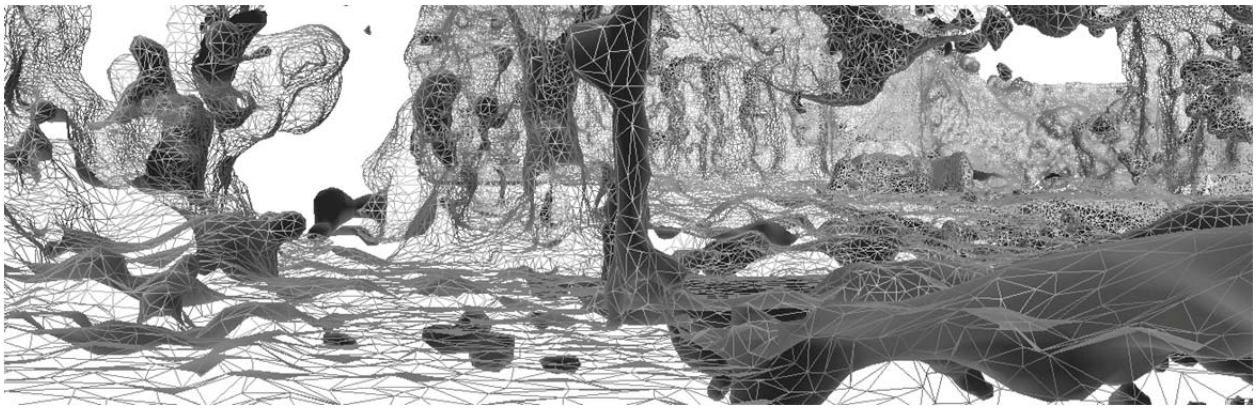

READING FAÇADES: INTEGRATING HUMAN AND COMPUTER VISION

ARCH 5110: ARCHITECTURE AS CATALYST
MARCH 9 - MARCH 13, 2015

INSTRUCTORS

Guest Instructor: Jentery Sayers, Assistant Professor, English and Social, Cultural, and Political Thought, and Director, Maker Lab in the Humanities, University of Victoria

Faculty Instructor: Andrea J. Johnson, AIA, LEED BD+C, Assistant Professor, UMN School of Architecture

GitHub Repository

github.com/jentery/facades/

COURSE DESCRIPTION

This Catalyst workshop explores the intersections of human and computer vision in the construction of three-dimensional space. How does the emergence of computer vision, or machine phenomenology, inform our interpretations of the built environment? How can the face or exterior of a building be detected, organized, and understood? Instead of approaching human and computer vision in a binary fashion, how might they be blended to ask questions about society, technology, and design?

In this workshop, we will combine image capture, computer programming, and physical computing techniques with object-detection frameworks in order to not only expand existing perceptions of built environments but also consider the relevance of computer vision to building facade design, archiving, and analysis. Here, the affordances of computer vision to systematically, superficially, and rapidly detect, describe, and model 3D objects will prove informative. These affordances will be combined with critical studies of algorithms and computational culture. Students will participate in hands-on, introductory workshops on Git, UAV flight for image capture, photogrammetry, and image processing. No previous experience in these areas will be assumed.

TEACHING FORMAT

Foundational lectures to introduce topics; workshops for skill-building; studio sessions with project critiques; seminar discussion.

COURSE OBJECTIVES

1. Approach computer vision as a technical and cultural matter, through a combination of theory and practice.
2. Consider and test techniques of image capture.
3. Build 3D models with repositories of 2D images.
4. Construct, describe, archive, and share image repositories using distributed version control.
5. Experiment with computer vision across a spectrum of realist representation and speculative expression.

ASSIGNMENTS

In addition to short readings, students will complete short exercises anchored in computer vision, programming, and 3D modeling. Class process and work will be posted by students throughout the week via GitHub. Each student will develop, create, and document a final project.

