

# Art 130A - Projects in New Technologies

UC Irvine

T/TH 3:30 - 5:30

Instructor: Curtis Bracher

Email: [teach@curtisbracher.info](mailto:teach@curtisbracher.info) - please use this email for **ALL** out of classroom communication.

Per email - **Always** include Art 130 in the subject line.

Office Hours: Tuesdays @5:30 or by Appointment via Zoom.

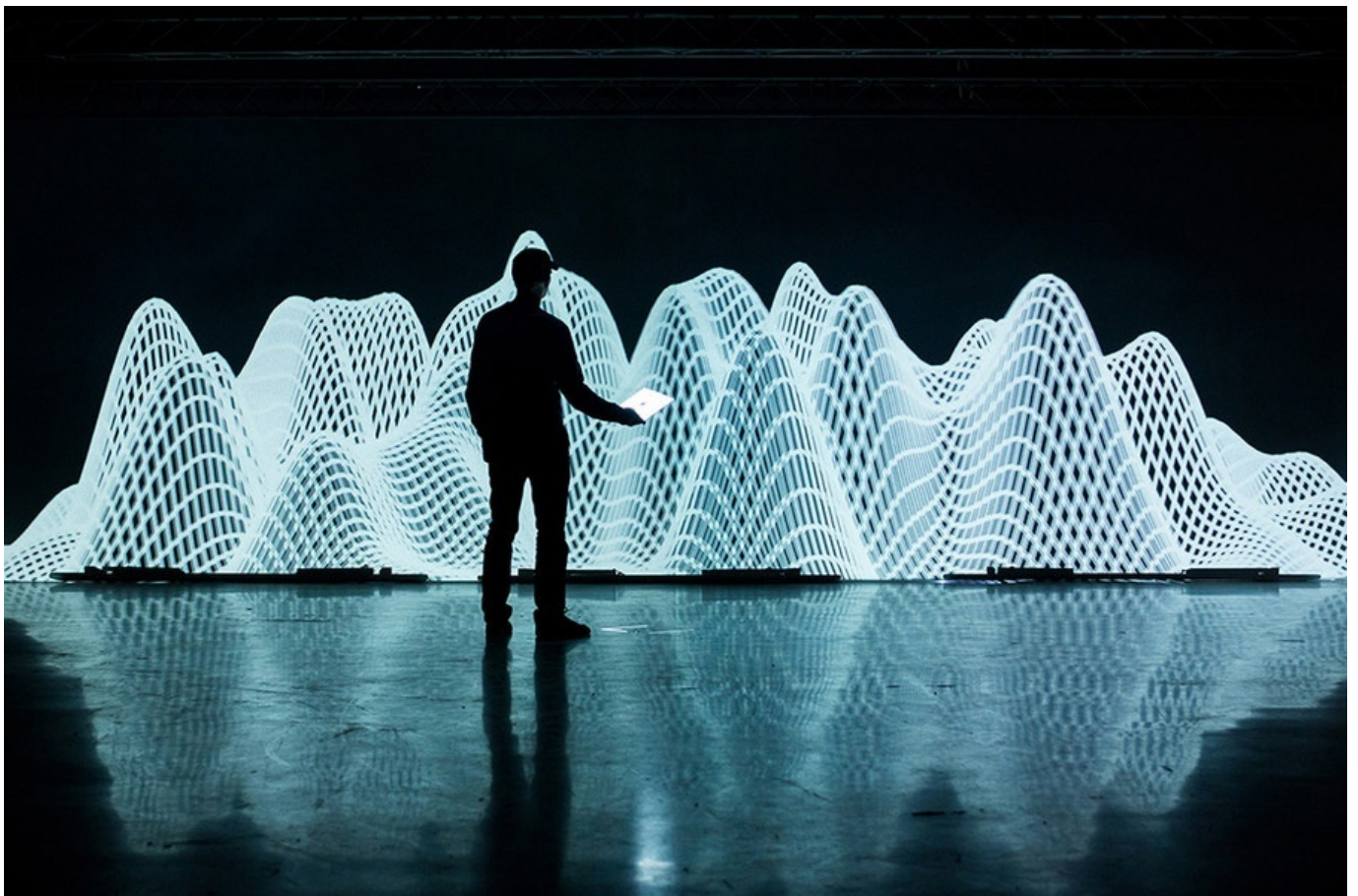
## COURSE OBJECTIVES

This interdisciplinary course is an introduction to Arts and Technology/**Interactive Media** as the digital **integration** of art, technology, video, graphics, sound for design and production in art, communications, entertainment, science, engineering, architectural and industrial applications. Through the integration of historical studies, theory and practice, students will address issues central to **interactivity** in art-making and design.

Students will engage in projects that incorporate a variety of digital media and emerging technology strategies. This course includes an **overview** of simple 2D graphics and motion/animation, digital still-image processing, digital sound generation, and the production steps involved in live, immersive interactive multimedia. Emphasis throughout the class is placed on the interactive, collaborative, and responsive creative process: Idea generation, prototyping, testing and completion of interactive media works.

An important part of understanding contemporary media is a mastery and refinement of perceptive, expressive and critical-thinking skills. The class will thus incorporate a theoretical research and writing component, in addition to hands-on tutorials, demonstrations, lectures, discussions and critiques.

Prerequisite: **ART 65A**. Recommended: ART 11B and **ART 106A**



## LEARNING OBJECTIVES

1. Demonstrate knowledge of the multifaceted communication between people and technology and its applications in Contemporary Art and Design.
2. Through the integration of historical studies, theory and practice, students will address issues central to **Interactivity** in art-making and design.
2. Evaluate both Analog and Digital interfaces for communications and usability
3. Apply the Principles of Design to time-based interactive, visual and audio experiences. Within these principle, students will analyze/understand the requirements of a given problem and develop an acceptable design solution.
4. Learn appropriate laboratory procedures to **author** basic interactive **experiences**.
5. Analyze the history of technology within interactive works using the vocabulary of the elements and principles of design to analyze contemporary practice in interactive design and art making including lens based, time-based, on screen, sound and physical computing and immersive environments within the contexts of art, business and marketing, design, gaming, interactivity, physical space as well as the forum of the web.
6. Consider Arts and Technologies impact on and within Social, Cultural, Political and Moral concerns at large.
7. Student will work towards situating personal explorations of Art and Technology within a broader Artistic Context



## NOTES FROM THE INSTRUCTOR

Contemporary ideas in art, more often than not, involve both aesthetic and digital/technological concerns. The arts of today require a broader context, interaction, participation and an acceptance of fluidity within your explorations. The possibilities of using technology in your work are as close to limitless as the expansiveness of your creativity..

As Media choice is no longer limited, the kinds of ideas that can be explored by an artist has also increased exponentially. The Arts and Technology blending requires that you, as that artist, re-think how you speak, what you speak of and what tools you use to develop an artistic voice. Personally, I see this expansion of Art into blended explorations as necessary. It is a reflection of an increasingly fluid world in response to our general human need for stasis and harmony.

In league with limitless possibility, you should **see this class as an overview**. Sort of a broad view of an ever changing horizon. Our focus, through a variety of works, will be on equipping you to inhabit and see beyond that horizon. Or at least start you on this multi-media, multi-disciplinary journey.

In my years as an artist and teacher, I find the broadest key to art is simple curiosity. Your curiosities will not only motivate you to producing work that is lived - seen, touched, explored - but it will embolden, encourage, and will be a lead through a path of constant further knowledge. That curiosity, your curiosity, is what makes art valuable and limitless.

Exploring with the combination of arts and technology gives you ways to ask questions of the world you live in as both honest and clear. To guide and encourage you in those curiosities. We've structured the class as an **art practice**, one that helps you fill-in knowledge gaps and expand your ideas into new technologies. There are critical studies built in. Theory plays a part in this growth. Situating yourself within contemporary attitudes will allow you to move past limits. Discussions of purpose and intent are designed as a way to both expand your methodology as well as your critical thinking skills. The conceptual is clarity as empowerment. Plus, here, we break things.

Throughout the class, You will be asked to complete **three interactive projects based in the arts and technology blend**. There will be requirements for each. Writing, research, discussion and presentation. I would assume that you are bringing the rumblings of ideas to the class. If not, I assume that you need a little guidance in finding that voice, or simply need encouragement. Perhaps, and probably more accurate, you need both. As a teacher, I will promise a degree of flexibility. What I ask of you is that you treat your artistic explorations with respect. That you continue to stay open and curious. The goal for your artwork is a level of completeness that develops your artistic voice and, in turn, opens you up to new avenues of explorations.

## THREE PROJECTS - STARTING AS A PROPOSAL

At the start of each project, you will be required to research and present your three artworks in the form of GRANT PROPOSALS. These proposals often require an amount of summarizing verbal discussion, justification, evidence of productivity, and supporting research that can be a revelation to ideas that you have. These proposals are not considered the artwork *per se*, instead a closer look. Your creative beginnings can be as intuitive and free-flowing as you want, but see these proposals as the next steps. Again, clarity is empowerment.

The proposals will be due during the formation phase for each project. The format of these proposals will be a template, but you are not limited to that template. If we can find an actual Grant proposal that fits your work, then we will use that particular format. You will be encouraged to work with actual Grants should the specifics and timing allow. Extra credit will be available for the professionalism required. Writing techniques, organization and graphic formation of these proposals will be discussed individually and as a group.

### Proposal Template

**Proposal Summary.** What are you doing? Succinct and formal. Explain what you intend to do, how it fits within your work in general, how it fits within broader artistic contexts. Think of this section also as the "Why". Why did you pick this particular path or idea? You can explain the explorative part of your project in terms of motivation. Consider discussing impact, especially if the work is intended to be public.

**Structure:** Less what and why, more how. How do you imagine the project working? Suggest a routine or timeline. What tools and materials do you foresee needing? How do you think you might handle working within an environment or space? Imagine and explain any external logistics. Can you add any prior experience to the suggested routines? What help do you need? If there are real questions as to procedure, e.g. programming, engineering, etc, bring those questions together into a list and provide some first draft ideas for finding outside help (beyond asking the teacher).

**Supporting Research:** Find as much similar work as possible and bring it together with some graphic coherence. Discuss similarities of the researched work to ideas and questions on which you are working. Not just visual similarities, but broader conceptual ones as well. This step is not to copy anyone else's work or to find/follow trends, but to better understand what you honestly are thinking/doing as an individual artist. Situating yourself within artistic enquiry at large advances your own artwork tenfold. Seeing your own work in broader context requires research, both on the web and in person. The research will need to contain *at least* two other reference works, summarized by some discussion of the work and its relevance to yours.



