Version 1
Subject to Revision

Sensing and Urban Spaces

Urban Informatics 2 Data Workshop

Tuesday, 5:00 – 7:00pm

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book ahead at http://vanky.co/officehours

Summary

tl;dr: Build sensors. Think about how data can support agendas in spatial and environmental justice, as well as enumerating use of public space. Play as a critical practice will be our M.O.

In recent years, interest in "public life"—people's daily interactions within the built environment (Gehl 2011)—has been renewed as urban spaces are being transformed into areas for recreation, socializing and human activity. However, many of the commonly-accepted theories in environmental psychology and planning were generated from limited observations—limited by time and space. This course asks in what ways can sensing technologies validate or challenge these theories of public space and social interaction, and how do we intersect them with aspects of environmental quality and justice, sustainability, equity and overall general well-being?

In this semester, in addition to addressing critical questions of environmental equity and the use of public space, we critically engage in questions of "play" as a mechanism to consider questions of human-computer-urban interfaces and interaction with the public.

Participants in this hands-on workshop will design and implement prototypes for the creating of data on human activity, and environmental conditions and quality. Students will also learn methodologies to analyze and present the data. We will use the university context as a living laboratory to test and reevaluate the commonly-accepted theories of public life while engaging in critical conversations that balance the positive aspects of better-informed design and policy with the challenges concerning data ethics, surveillance, and privacy.

Course Mechanics

Learning Objectives

In this class, students will not only discuss how sensing technologies, as proxies for smart cities technologies, may or may not support larger design and justice objectives, students will also engage in hands-on development and testing of sensor prototypes to support their inquiries into these topics. As such, objectives for this class widely range from hardware development to theoretical understandings of the ethics involved in these technologies within a democratic society. Largely, we can think of the data within the framework of technical (*from "technos", meaning "art, skill, cunning of hand" as it pertains to the science of craft*) and theoretical (*as a set of knowledge and philosophically-based outcomes*):

Technical:	Ability to design and implement basic hardware prototypes; Ability to create and process machine data; Understanding of how sensing technologies work; Understand how to implement sensors to support planning objectives
Theoretical:	Understand of the potentials and limitations of smart cities technologies; Understand the critical aspects of sensing and privacy, ethics and surveillance; Ability to discuss environmental and social justice differences across the fabric of the city using data; Ability to measure behavioral phenomena. Think critically about human-computer interfaces, including questions of empathy and reciprocity.

Ultimately, the objectives of this class is to learn by doing while being reflective practioners as we question the application and use of these tools and discussions to the creation and promotion of better environments.

Instruction

This class marries several instructional formats to facilitate both an interrogation of these methods from a critical distance, but also by actively learning the methods through use. In the first approach, seminar-styled, student-driven discussions and presentations will consider various approaches and techniques, as well as their opportunities, limitations, and implications on research, design and planning. In a practical approach, a physical prototyping project will form the cornerstone by which we can engage in these conversations in an active sense, using the work as an anchor to the conversations surrounding these techniques and datasets. While certain class meeting sessions are planned for project development and discussion of research design and methods, students are expected to use their projects as additional discussion material throughout the semester.

Prerequisites

Due to the wide variation is skillsets, the general mantra for the class is that course participants are required, at a minimum, to approach the activities and lectures with enthusiasm, grit and/or perseverance. There is no other requirement although coding experience is highly recommended.

Equipment

Students will be building their own physical prototypes for deployment, and will be required to purchase any sensors or equipment they may require. An Arduino breadboard may be borrowed for final projects, but students are required to return this at the end of the term.

Assignments and Grading

The class is organized as a series of sprints—that organize the class toward the implementation of your final project. While these sprints are meant to frame sets of knowledge and skills, they should be thought of as discrete sections, but merely organizational stages in our learning.

Building Knowledge
To support a wider set of information gathering, the first half of the class has students collecting, collating and presenting case study precedent projects and readings to frame the state of understanding as we debate the potential relationships that digital information and the built environment have together. As groups, students will frame conversations for their peers to engage with these ideas and projects.