The readings, exercises, and seminar discussions will stress how work in computer vision operates on a spectrum, from realist representation (e.g., depicting the built environment as accurately as possible) to speculative expression (e.g., using computation to create things that do not exist in the world). Throughout the week, students will be encouraged to explore and test this spectrum. What does photogrammetry allow us to see that we may not otherwise? How can it help us model lived, social reality? How can it help us stitch together alternative realities, make curious media, and prototype counterfactuals? How can it be performed collaboratively or creatively?

During exhibition, students will be expected to share work that responds to these questions and more, through digital or tactile media. Through this work they will also be expected to assume a position (if you will) on the spectrum of representation and speculation.

DOCUMENTATION

Complete documentation of process and final project is required. All final files must be uploaded to the class Google Drive folder by Monday, March 23, within the file structure shown. Minimum requirements:

- Final boards and images of work from final exhibition
- Portfolio of process and final work
- One page summary of thoughts on the workshop
- Working files of all submitted documents
- Materials to be included in final group video

Note: Save images as 72 ppi jpeg, min. 3600 pixels in one dimension, maximum quality 10 or above

MATERIALS

Each student should have access to a computer. If possible (but not required), students should bring the following to meetings:

- A laptop (Windows, OSX, or Linux)
- A camera (a DSLR with an SD card, if possible)

Students are also encouraged to install the following on their machines:

- Agisoft PhotoScan 1.1.3, http://www.agisoft.com/downloads/installer/
- Git, http://git-scm.com/downloads

Students should also create an account with https://github.com/, if they have not already.

During the week, students may be asked to work with additional software and languages, such as Rhino and Python, in which case they will be given additional instruction.

READINGS

- Arnall, Timo. 2012. *Robot Readable World*. https://vimeo.com/36239715.
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- Berry, David. 2012. “What Is the ‘New Aesthetic’?” *Stunlaw*. http://stunlaw.blogspot.ca/2012/04/what-is-new-aesthetic.html.
- Bridle, James. 2011. “The New Aesthetic: Waving at the Machines.” *Booktwo*. http://booktwo.org/notebook/waving-at-machines/.
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- Jones, Matt. 2011. “Sensor-Vernacular.” BERG. http://berglondon.com/blog/2011/05/13/sensor-vernacular/.
- Manovich, Lev. 2009. “Cultural Analytics.” *Software Studies*. http://lab.softwarestudies.com/p/cultural-analytics.html.
- Minsky, Marvin. 1974. “A Framework for Representing Knowledge.”https://web.media.mit.edu/~minsky/papers/Frames/frames.html.
- Papert, Seymour. 1966. “The Summer Vision Project,” July. http://dspace.mit.edu/handle/1721.1/6125.
- Resig, John. 2015. “Using Computer Vision to Increase the Research Potential of Photo Archives.” John Resig.http://ejohn.org/research/computer-vision-photo-archives/.
- Sayers, Jentery. 2014. “The Relevance of Remaking.” *The Maker Lab in the Humanities*.http://maker.uvic.ca/remaking/.
- Sterling, Bruce. 2005. *Shaping Things*. MIT Press.
- ———. 2009. “Design Fiction.” *Interactions* 16 (3): 20–24.doi:10.1145/1516016.1516021.
- ———. 2012. “An Essay on the New Aesthetic.” *Wired*. April 2. http://www.wired.com/2012/04/an-essay-on-the-new-aesthetic/.
- Szeliski, Richard. 2010. *Computer Vision: Algorithms and Applications*. Springer Science & Business Media.

SCHEDULE

03.9	M	9:00am	Kickoff (Rapson Courtyard)
		9:30am	Introduction to Workshop (Rapson 109)
		10:00am	Presentation/Discussion: Computer Vision as Culture + Technique *Cultural theories of technology (instrumentalism, determinism, positivism); notion of the eversion (distributed computing, internet inside out)*
		12:00pm	Noon Lecture: Jentery Sayers (Rapson 54)
		2:00pm	Introduction to Git, GitHub and Markdown, web spidering/scraping
		6:00pm	Evening Lecture: Omar Gandhi (Rapson 100)