Lucy Solomon

# INSTRUCTOR INTRODUCTION AND HOW TO CONTACT



Instructor: Curtis Bracher

## Instructor Introductions

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**Who am I?** Thirty-year practicing and teaching artist. Involvement in a wide variety of group and solo shows during that time. Some noted, some not. Shows in both Experimental Drawing Processes and Interactive/Kinetic/Digital Installation have stretched throughout the United States - NY through CA. I continue to work collaboratively as well. Current project examples include work with AI/Deep Learning and Old-Growth Forests as well as an autonomous, microalgae-based, interactive robotic Brittle Star - both of which involve partners in the field of Biology, Engineering, AI. More Info [www.curtisbracher.info](http://www.curtisbracher.info)

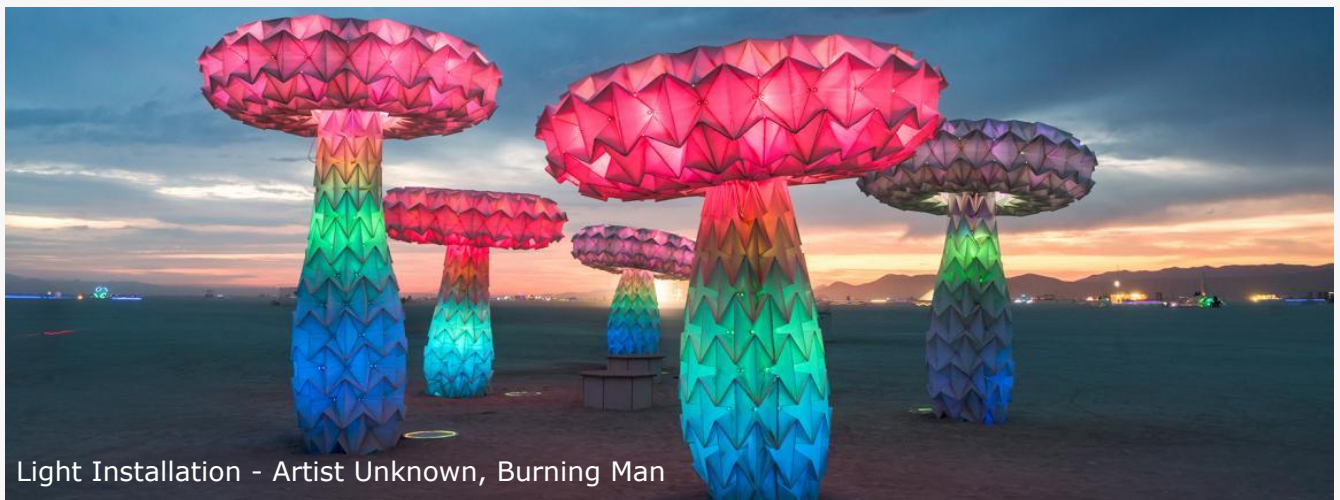
## Instructor Contact

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Here are a few ways to reach me or your fellow students with questions, ideas or concerns about this class.

1. **Office Hours.** In Office. **Mondays @ 5 PM** Best way to get questions answered would be in person. Zoom Office Hours are available by request -
2. **Canvas Inbox** from the Main Navigation is the fastest and safest way to reach me email
3. **Class Discord - Q and A Discussion Thread** - We will set up a communication channel for both you and I to communicate when there are questions and concerns that might benefit the entire class.

I am available to answer **email questions on M-Th** and you can expect a reply within 24 hrs. Fridays and weekends will be longer response times. I will do my best to respond to all concerns, but please do not expect this class to be taught through email. Any confusion or questions about the class ideas, schedule, activities and specific information being presented are best answered in class or the Office hour on Wednesdays. Look for all specific activities, instructions, due dates, etc on Canvas, in the class **Modules** section You can find general schedule information in the class **Announcement** section. Those two sections will be your information go-to's.



Light Installation - Artist Unknown, Burning Man

# IMPORTANT DATES

If you decide not to finish this course, **you** must drop the class through administrative channels. Use [MySWC and Web Advisor](#). The last day to add or drop for refund is Sept 3rd. The last day to withdraw without receiving a "W" is Sept 3rd. The last day to withdraw receiving a "W" is Nov 12th. No class activities will be scheduled for these observed holidays: Monday, Sept 6th, Labor day. Monday, Nov 22nd - Friday, Nov 26th, Fall Break.

***In-Class FINAL: Monday, Dec 13th @ PM. You will be expected to present and participate in a class crit.***

# SCHOOL POLICIES

## COVID POLICIES AND DOCUMENTATION PROCEDURES

For Fall 2021, you will be required both to be vaccinated and to wear a mask while indoors. **You must document your vaccination through SWC.** Click on the link above to take you to further information, guidelines and SDCC vaccination registration procedures. [Free Vaccination Locations](#)

### **Canvas Access Agreement**

Enrolling in a partial online education course you agree that you are the person accessing and completing the work for this course and will not share your username and password with others.



### **Disability Support Services (DSS) Accommodation Statement**

Any student who, because of a disabling condition, may require special arrangements in order to meet the Southwestern College recommends that students with disabilities or specific learning needs contact their professors during the first two weeks of class to discuss academic accommodations. If a student believes they may have a disability and would like more information, they are encouraged to contact [Disability Support Services](#) (DSS) at (619) 482-6512 (voice), (619) 207-4480 (video phone), or email at [DSS@swccd.edu](mailto:DSS@swccd.edu).

Alternate forms of this syllabus and other course materials are available upon request

### **Academic Honesty Policy**

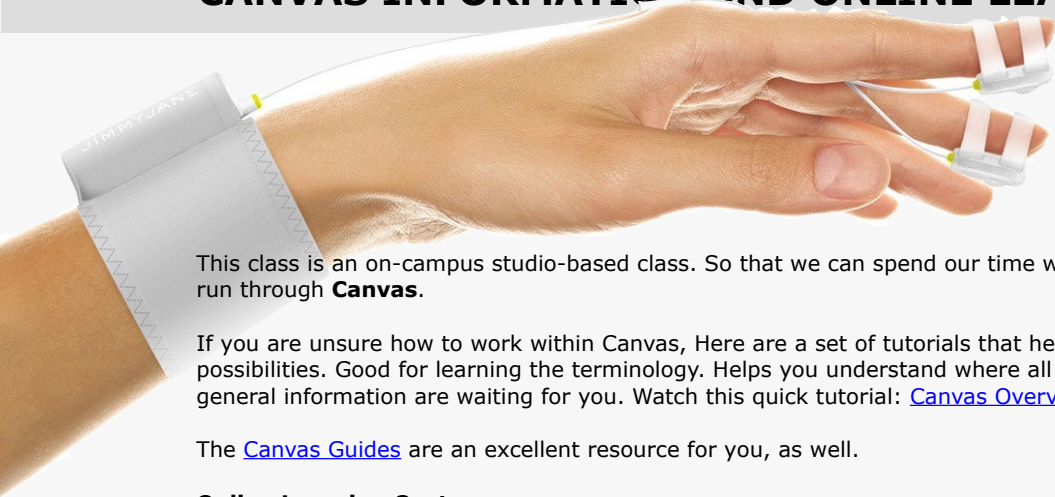
Academic dishonesty of any type by a student provides grounds for: disciplinary action by the instructor or college. In written work, no material may be copied from another without proper quotation marks, footnotes, or appropriate documentation

## STUDENT SERVICES AND SUPPORT

Student support services are available online. For a complete list of services, including the library, tutoring, and counseling, visit the [Student Services and Campus Resources](#) webpage. If you are comfortable doing so, please notify your instructor any particular needs or interests you may have regarding your college experience; this will enable your instructor to brainstorm potential resources and options with you

- Free online tutoring is available to all currently enrolled Southwestern College students through SWC's [Online Writing Lab \(OWL\)](#) and the [Western eTutoring Consortium](#).
- [Counseling Services](#): assists students to complete their Student Education Plan and to think critically about their college planning.
- [Food, Financial, and Housing Insecurity](#): provides support to students with access to basic wellness resources, such as food, clothing.
- [Health Services](#) provides first aid care and health education to students.
- [Library](#) - provides learning resource support and materials

## CANVAS INFORMATION AND ONLINE LEARNING CENTER



This class is an on-campus studio-based class. So that we can spend our time working, much of *class information* will be run through **Canvas**.

If you are unsure how to work within Canvas, Here are a set of tutorials that help you navigate through its many possibilities. Good for learning the terminology. Helps you understand where all of your assignments, reading, and general information are waiting for you. Watch this quick tutorial: [Canvas Overview for Students](#).

The [Canvas Guides](#) are an excellent resource for you, as well.

### Online Learning Center

Taking your first online or hybrid course will be a different experience than a traditional face-to-face class. What should you expect when you take a distance education course? Here's a road map that can help you on your way.

- Go here for Information about starting your [SWC Online Education](#)
- SWC Online Learning Center's [Canvas Essentials resource site](#) with specific to Canvas questions
- [Distance Education pages of the SWC website](#) are very thorough resources.

## STUDENT PARTICIPATION

A student's **participation**, in the form of **consistent attendance, contributions to class discussions and completion of course assignments**, is **required** and essential to a successful learning experience.

**Attendance is required** in all UCI classes. In each class, attendance is tied to specific learning outcomes as well as to course grades. Any absence will affect your ability to complete coursework successfully. Students critique and evaluate each other's work in class and it is essential for your progress and learning experience to be present to do so.

**Non-attendance** (considered non-participation) **will result in a lower grade**. Scheduled tests, the mid-term and or the Final are weighted as **two** absences. I will take **attendance at the end** of every class with a **sign-in sheet**. It is crucial that you attend each class meeting **at its scheduled starting time** and be ready to work. **Habitual tardiness** and/or absence will detrimentally affect your learning and progress in the course.

In most cases, **lecture and project materials will be delivered at the start of class**. It is very important that you are there on time, and ready, so that you know what is expected from each project or idea covered. Lecture material will not be repeated.

# GRADING

There are a variety of methods and events planned for the **instruction** of this class. The list includes Lectures, Presentations, Demonstrations, Technological and Creative Exercises, Research - both live and involving the Web, Individual Instruction, Collaborative Projects, Group Critiques and Discussions, Outside-of-Class Assignments,

Grade Percentage	Assignment type	Points
30%	Tests, Quizzes, Critical Writing based on Lecture Material	200 pts
55%	Class Projects, Activities and Participation. Includes Final	350 pts
15%	Project Proposals	100 pts

100-90% = "A", 89-80% = "B", 79-70% = "C", 69-60% = "D", Below 59% = "F"

## Grading Criteria:

- Understanding and Application of Visual Concepts and Techniques through projects and testing.
- Exploration and Presentation of Ideas - Quality of Assignments
- Participation in class discussion.
- Demonstration of Abstract Thought and Critical Thinking through an assortment of writing assignments.



## Collaboration - Working in Groups

Doing the work in a collaborative methods is whole-heartedly welcomed! However, each team member must carry their own weight in the development and documentation of a project. Afterwards, each collaborator will fill out a brief **Peer Review** form, which will allow you to discretely provide feedback on your collaborators. Grades will be given individually, and this feedback will be taken into account when factoring grades.