Peer Teaching
How do we translate activities and phenomena in the built environment using sensors? This module of the class everyone working together to create a common resource of sensor types and how they work—what they measure, and how. As a class, we will share this information with each other in presentational, hand-on, and archived manners for us to share this information that frames our prototyping and final project…

Final Project
The last third of the course is dedicated to a final group project, with an agenda of your choosing and may draw from any/all of the lessons from the course. We will be working with the NYC Parks Department, and projects should in some way address the challenges set forth by the Parks Department. The intent is for you to question the role of spatial and environmental equity and the policies that purport to enhance it. Here, you will implement a prototype that measures aspects of the use, interactions, quality and/or other metrics of the built environment and the people who occupy that space, and validate or disclaim those planning and design claims. You should implement the hardware with enough time to implement the sensors and to process the data.

Grading
Attendance and Participation ……..…… 20%
Prelim. Assignments …….. 20%

Project Process …….. 20%
Prototype Implementation …… 10%
Final Project …….. 30%

Readings and Required Texts

There are no required texts, although the following books have been placed on reserves, but are great books to have on hand (and can be found as e-resources, and as a bargain used book). Readings for the course can be found electronically in Canvas or on reserve. A listing of the sections' required readings are found in the Files > Readings section of Canvas.

Igoe, T. (2011). *Making Things Talk: Using Sensors, Networks, and Arduino to see, hear, and feel your world.* " O'Reilly Media, Inc. https://clio.columbia.edu/catalog/13692054

Banzi, M., & Shiloh, M. (2014). *Getting started with Arduino: the open source electronics prototyping platform.* Maker Media, Inc.

Margolis, M. (2011). *Arduino Cookbook: Recipes to Begin, Expand, and Enhance Your Projects.* " O'Reilly Media, Inc.

Resources

Students are invited to visit the Columbia Makerspace in Mudd 254, as well as the GSAPP Fabrication Lab for ideas/inspiration/help in building their final prototypes.

Policies

This course will strictly enforce the **GSAPP honor code**, which can be viewed at https://www.arch.columbia.edu/honor-system. Plagiarism, including the use of another's work in the class, is automatic grounds—at minimum—for failing. For more information, please refer to https://www.arch.columbia.edu/plagiarism-policy.

The School will make reasonable **accommodations** for persons with documented disabilities. Services are available only to students who have registered and submit appropriate documentation. As your instructor, I am happy to discuss specific needs with you as well. Please report any access related concerns about instructional material to Office of Disability Services and to me as your instructor.

Students are welcome to use **electronic devices** as long as they are being used for the strict and sole purpose of class-related material. Non-class related, on-screen materials during class time is strictly prohibited, unless given permission from the instructor. Penalties may include embarrassment, revoking of privileges or impacts to the student's grade.

The University is committed to maintaining a safe environment for students. Because of this commitment and because of federal and state regulations, we must advise you that if you tell any of your instructors about **sexual harassment or gender-based misconduct** involving a member of the campus community, your instructor is required to report this information to the Title IX Coordinator, Margorie Fisher. While this information is considered private, it may lead to follow up. For more information on these policies, see https://www.arch.columbia.edu/discrimination-policy.

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Schedule

	Class		Due	
	Module 1	Module 2	Assignment	Project
21 Jan	Introduction	Situated Technologies		
28 Jan	Theorizing Play	Digital/Physical Interfaces	Digital/Physical Interfaces	
04 Feb	Environmental Justice	Ethics and Protocols	Website Profile	
11 Feb	Site + Intro to Sensors	Theory Presentation 1		
18 Feb	Arduino Hands-On	Theory Presentation 2	CITI Training Due	… *Weekend Site Visit?*
25 Feb	**Project Pitch**			Written Brief + Presentation
03 Mar	Technical Presentation 1	Reviewing Protocols		Protocols
10 Mar	Technical Presentation 2	Rhino/3d Printing		Refined Brief
17 Mar	- - - - - - - - - - - - SPRING BREAK - - - - - - - - - - - - - - - -			… *Orders should be made!*
24 Mar	**Design Review**			Website; Design + Tech Sketch (w/ Precedents)
31 Mar	Build Week 1			
07 Apr	Build Week 2			… *Implementations this week!*
14 Apr	Analytical "Pin Up"			Data Cleaning + Visualization Draft
21 Apr				Findings and Conclusions
28 Apr	**Final Presentations**			Presentations
05 May				Deliverables Submitted

LiPS Lectures

This semester's edition of the LiPS Lecture Series will emphasize topics regarding data and urban technologies. While all the lectures are worth your attendance, the following are related to the conversations of this class:

January 21 – Ben Green
January 28 – Jennifer Light*
April 7 – Rob Goodspeed
April 14 – Rachel Franklin*
April 21 -- Catherine d'Ignazio

* = very in tune with our class.