03.10	Tu	9:00am	Group Fieldwork
		10:30am	Introduction to Photogrammetry and PhotoScan
		12:00pm	Noon Lecture: Ian Harris (Rapson 54)
		2:00pm	Individual Fieldwork
		4:00pm	Presentations and Discussion; Alignment, Meshes
		6:00pm	Evening Lecture: Doris Kim Sung (Rapson 100)
03.11	W	9:00am	Collaborative Model-Making
		10:30am	Individual Fieldwork
		12:00pm	Noon Lecture: Diane Willow (Rapson 54)
		2:00pm	Group Fieldwork with UAV and Cameras
		3:30pm	Conceptualizing Photogrammatic Practice; Post-production Techniques
		6:00pm	Evening Lecture: Leah Buechley (Bell Museum)
03.12	Th	9:00am	Discussion: Articulating Photogrammatic Techniques
		10:30am	Finalizing Final Project Approaches
		12:00pm	Noon Lecture: Hideyuki Nakayama (Rapson 54)
		2:00pm	Individual Project Work
		5:00pm	Final Project Discussions
		6:00pm	Evening Lecture: John McMorrough (Rapson 100)
		7:00pm	Panel: Catalyst Guests (Rapson 100)
03.13	F	9:00am	Final Show Set Up
		2:00pm	Final Show Exhibition and Presentations
03.23	M	5:00pm	Project Documentation Due

POLICIES

ATTENDANCE

Attendance is required M-TH from 9:00am–7:00pm, and Friday from 9:00am–4:00pm. Students must work in the studio/workshop as required and present their work as scheduled. An absence must be discussed with the instructors ahead of time, and will be grounds for grade reduction or failure at the discretion of the instructors.

GRADING

The nature of studio work is highly dependent on evaluations that can only be done when the work is complete. The final grade will be based on the following:

Participation & GitHub (20%)
Project (60%)
Project Documentation (20%)

Final grades will be based on the following **S-N** University Grading Policy:

S Achievement satisfactory to the instructor, not less than that required for a C-.
N Student performance not meriting an S.

LATE WORK
No late work will be accepted.

INCOMPLETE WORK
Incomplete work will not be accepted without instructor's prior approval and written agreement as to revised due dates and grading policy. The grade of incomplete can only be given if the work is substantially complete and the student has documentation of illness or extreme circumstances.

SUBJECT TO CHANGE
With the exception of the grade and attendance policies, parts of this syllabus are subject to change with advance notice, as deemed appropriate by the instructor.

STUDENTS WITH DISABILITIES
This syllabus can be made available in alternative formats upon request. Contact the School of Architecture 612.624.7866. Students with Disabilities that affect their ability to participate fully in class or meet all course requirements are encouraged to bring this to the attention of the instructor so that appropriate accommodations can be arranged. Reasonable effort will be made to accommodate students with disabilities. Please contact your instructor to initiate a discussion on how we can best support you to succeed in the course. Further information is available from Disability Services (16 Johnson Hall)

SCHOLASTIC CONDUCT
All students are responsible for conduct in conformance with the University of Minnesota Student Conduct Code which, among other provisions, broadly defines scholastic misconduct as "any act that violates the rights of another student in academic work or that involves misrepresentation of your own work."

INTELLECTUAL PROPERTY
The College of Architecture and Landscape Architecture has the right to retain any student project whether it be for display, accreditation, archive, documentation or any other educational or legal purpose. In addition, the College reserves the right to reproduce and publish images of any such student work in collegiate publications, printed or electronic, for the purposes of research, scholarship, teaching, publicity and outreach, giving publication credit to the creator/student.

WORKLOAD
For graduate courses, one credit is defined as equivalent *more than* an average of three hours of learning effort per week (over a full semester) necessary for an average student to achieve an average grade in the course.

ACADEMIC POLICIES
Academic policies for this course (including but not limited to: accommodations for students with disabilities, statements on classroom conduct, and statements regarding sexual harassment, and academic integrity) can be can be found in the University's website at http://www.oscai.umn.edu/index.html. Classroom misconduct, violation of academic integrity, sexual harassment and issues concerning students with disabilities should be reported to the Director of College of Design Student Services and to the Department Head.