# NO TEXTBOOK BUT SUGGESTED READINGS

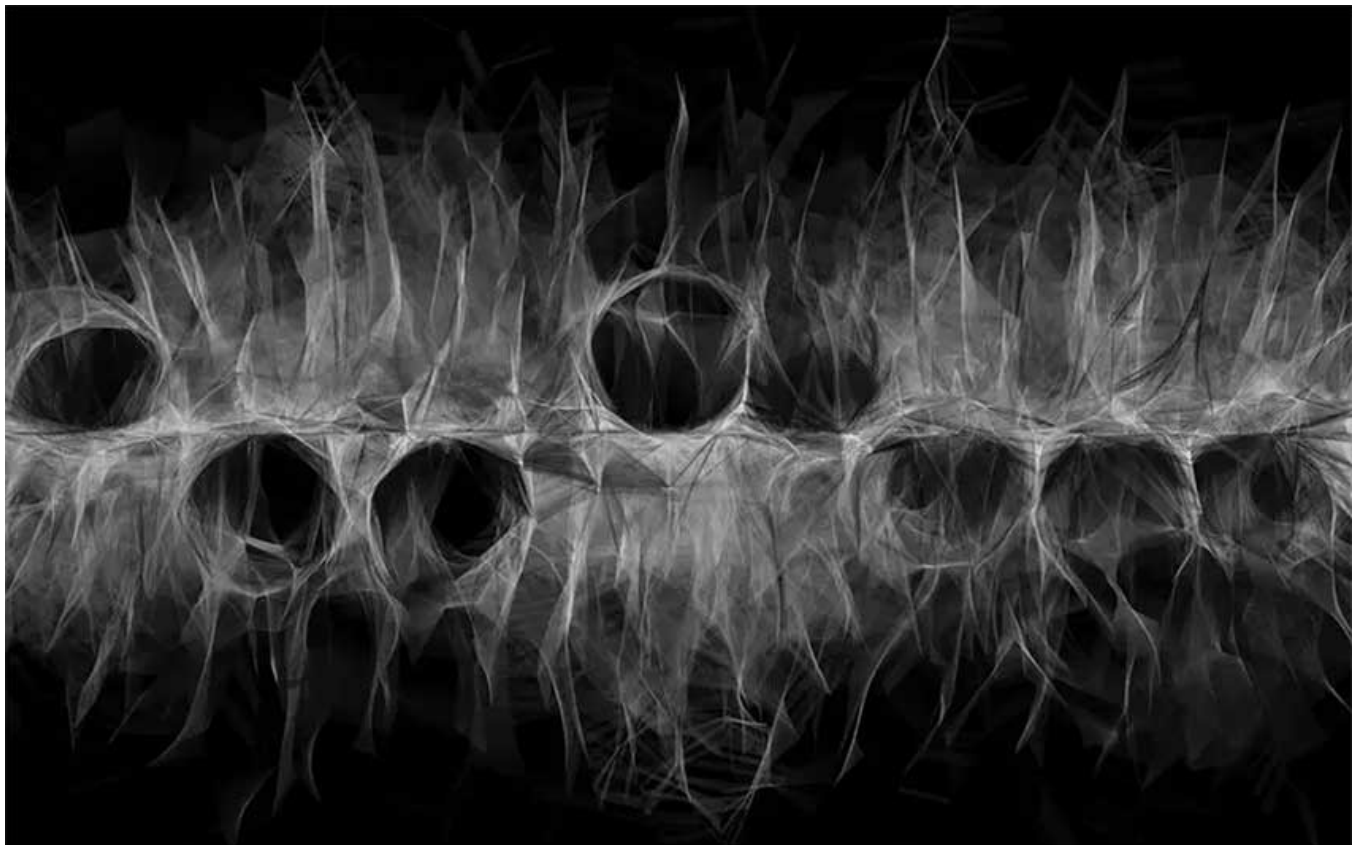
**There is NO required textbook for this class.** All readings will be OER based information. I will handout that information at the appropriate time.

While there will be no singular textbook, I suggest that you read EVERYTHING that you can get your hands on. No book gives you all of the answers that you seek, but every book has at least some information that adds to your general knowledge. As a contemporary mixed-media artist you've signed up for the need to know a large amount of aesthetic and digital methodology, as well as at least a little about everything Cultural, Social, Philosophical, Political, Moral. The following suggested reference list is merely a taste.



## BIBLIOGRAPHY OF SUGGESTED REFERENCE

- Programming Interactivity** - Joshua Noble 2012. O'Reilly
- The Nature of Code: Simulating Natural Systems with Processing** by Daniel Shiffman (Incredible reference for coding complex behaviors. Read anything from Daniel Shiffman)
- Audio-Vision. Sound on Screen.** Michel Chion. Columbia U Press, NY. 1990
- Social Engineering: The Science of Human Hacking** - Christopher Hadnagy. Wiley. 2018
- Ethics in the Digital Domain.** Robert Fortner. Rowman & Littlefield. 2020
- The Artist's Guide to Public Art: How to Find and Win Commissions** - Lynn Basa. Allworth. 2019
- AI Ethics** - Mark Coeckelbergh. MIT. 2020
- Python Crash Course: A Hands-On, Project-Based Introduction** - Eric Matthes. No Starch. 2019
- Learning Deep Learning: Theory and Practice of Neural Networks, Computer Vision, Natural Language Processing, and Transformers Using TensorFlow** - Magnus Ekman - Addison-Wesley Professional. 2021
- Learning OpenCV 4 Computer Vision with Python 3: Get to grips with tools, techniques, and algorithms for computer vision and machine learning.** Joseph Howse, Joe Minichino. Packt. 2020
- Radicalized: Four Tales of Our Present Moment** - Cory Doctorow - Tor Books. 2020
- Re-Imagining Value: Insights from the Care Economy, Cyberspace, and Nature.** Common Strategies
- Physical Computing: Sensing and Controlling the Physical World with Computers** - Dan O'Sullivan, Tom Igoe. Tomson. 2004
- Vehicles: Experiments in Synthetic Psychology** - Valentino Braitenberg
- Embedded System Design** - Peter Marwedel - Springer. 2019
- Art as Social Practice: Technologies for Change.** Judy Walgren, Xtine Burrough. Routledge 2022



# MATERIALS AND TOOLS NEEDED

## Open Source Alternatives and Downloads

There are many Interactive Arts+Tech related apps, programs and languages out there. Some are very powerful, some are specialized, some industry standards, and of course some don't quite live up to the promises. Here I will list a handful of very useful applications that actually do live up to the billing and can be used in a wide variety of interactive works. The list is by no means complete. I am only listing *Open Source Material*. These suggestions are meant as ways to get up to professional speed without having to continually pay for licensure. Both in and out of school.

The First two - TouchDesigner and Blender - are visual powerhouses. They are stable, free, open source, and industry-standard equivalent. Along with the learning of Python and the Arduino IDE, they cover most of your interactive needs. Admittedly, they have a steep learning curve, one that we can't fully cover within the scope of this class, but are definitely worth your effort. Both have a constantly growing feature set and are fully supported by a large user base. Importantly, they have a huge amount of learning material and guidance as well. Power User material.



TouchDesigner is a node based visual programming language for real time interactive multimedia content, mapping and projection, generative art work, It's been used by artists, programmers, creative coders, software designers, and performers to create performances, installations, and fixed media works. [TouchDesigner Download](#)



Blender is a 3D computer graphics software toolset used for creating animated films, visual effects, art, 3D-printed models, motion graphics, interactive 3D applications, virtual reality, and video games (in concert with Unity). Blender's features include modelling, UV mapping, texturing, digital drawing, raster graphics editing, rigging and skinning, fluid and smoke simulation, particle simulation, soft body simulation, sculpting, animation, match moving, rendering, motion graphics, video editing, and compositing. In the 3D world, there is not much that Blender can not do and it matches (or exceeds) all of costly industry standards such as Maya or 3DMax. [Blender Download](#)



Not an application but a programming language. Python is incredibly flexible, fairly intuitive and structures many (if not most) interactive and visual libraries/apps. For instance, many of the libraries that do the work for AI/Machine Learning are written with Python - e.g. Tensorflow. I suggest that you get to work on the basics of this wide reaching programming language immediately.



There are many different Micro-Controllers available currently. All of which need an IDE to develop your ideas and communicate with the MC. Arduino's IDE is the king because of its long history, stability, ease of use, add-on support and ubiquitousness. Since it plays nice with both software and hardware, is platform independent, almost every micro-controller can be developed within this integrated environment.



[atom.io](#) Atom was an excellent workspace for Python Coding, however it is getting sunsetted...Booooo. Github is now working with Microsoft Visual Studio... more boooooo. Visual Studio free version is not as good. [Sublime](#) is shareware.



Processing/p5.js are flexible software sketchbooks and languages for learning how to code within the context of the visual arts. They are particularly suited to developing generative visuals for projection and interactivity. P5.js is the javascript version of Processing, for use on the web. [P5.js download](#). [Processing Download](#)



Inkscape is a free and open-source vector graphics editor used to create vector images, primarily in Scalable Vector Graphics format. Other formats can be imported and exported. Inkscape can render primitive vector shapes and text. I use it when I need to fire up the Laser-cutter or simply need a quick SVG or other vector graphic. Easier to use than Illustrator. [Inkscape Download](#)



Free, open source, cross-platform audio software. **Audacity** is an easy-to-use, multi-track audio editor and recorder. Not as powerful as Audition, Pro Logic etc, but it's my go to when I want to work quickly and simply with audio files. [Audacity](#)

# MATERIALS AND TOOLS NEEDED

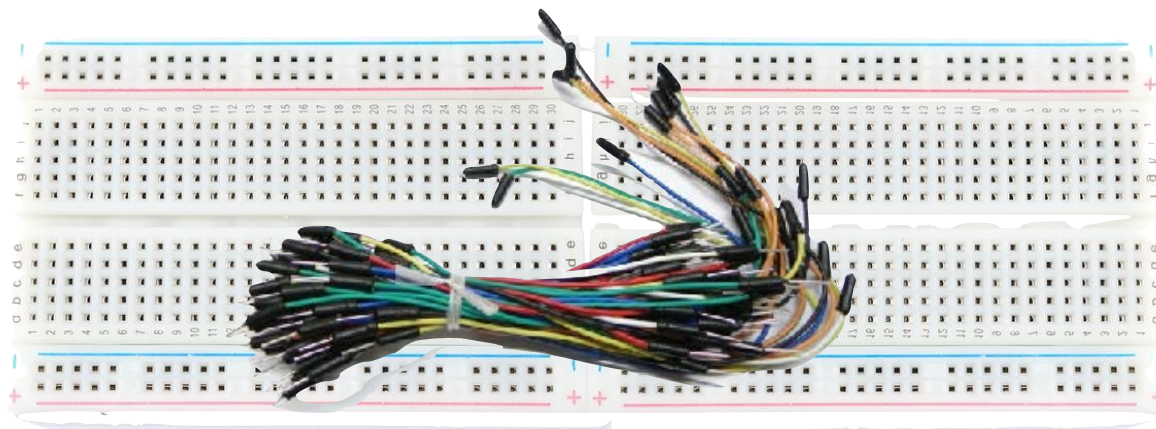
## Basic Electronics Project

One of the main reasons there is no specific textbook is that materials and tools for a mixed-media class tend to be costly. You can plan on spending anywhere from a \$0-\$500 (or more). The zero end would be if you choose to work only with found objects that you repurpose and use tools that either the school or others let you borrow. You do NOT need to spend a lot of money to make good artwork. The higher end would include tools and various miscellaneous parts, power, and components for your circuits. It is up to you how you want to proceed. I can speak from experience that if time and some polish is important to you, start saving. So that you only buy what you need for the specific project, we can talk about a parts list as you work on the specific proposals.



