weighted equally toward course grade)

- 1) A first project in the Arduino technology, using motion and LEDs.
- 2) A thematic piece of research and criticism on recent work in responsive surfaces, with seminar presentation in two stages, and an online journal page.
- 3) A scripting project, using stored data.
- 4) A final project journal, documenting your process and experimentation.
- 5) The final project installation

Technology: The course will use the popular open-source electronic arts prototyping technology called Arduino. At the heart of this is an output controller board that can work with your computer or stand alone. You can load a script onto it, embed it into an installation, and reuse it afterward. Arduino has become the standard in for coursework in electronic art and physical computing, so there are ample learning resources online. The open source community provides advice, examples, scripts, and supply chains. Thus no canned labs in such courses: you can own these boards, acquire hard and soft components on demand, and build with them as you wish.

Surfaces: The course emphasizes surfaces, more than sculptural form, because surfaces have always been the main context for symbols. One possibility for the final project is to embed the installations in a fixed wall. But this is not a course in robotic art, but instead a course about what is happening to many surfaces in architecture.

Semester Calendar

- Week 1 (6 January)
Introduction
- Weeks 2-4 (13, 20, 27 January)
Getting Started in Electronic Arts
laboratory: Basics of input and output. Visual script-building. Weekly learning stages.
technology: Arduino, rangefinder inputs, LED outputs
project 1: A first physical installation
- Week 5 (3 February)
Critique
project 2: First-stage presentations by all on cultural research & critique
- Weeks 6-8 (10, 17, 24 February)
Ambient Data
laboratory: Do-it-yourself electronics studio culture.
technology: Arduino, Processing scripts, data streams, wall-projected outputs
project 3: Working with accumulated local data.
project 2: Research/critique presentations, 2 per session.
- Weeks 10-14 (10 March – 5 April)
Course Projects
project 4: Final project journal and installation
project 2: Research/critique presentations continue, 2 per session.
laboratory: Survey of physical inputs and outputs and their engineering principles.
technology: Arduino + selected inputs and physical outputs
consultation: Class time devoted to project-based learning
journal: You are expected to keep a miniblog of your progress
installation: Your project should be able to run for 24 hours.
- Week 15 (14 April)
Exhibit

Resources

- Community:* <http://www.arduino.cc/>
- Resource sharing:* www.tumblr.com
- Processing course:* <http://www.shiffman.net/>
- Arduino course:* <http://tigoe.net/pcomp/>
- Instructor's tags:* www.delicious.com/mmmc/ (alas delicious may soon be shuttered)
- A&D colleagues:* John Marshall, Omar Khan, Heidi Kumao, Michael Rodemer
- Book:* Adam Greenfield. 2007. *Everyware*. Berkeley: Peachpit Press.
- Book:* Mike Kuniavsky. 2010. *Smart Things—Ubiquitous Computing User Experience Design*. San Francisco: Morgan Kaufmann. A practical perspective on networked things.
- Book:* Thorsten Kloster, ed. 2009. *Smart Surfaces—and their application in architecture and design*. Basel: Birkhauser.
- Manual:* Forrest Mims. 2000. *Getting Started in Electronics*. Lincolnwood, IL: Master Publishing.
- Supplier:* <http://www.sparkfun.com/>
- Supplier:* <http://www.trossenrobotics.com/>
- Toolkit:* A shared toolbox can be put on checkout at the media center, to include spare wire, assorted resistors, soldering iron, wire strippers, voltage meter, and such.
- Gear:* There is no fixed lab kit for the course, but the group may want to pool some orders to the suppliers above, and you will need to stop by the local Radio Shack. Besides a basic Arduino board, items to consider are hand tools, connector wire and solderless breadboard, a few colors of LEDs, servomotors, and a variety of sensors (many will be discussed and demonstrated, but a favorite genre has been rangefinders.)