### Arduino Sensor Kit

To begin your experiments You will at least need to buy a Starter Pack Arduino Sensor Kit (~\$60-\$80). The kit is available from a variety of places but as with everything else, you get what you pay for regardless of the hype. Cheaper is NOT better. Cheap is usually missing/have wrong parts, drivers, might not include the proper micro-controller and or just plain won't work. Knock-off problems will not be accepted as excuses for not completing work. You will be required to buy various other components and breakout boards (sensors) as each project unfolds.





# MATERIALS AND TOOLS NEEDED

## Basic Electronics Project

The most basic of equipment to begin your experiments in electronic activity. These are not required for the class, but will soon be necessary as you progress.

A **soldering station** is a multipurpose power soldering device designed for electronic components soldering. This type of equipment is mostly used in electronics and electrical engineering. Soldering station consists of one or more soldering tools connected to the main unit, which includes the controls (temperature adjustment), means of indication, and may be equipped with an electric transformer. Soldering stations may include some accessories – holders and stands, soldering tip cleaners, etc. Though more expensive, my personal favorite - quality and ease of use - is the Hakko brand. Spend the money on this VERY important piece of equipment. It is WELL worth it.

A **digital multimeter** is a test tool used to measure two or more electrical values—principally voltage (volts), current (amps) and resistance (ohms). It is a standard diagnostic tool in the electrical/electronic industries.



# MATERIALS AND TOOLS NEEDED

## Basic Electronics Project

**Other tools and materials may be required *per project and as needed.***

If you are able, and plan on continuing to work with an Art and Technology blend, I would highly suggest that you build up an Electronic Workbench. Organizational boxes and shelves, strong lighting are highly recommended. As you are able, grab the necessary parts and tools to mock and build wide variety of electronic circuits for your interactive installations. It is suggested that you begin to acquire sets of components - resistors, capacitors, transistors, potentiometers, switches, etc, proper electronic building and testing tools and a variety of power sources. For instance, buying a few widths of conductive thread would make things handy if you plan on working with any kind of wearables.



## PLACES TO BUY ELECTRONIC MATERIALS

Amazon.com (Surprisingly good prices on this kind of stuff!)

Adafruit.com Great for sensors, kits and basics. Located in NY. Great learning source.

Sparkfun.com Great for sensors. Located in CO. Very good learning source.

Mouser - Huge selection of Electronic components

Digit-Key - Huge selection of Electronic components

Elexp.com (Looks like a scam, but it is not. Good prices on basic components. Located in NJ.)

Ebay - Cheap components from China. Long delivery times

Aliexpress - Cheap components from China. Long delivery times

Bangood - Cheap components from China. Long delivery times

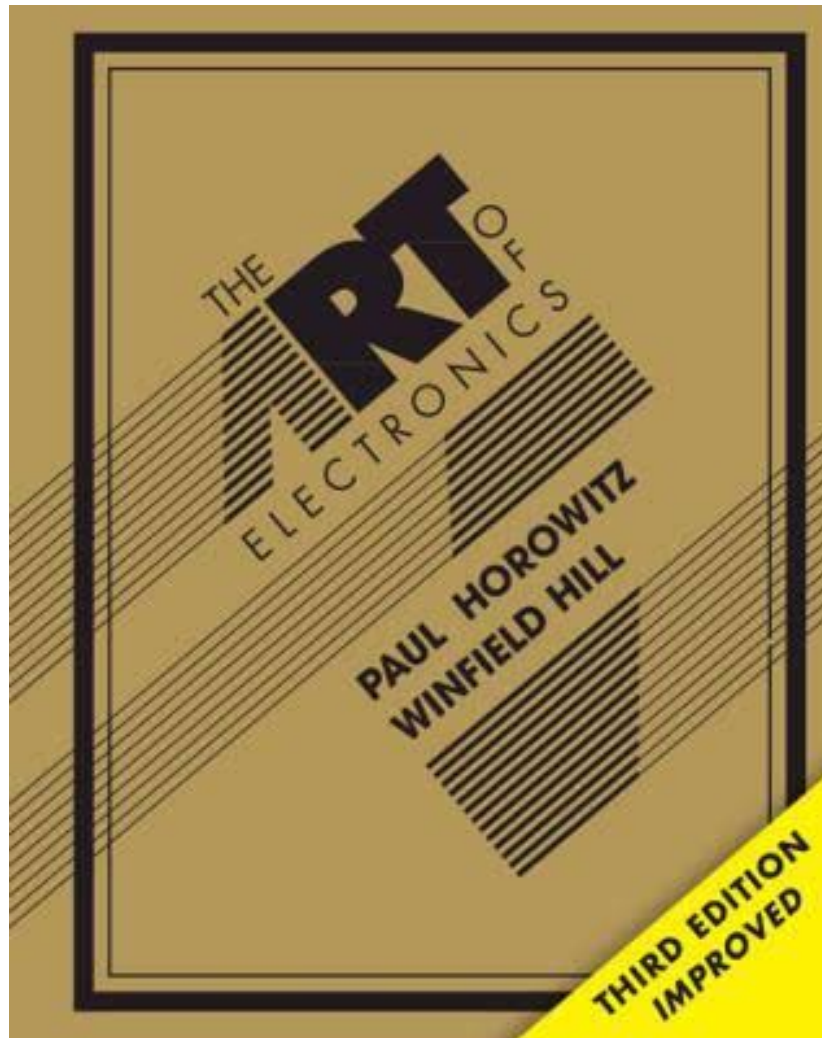
# MATERIALS AND TOOLS NEEDED

## Basic Electronics Project

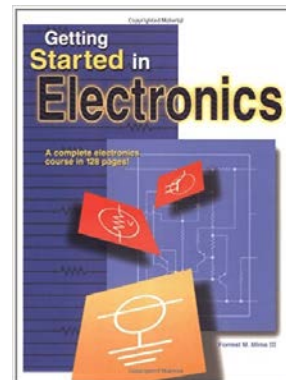
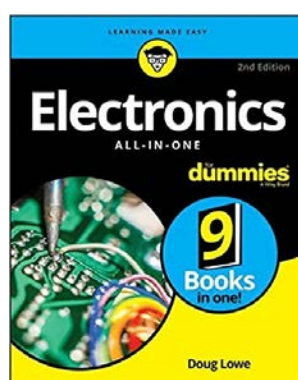
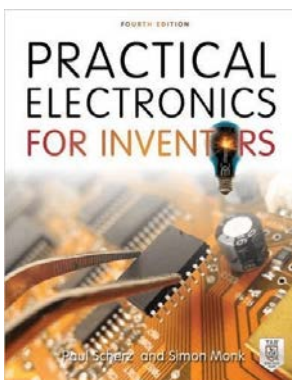
### ***SUGGESTED* REFERENCE**

Seminal book for beginning electronics. Thorough. Not required for class, but should be...

[Art of Electronics - Amazon](#)



Other suggested reference books. Get the most current edition.



# CLASS OVERVIEW

## **This class will consist of three projects, each based on various concepts of Art + Technology as Interactive and Immersive Design**

Each project includes a number of appropriate exercises, conceptual mapping and production based skill building. Testing will be based on vocabulary, concept expansion and application-language development.

**You do not need to do all of this (very partial) list. Other experiments in Arts+Tech can be proposed. The examples are just starting points to structure your 3 projects.**

### **Experimental Impulse - Purposeful Hacking - Re-purpose as Intent**

Basic Electronic Skills Discussion of basic electronics and circuitry. Clarifying the names and usages of various components. Considering the equipment and testing. Power Management.

Intro to Sensors both as Input and Output.

Introduction to Micro-controllers. Basics and Usage.

Using Arduino as a development environment. IDE and programming.

LED basic projects from the starter kit. How to expand on the basics.

### **Culture Jamming - Political and Social Collaboration in Interactive Media**

Art as Collaboration

Politics of Space.

Living Form - Social Activity as Art

### **Re-assigning Place - Environmental Projection**

Generative Art. Algorithm-based expression, and the nuts-and-bolts/grammar aspects specific to the Processing programming language.

TouchDesigner as Framework. Projection logistics

Scale as Idea.

### **Interactive Projection - Reactive Video**

*Script, Shoot, Edit and Project a Reactive Video into Small Scaled Space. Build Tableau Vivant Communication between Arduino and Processing. Depth perceptions using Kinect Projection Mapping. Developing and using Space as 3D environments.*

### **Sensoriums - Immersive and Interactive Spaces**

Development of multi-perceptual, sensor-based Immersive AND Interactive Installation.

*Sensor Control fundamentals. Sensor Circuits.*

Immersion as Sense of Space and Time

Multi-sensorial input as aesthetic. Discussion of Audio and Visual Contract

### **Wearable Experiences**

Sensors and Activity/Motion - Physiology as Meaning

Designing the Interface. Message as Medium.

3D Printing Fundamentals

### **Augmented Reality - Designing the Blend of Realities**

*Developing an Augmented Reality*

*Blender and 3D world building*

*Discuss 2D/3D perceptions and realities as epistemological.*

*Turn Static Data/Visual into Interactive Web Graphic.*

### **Artificial Intelligence as Art**

Using Cultural Data. NN/ML/Deep Learning as a way to find Visual Relationship

Computer Vision Malfeasance

Ethics of AI and the understanding of a fluid truth.

### **Art + Science Blending**

Art as Natural Systems. Human Interventions. Environment as Context.

IOT - TCP/IP Protocols - Communications over the world.

Getting readings as data with Arduino. Sensor Read and Response. Sending output through the net, esp32 controllers.

# CLASS SCHEDULE - 10 WEEKS

This schedule is **tentative and should be considered an overview**. It will be **adjusted** as the semester unfolds. There will also be a number of class exercises that help us better understand the concepts being discussed. I will hand out information at that time.

Wk - Dates	Project Overview	Activity and Discussion	Due Dates
<b>WK 1</b> Sep 22	<b>Intro Arts and Tech Proposals</b>	Discussion of Class Structure Materials and Tools Discussion Grant Writing as Clarity Research Guidance - Situating yourself in Art Explorations	Class Presentations Prior Work
<b>PROJECT 1 - THE EXPERIMENTAL IMPULSE</b>			
<b>WK2</b> Sep 27 - 29	<b>Hacking - Basic Electronics</b> Micro-Controllers Components Sensors	Micro-Controller Introductions Embedded Systems <i>Basic Circuitry</i> <i>IOT Communications - ThingSpeak</i>	Sensor Experiment Due
<b>WK 3</b> Oct 4-6	<b>Experimental Impulse Re-Purposing</b> Adding <i>Content</i> to your Experiments	Re-purposing Objects as Changing <i>Intent</i> Roundtable Discussions -Adding Content to your Experiments Artist Review - PacificStandardTime	Re-Purposing Exercise Due
<b>WK 4</b> Oct 11-13	<b>Project 1 Experimental Impulse Presentations</b>	Class Critiques. Present Project 1 to Class Documentation Possibilities	<b>Exercise 1 Due</b>
<b>PROJECT 2 - TECHNOLOGIES OF CHANGE - ART AS SOCIAL ACTIVITY</b>			
<b>WK 5</b> Oct 18 -20	<b>Art as Collaboration Art Social/Cultural Action</b>	Project 2 Class Discussions Develop Groups - Discuss Collaborations Can Art be Social Activity? Should Art have Social Value?	Project 2 Proposals Due
<b>WK 6</b> Oct 25 - 27	<b>Politics of Space</b> Social Activity as Construct <b>Culture Jamming</b> Public Art. Disruption as Art <b>Environment as Context</b>	Where is Why. Visual Impact and Message TouchDesigner Demo - Video Mapping. Targeting Projections Artist Profile - Culture Jamming Roundtable Discussion- Working in the Environment - Challenges and Response	Video Mapping Exercise Due
<b>WK 7</b> Nov 1 - 3	<b>Arts + Science Technologies as Change</b>  <b>Project 1 - Culture Jamming Presentations</b>	Discussion: AI as Art: Way of Seeing, Creating Truth Working with New Biologies - Cultural data Artist Profile: <b>Beall Center</b> visit  Class Presentations of Project 2	<b>Project 2 Due</b>
<b>PROJECT 3 - SENSORIUMS - IMMERSIVE AND INTERACTIVE</b>			
<b>WK 8</b> Nov 8-10	<b>Project 2 -Sensoriums: Immersive and Interactive</b>  Augmented Reality Real VS Imagined	Sensoriums - Developing a Whole, Lived Experience  Designing the Experience - Augmented Reality Discussion What is Interactivity? Usability? How is that Message? <b>Artist Profile</b> Augmented Reality Designer Blender - 3D World	Project 3 Proposals Due
<b>WK 9</b> Nov 15 - 17 Nov 22	<b>Wearable Experiences</b> Using Sensors as Active Input	Designing with Senses beyond Sight Artist Profile - Embodied Encounters - From BEALL Center Archives Connections - 3D Printing Development TinkerCad or Blender, Cura/Slicing, 3D Print Materials + Plastics	3D Print file Due
<b>THANKSGIVING BREAK - Nov 24-25th</b>			
<b>WK 10</b> Nov 29 - Dec 1	<b>Immersion Projection Logistics</b>	TouchDesigner Demo - Generative Art Installation and Projection - Aesthetic idea developing Projection Logistics - Organizing, Scale, Powering, Lighting Artist Profile: Large Scale Video Projection Artist	
<b>Final</b> Dec 6th	<b>Final - Presentations</b>	Presentations of Project 3	<b>Project 3 Due</b> Popcorn Due

# 1 PROJECT ONE - THE EXPERIMENTAL IMPULSE

## HACKING INTENT - RE-PURPOSING OBJECTS

### CHANGE AN OBJECT(S) FROM IT'S ORIGINAL IDEA, RECEPTION, USE AND INTENT TO A DIFFERENT CULTURAL, SOCIAL OR POLITICAL CONSIDERATION

What does it mean to be Experimental?  
Breaking Things - Hacking Intent  
Defining Context, Relation, Interaction

Basic Electrical Considerations - Electricity, Components, Circuits, Sensors, Microcontrollers, Power



## Experimental Impulse - LA Art in the 60-80's

**California Institute of the Arts (CalArts) / REDCAT**  
*The Experimental Impulse*

*Experimental Impulse* explores the pivotal role of experimentation in artmaking in L.A. during a time when the city was emerging as an important artistic center. Conceived from the perspective of artists who currently live and work in Los Angeles, this exhibition offers new insights into the understanding of developments in the art world between 1945 and 1980, and in doing so bridge the distance between earlier developments and current practices. Operating from a position that context informs content, *Experimental Impulse* examines critical moments of artist-initiated/organized commerce and exchange that were responses to the lack of opportunities in mainstream institutions within the relatively young artistic landscape of Los Angeles. The exhibition identifies and focuses on key moments that represented crucial experiments in art-making and presenting: the *Formal Program* at CalArts and the *Womanhouse*; the short-lived *School of Design* program at CalArts that merged ideas of environmental design, humanistic psychology and art (1969-73); self-published ideas/journals such as *Sereno* (1958-64), *Yes* (1974-81), *Yes!*, *Performance* (1978-97) and *LAICA Journal* (1974-87); the radical convergence of art, music and publishing within the Los Angeles punk scene; and *Studio Z*, a weekly gathering of artists at David Hammer's studio on Stouven Avenue.



# 1

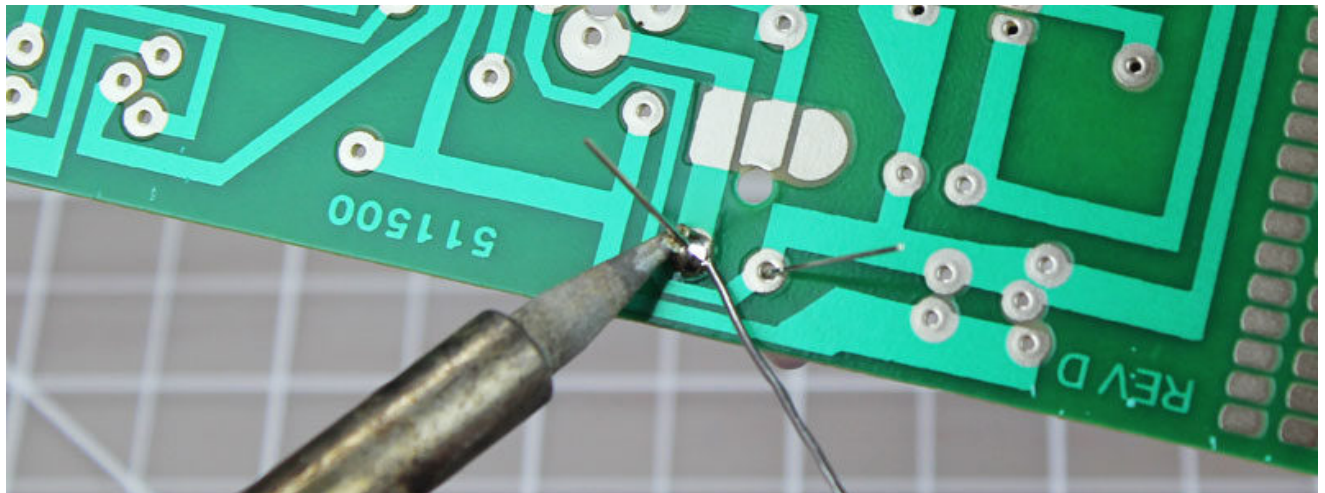
## PROJECT ONE - EXPERIMENTAL IMPULSE

### Basic Electrical Considerations

#### BASIC ELECTRICAL CONSIDERATIONS

An **electronic circuit** is composed of individual **electronic components**, such as **resistors**, **transistors**, **capacitors**, **inductors** and **diodes**, connected by conductive **wires** or **traces** through which **electric current** can flow. To be referred to as *electronic*, rather than *electrical*, generally at least one **active component** must be present. The combination of components and wires allows various simple and complex operations to be performed: signals can be amplified, computations can be performed, and data can be moved from one place to another.<sup>[1]</sup>

Circuits can be constructed of discrete components connected by individual pieces of wire, but today it is much more common to create interconnections by photolithographic techniques on a laminated **substrate** (a **printed circuit board** or PCB) and **solder** the components to these interconnections to create a finished circuit. In an **integrated circuit** or IC, the components and interconnections are formed on the same substrate, typically a **semiconductor** such as **silicon** or (less commonly) **gallium arsenide**.<sup>[2]</sup>



#### DIGITAL OR ANALOG

An electronic circuit can usually be categorized as an **analog circuit**, a **digital circuit**, or a mixed-signal circuit (a combination of analog circuits and digital circuits). The most widely used **semiconductor device** in electronic circuits is the **MOSFET** (metal-oxide-semiconductor **field-effect transistor**).

In **digital electronic circuits**, electric signals take on discrete values, to represent logical and numeric values

**Analog electronic circuits** are those in which current or **voltage** may vary continuously with time to correspond to the information being represented. Analog circuitry is constructed from two fundamental building blocks: **series** and **parallel** circuits.

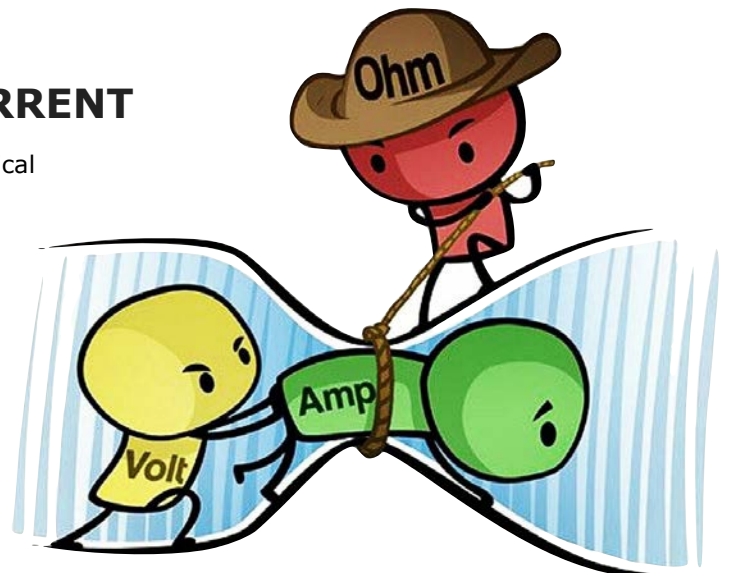
#### VOLTAGE, RESISTANCE, CURRENT

Current, voltage, resistance, Ohm's Law, and practical ways to avoid damaging yourself or your board.

$$V = I / R$$

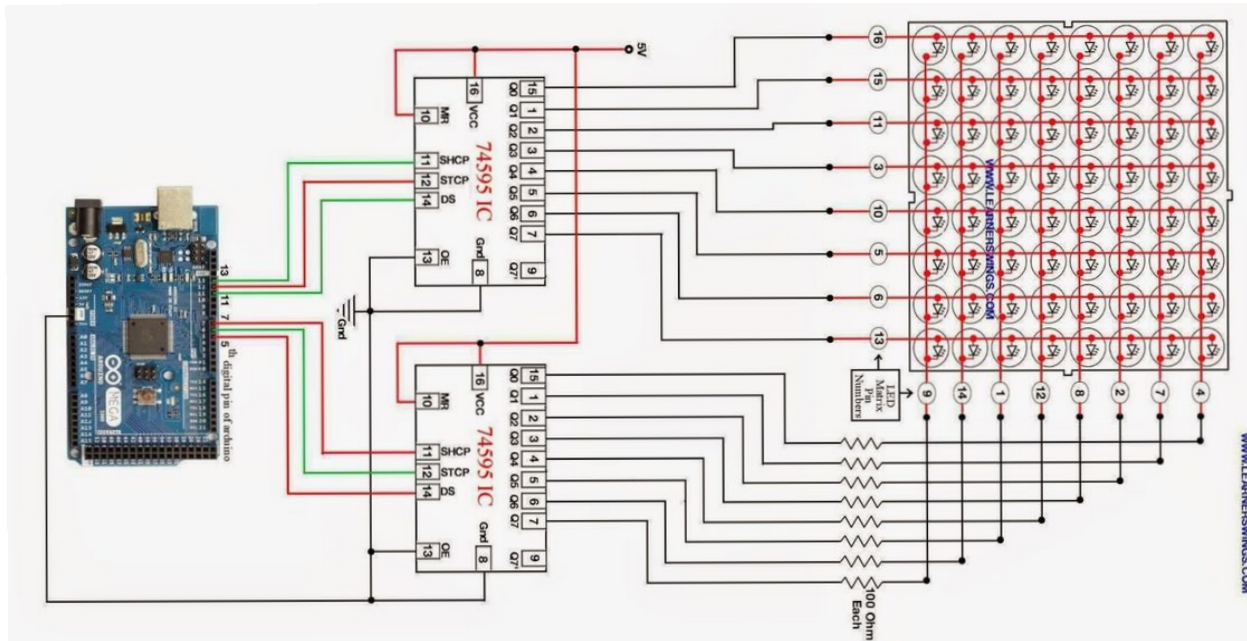
$$I = V / R$$

$$R = V / I$$



# 1 PROJECT ONE - THE EXPERIMENTAL IMPULSE

## Basic Electrical Considerations



## SERIES VS PARALLEL CIRCUITS

## POWER MANAGEMENT



## BASIC ELECTRICAL DEMO

MicroController Basics

Components

Sensors

Bad code won't break your Arduino but bad wiring can  
Circuits

Series Vs Parallel

Conditioning electricity. Reading resistor codes.

Resistance between power and ground

Powering your Circuits. Power Management.

Using a multimeter to measure voltage, resistance and continuity.

Reading a simple schematic; nodes and wires. EasyEDA - free, online schematic generator.

What is a breadboard? Using a breadboard.

Voltage dividers resistor/photoresistor, resistor/LED.

Wiring up a switch with pullup resistor.

Wiring up an LED with current limiting resistor. Adding transistors, IR readings.

Wiring up a photoresistor voltage divider (as a basic analog sensor).

Soldering basics

# 1 PROJECT ONE - THE EXPERIMENTAL IMPULSE

## Using the MicroController

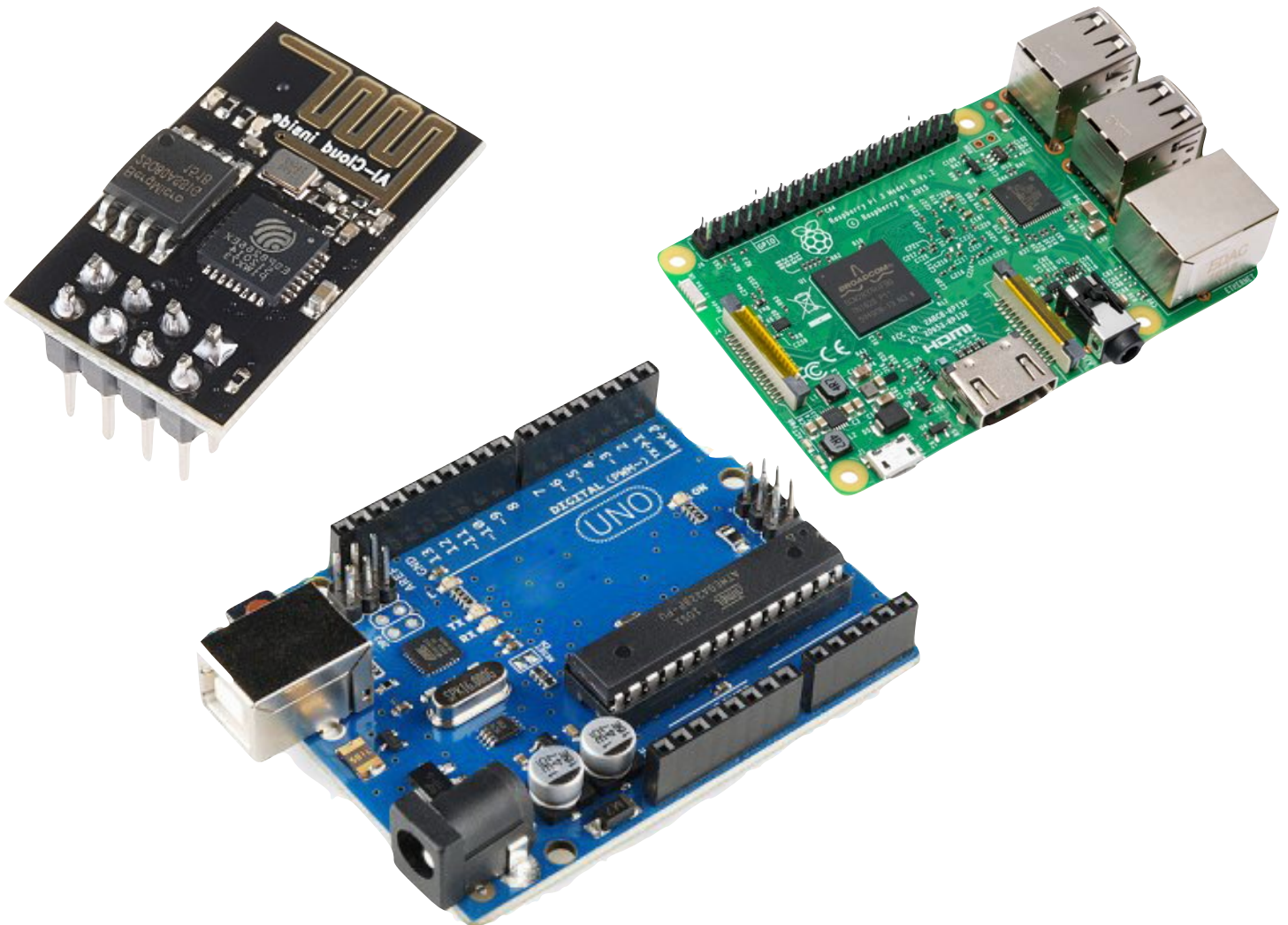
You will need a variety of micro-controller boards as we progress through the stages of projects. We will start with the classic Arduino UNO. If WIFI is needed, then we will use an ESP32/ESP8266 or if more processing power is necessary, we will use the Raspberry Pi.

### MICROCONTROLLERS

The **Arduino Uno** is an [open-source microcontroller board](#) based on the [Microchip ATmega328P](#) microcontroller and developed by [Arduino.cc](#).<sup>[2][3]</sup> The board is equipped with sets of digital and analog [input/output](#) (I/O) pins that may be interfaced to various [expansion boards](#) (shields) and other circuits.<sup>[1]</sup> The board has 14 digital I/O pins (six capable of [PWM](#) output), 6 analog I/O pins, and is programmable with the [Arduino IDE](#) (Integrated Development Environment).

The **ESP32/ESP8266** are low-cost [Wi-Fi](#) microchips with full [TCP/IP stack](#) and [microcontroller](#) capability produced by manufacturer Espressif Systems.

The **Raspberry Pi** is a series of small [single-board computers](#). All models feature a [system on a chip](#) (SoC) with an integrated [central processing unit](#) (CPU) and [on-chip graphics processing unit](#) (GPU). Processor speed ranges from 700 MHz to 1.5 GHz; on-board memory ranges from 256 MB to 4 GB [random-access memory](#) (RAM). [Secure Digital](#) (SD) cards for the operating system and program memory. For video output, [HDMI](#) and [composite video](#) are supported, with a standard 3.5 mm [tip-ring-sleeve](#) jack for audio output. Lower-level output is provided by a number of [GPIO](#) pins, which support common protocols like [I<sup>2</sup>C](#)



# 1 PROJECT ONE - THE EXPERIMENTAL IMPULSE

## Using the Micro-Controller

Focus on the Arduino Microcontroller and it's basic electronics. We will experiment with offscreen modes of input and output, and create physical-digital hybrids utilizing both the Arduino/Micro-controller boards and sensor circuitry.

An introduction and contextualization of the Arduino Microcontroller.  
Brief history of the Arduino  
What is a Micro-controller? What are the different usages?

We will prototype basic electronic circuits

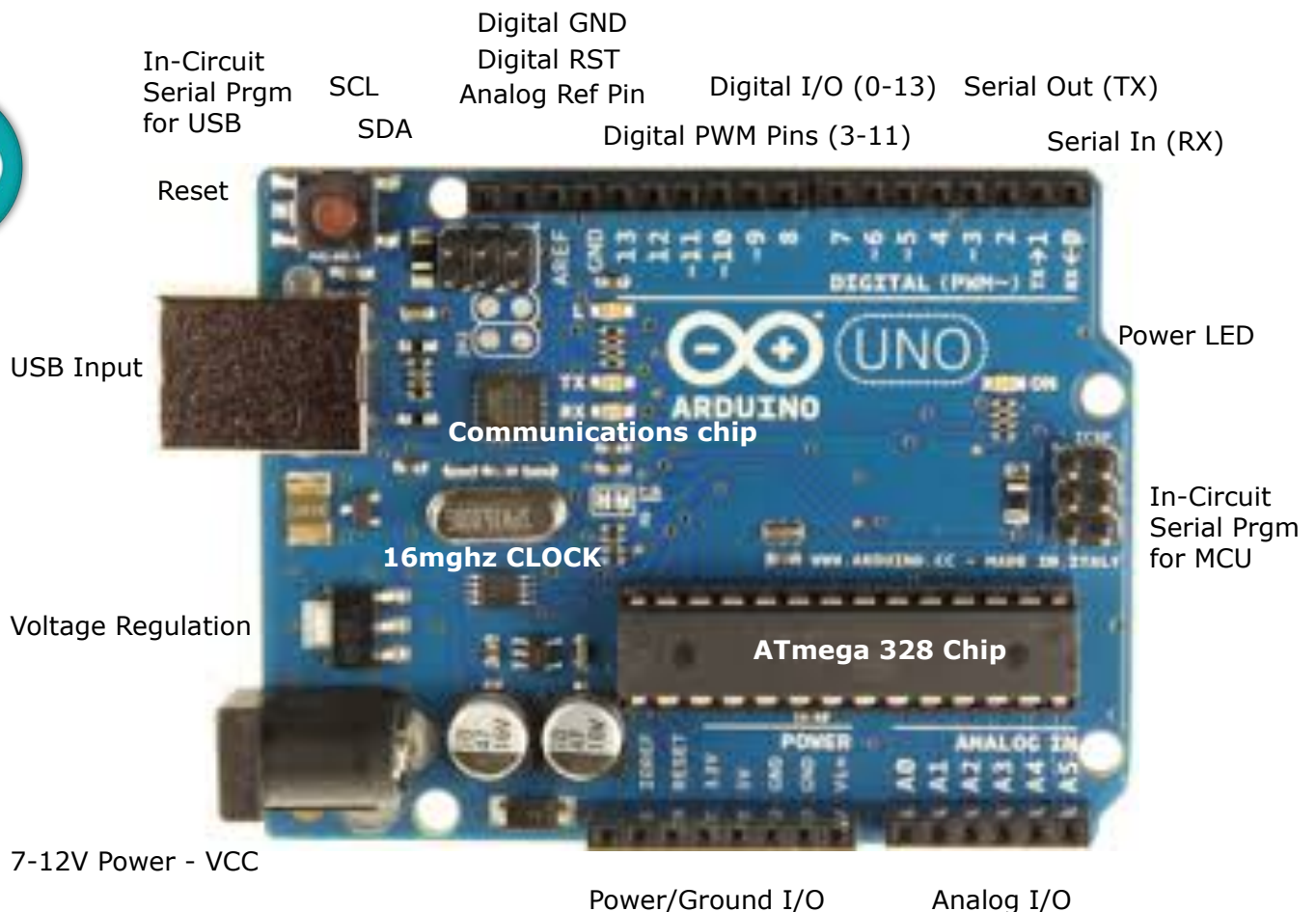
Use the Arduino's digital input and output with LEDs, buttons, switches, etc.

Use the Arduino's analog input and output to achieve better sensing and feedback make things move with small motors

Incorporate sensors which allow you to create more complex physical interactions communicate between Processing

- **Digital Pins:** How the pins work and what it means for them to be configured as inputs or outputs.
- **Analog Input Pins:** Details about the analog-to-digital conversion and other uses of the pins.
- **PWM:** How the analogWrite() function simulates an analog output using pulse-width modulation.
- **Memory:** The various types of memory available on the Arduino board.

### QUICK TOUR AROUND THE MICROCONTROLLER



# 1 PROJECT ONE - THE EXPERIMENTAL IMPULSE

## Arduino IDE

### CODING WITH THE ARDUINO IDE

- Navigating the Arduino integrated development environment (IDE) void setup() and void loop()
- Writing a blinking sketch from scratch
- Using built-in help in the IDE
- Downloading firmware to the Arduino
- Blinking the LED
- Variables, variable types, and scope Doing math, comparisons, etc. Control logic (if/else)
- Iteration (for loops and while()) Avoiding blocking code
- Driving a hobby servo with the Servo library
- Using a transistor circuit to drive heavier loads
- Adding libraries from the web for greater functionality:
- Nesting indefinitely



**Verify/Upload** **Save** **Serial**

**MUST HAVE 2 FUNCTIONS**

**setup()**  
Initializes Program

**loop()**  
Function runs continually

```
#include "Adafruit_CCS811.h"
Adafruit_CCS811 ccs;

void setup() {
  Serial.begin(9600);
  Serial.println("CCS811 test");

  if(!ccs.begin()){
    Serial.println("Failed to start sensor! Please check your wiring.");
    while(1);
  }
  //calibrate temperature sensor
  while(!ccs.available());
  float temp = ccs.calculateTemperature();
  ccs.setTempOffset(temp - 25.0);
}

void loop() {
  if(ccs.available()){
    float temp = ccs.calculateTemperature();
    if(!ccs.readData()){
      Serial.print("CO2: ");
      Serial.print(ccs.getCO2());
      Serial.print("ppm, TVOC: ");
      Serial.print(ccs.getTVOC());
      Serial.print("ppb Temp:");
      Serial.println(temp);
    }
    else{
      Serial.println("ERROR!");
      while(1);
    }
  }
  delay(500);
}
```

**Console**  
Info about the machine, code or connection

35 Node32s, Default, 80MHz, 115200, None on /dev/cu.usbserial-0001

### USING LIBRARIES AS ADD-ONS



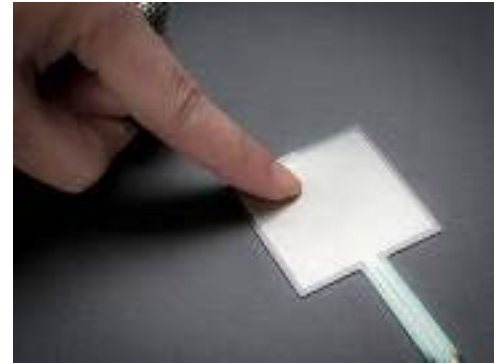
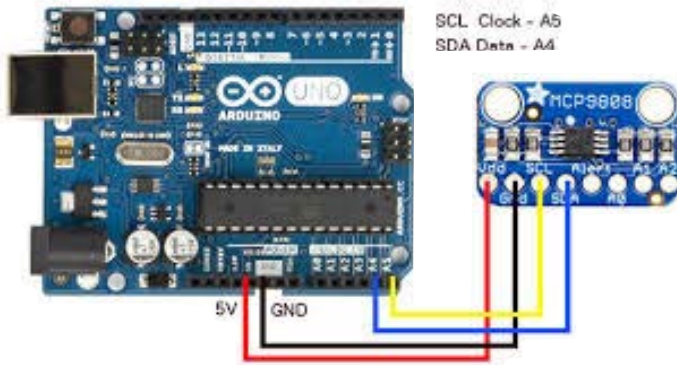
Libraries are a collection of code that makes it easy for you to connect to a sensor, display, module, etc. For example, the built-in LiquidCrystal library makes it easy to talk to character LCD displays. There are hundreds of additional libraries available on the Internet for download. The built-in libraries and some of these additional libraries are [listed in the reference](#). To use other microcontrollers within the Arduino IDE, such as the ESP32, you will have to add a separate library through the Library Manager.

# 1 PROJECT ONE - THE EXPERIMENTAL IMPULSE

## Sensor Control and Interaction

### Arduino/Sensors -

Language for Arduino - Sensor Control. This section of exercises would include programming and micro-processor control for sensory interaction.



### Sensor Control Design - Motion



# 1 PROJECT ONE - THE EXPERIMENTAL IMPULSE

## Sensor Control and Interaction

Sensuous Design - **Sight, Touch, Smell, Sound, Taste Sensors**



Candice Lin and Patrick Staff, *LESBIAN GULLS, DEAD ZONES, SWEAT AND T*, 2017.

## Build a collaborative "Situation" Disruption in Social/Cultural/Political space

### Possible Lecture and Discussion Topics

Art as Disruption - Culture Jamming  
 Social Art Tactics - Social as Interactive  
 Collaboration as Epistemological Experience  
 Inter-Relation/Cloud/Data-Sourcing/Internet Interactions  
 Big Data Knows where you are....Control/Privacy/Moral  
 Graffiti vs Art - Expression Motives



## Praba Pilar *Techno - Tamaladas*

### Latinx Politics - Resistance, Disruption and Power

*I live alongside half of the world's tech billionaires, in the unceded territories of the Chochenyo and Ramaytush Ohlone peoples, presently occupied by Silicon Valley extraction corporations. Many of us in the Bay Area personally experience how these technology corporations have deepened wealth inequality, precarity, evictions, homelessness, poverty, and displacement. If you are not a high paid executive or programmer, but an artist, teacher, nurse, landscaper, or low wage worker in the 'sharing economy,' you can easily be pushed to the margins - displaced, dislocated, and dispossessed. Rather than benefiting, many of us watch the technology sector's monopoly corporations disinvest locally through [tax havens](#), normalize extreme surveillance, shatter the commons, and demolish civic society around the world. We are front line witnesses of [21st century techno colonialism](#).*

*Against this daily palpable divide, I have been working on the Techno-Tamaladas, an art project of performances, social practice, media making, gatherings, cultivation, harvesting, and events. The project is based on maíz and nixtamalization as Indigenous technologies of life. It asks publics to reimagine technological development by affirming the concepts of relational accountability and reciprocity of the Indigenous and Afro Americas. Through community tamaladas, we share possibilities of resurgence amidst our communities in crisis.*



# 2

## PROJECT TWO - TECHNOLOGIES OF CHANGE SOCIAL ACTIVITY AS ART



Can't Help Myself - Peng Yu Sun Yuan - Theresa Bruno



Social Climber - Theresa Bruno



Olafur Eliasson - Ice Watch



# 2

## PROJECT TWO - TECHNOLOGY AS CHANGE Art and Science - Natural Systems as Epistemological.

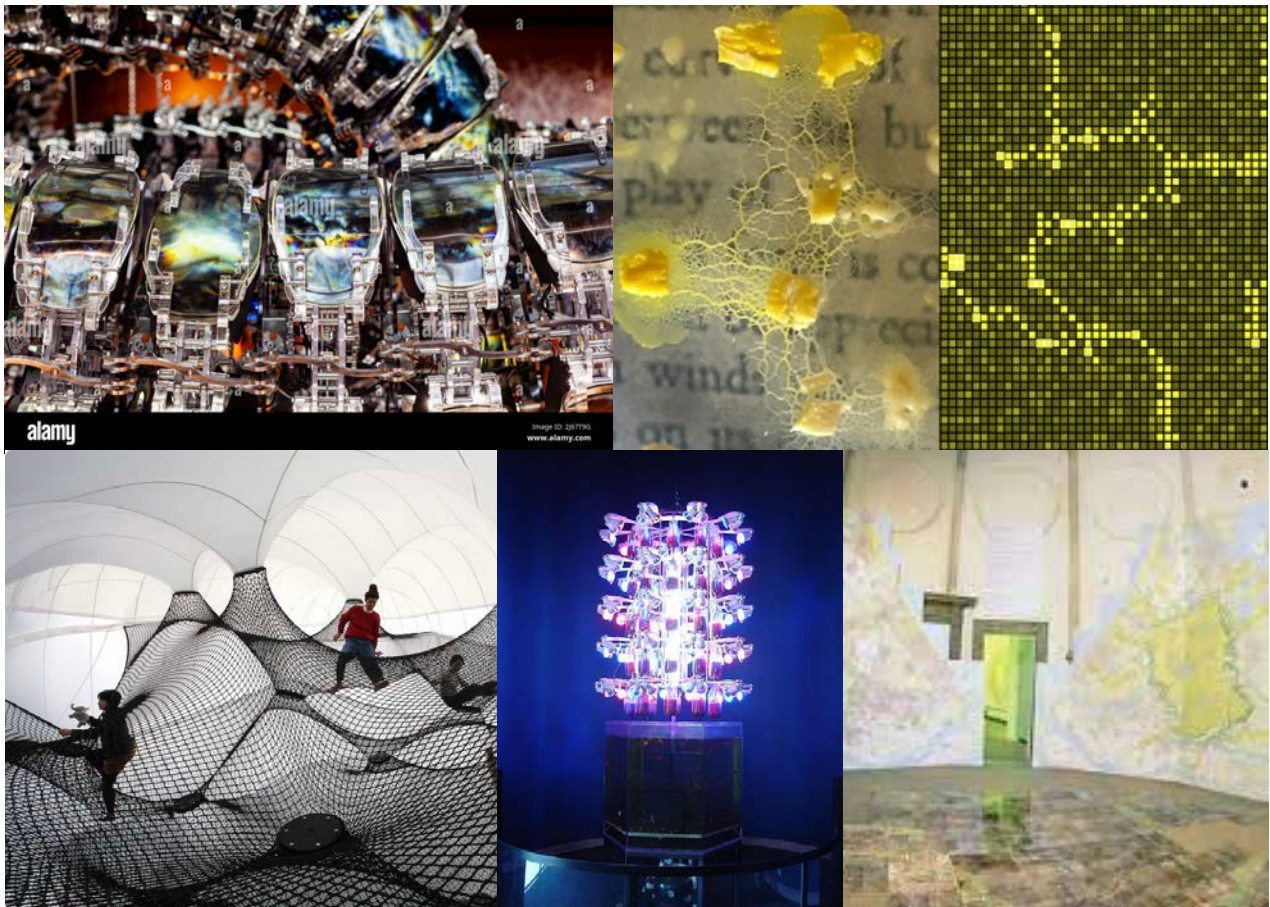
Artists who use the Art+Sciences blend methodologies of visual strategy with the power of Science as an exploration of natural systems. It's practitioners often draw on multi-disciplinary collaborations as a frame for art as social practice - rethinking theories, knowledges and the concept of community. "How nature's patterns and human behavioral patterns overlap"...

### Possible Topics

Toward an Anthropology beyond Human - New Ways of Seeing and Being  
Art and Science, Why both grow more powerful together, rather than separately.  
Art across Species  
Art and Collaboration - Is Science and Art really that different?  
Microbiological Organisms as a Model for Thinking  
Does Slime-Mold Gentrify?  
Ecosystemic Inteligences.

### Simone Osthoff in Women, Art and Technology

*The quality of the future, from the biophysical to social ecologies, will certainly depend on ethical implications of present technological and aesthetic choices, enhancing or erasing the potential for personal and collective agency and actions."* -



# 2

## PROJECT TWO - TECHNOLOGY AS CHANGE

### Artificial Intelligence as Artist - ML Based Art

#### Possible Topics in AI

AI as Art. What is the Art?  
Who is the Artist? Programmer, Machine, Marketer  
What is the relationship between Human and AI?  
Trending towards Data Science. What is AI good for, not good for?  
Ethics in AI, Computer Vision  
Who is the Artist? Programmer, Machine, Marketer  
Bias in Machine Learning  
Can Art be about something other than visual? Deep Learning relationships with Information?

#### Google Collab - Art Machine.

Put in text, get AI art.  
This notebook is by Hillel Wayne ([website](#), [twitter](#)). It's based on [this notebook](#) by Katherine Crowson ([github](#), [twitter](#)), simplified to make it more accessible to nonprogrammers. The original technique was discovered by <https://twitter.com/advadnoun>.  
If you want to learn more about AI-generated art, [this](#) is a great introduction. It lists other generators at the end.

#### Learning to Smile



The ellipsoid pavilion – which has more than a passing resemblance to a human brain – is formed from a fibreglass exoskeleton containing an intricately woven network of photoluminescent fibers. This light-emitting material has the capacity to pulsate in an array of colours that react to the facial expressions of the people that surround it. This real-time response is achieved by collecting data from several cameras, which scan the emotions of passers-by and catalogue them as either anger, contempt, disgust, fear, happiness, neutral, sadness or surprise. In effect, the interpretation of this data allows the [sculpture](#) to 'smile back' at its audience (or perhaps sneer), as well as pulsate light patterns in relation to physical movement, crowd size and noise levels.

# 2

## PROJECT TWO - TECHNOLOGY AS CHANGE

### Artificial Intelligence as Artist - ML Based Art

#### Examples of AI-Based Art Installations



Year Artist Technology Theme Medium Feature Date

<p><b>Hye Min Cho</b></p> <p>Neural Radiance Fields applied to a rotating butterfly</p> <p>NeRF</p>	<p><b>Daniël Korssen</b></p> <p>Create a shared playlist on Spotify and create a digital dance party by animating each dancer with PoseNet</p> <p>PoseNet</p>	<p><b>Rafael Redondo</b></p> <p>Extract depth maps with MegaDepth and animate paintings in 3D</p> <p>MegaDepth</p>	<p><b>Errthang is alive</b></p> <p>StyleGAN2-ADA trained on myths and interpolated with music</p> <p>StyleGAN</p>
---	---	--	---

Paris-based ML researcher and Google Arts & Culture Lab resident [Emil Wallner](#) curated a collection of eclectic ML experiment projects, such as training a StyleGAN2-ADA on myths and interpolating it with music, a robot that writes poems on the beach, and Neural Radiance Fields "applied to a rotating butterfly."

### Discussing Scale as Political and Cultural Messaging



#### Large-Scale Video Projection Considerations

Mapping as Context. Environment Considerations  
 Video Wall Settings  
 Isometric Alignment and Edge Blending  
 Computer or Non-Computer Solutions  
 Using Multiple Projections  
 Pixel Pitch



**Krzysztof Wodiczko**  
**"The Tijuana Projection" (2001)**

*After a two-year process, Krzysztof Wodiczko's project culminated in two evenings of projections on the 60-foot-diameter façade of the Omnimax Theater at the Centro Cultural Tijuana. Known for his large-scale outdoor projections, with "Tijuana Projection/Proyección en Tijuana" Wodiczko wanted to use progressive technology to give voice and visibility to the women who work in the maquiladora industry in Tijuana. The projections consisted of prerecorded materials interspersed with live feeds from a headset with an integrated camera and microphone designed by the artist and worn by the participating women. This was Wodiczko's first time creating a projection incorporating live segments, adding a certain immediacy and potency to the presentation of these very personal accounts.*

*In preparation for the projection, the artist conducted nearly one year of workshops with eight participating women. His work with these eight women was facilitated through two organizations based in Tijuana, (Factor X and Yeuan), that are dedicated to helping women who face difficulties in the workplace or at home. The pre-recorded and live personal testimonies given by the eight women focused on work-related and sexual abuse, family disintegration, alcoholism, and domestic violence. The scale at which these stories were heard and witnessed in the open space of the city and by an audience of more than 1,500 on the Centro plaza over the two nights created a powerful impact and literally magnified what so often never gets spoken about. The projections took place February 23 and 24, 2001*

# 3

## PROJECT 3 - SENSORIUMS

Interactive Immersive - Sensorial Experiences

### ***Design and Implement a Large Scale Immersive and Interactive Experience based on Sensory Input***

#### **Possible Topics**

Culture Sensorium/ Inter-Relational Architectural Spaces  
Designing Space, Experience rather than Form  
Interactive Architecture - Sensoriums  
History of Installation, Site-Specific Art and Performance  
Multi - Sensory inputs - Seeing Yourself Sensing  
Perspective as Immersion



# 3

## PROJECT 3 - SENSORIUMS

Interactive Immersive - Sensorial Experiences

### Sensor-Based Immersive Environments



# 3

## PROJECT 3 - SENSORIUMS

Interactive Immersive - Sensorial Experiences

### Examples of Multi-Sensorial Experiences as Interactive



Smell Dating - Sam Levine and Tega Brain



**BEALL**

#### BEALL CENTER VISIT

research and exhibitions that explore new relationships between the arts, sciences, and engineering, and thus, promote new forms of creation and expression using digital technologies

# 3

## PROJECT 3 - **SENSORIUMS**

### Wearable Interfaces - Body as Interactive Site

#### ***Design a Wearable/Personal Interface - Mock-up***

##### **User interface Design Considerations**

Nanotechnologies - Body as *Interactive Site*

Browser Model - Dynamic Content

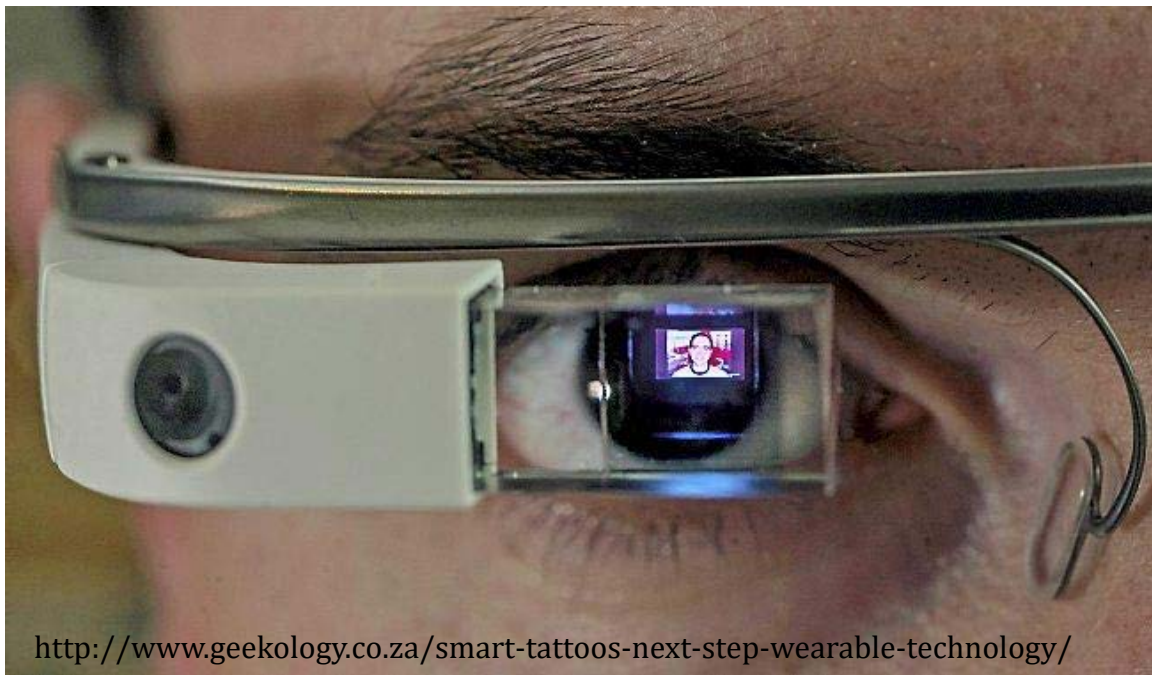
User Research - **UI Professional possibilities**

Group Think - Transparent Experience

How much is too much? Is Personal Data Personal?

Navigational Theory

3D Printing Basics

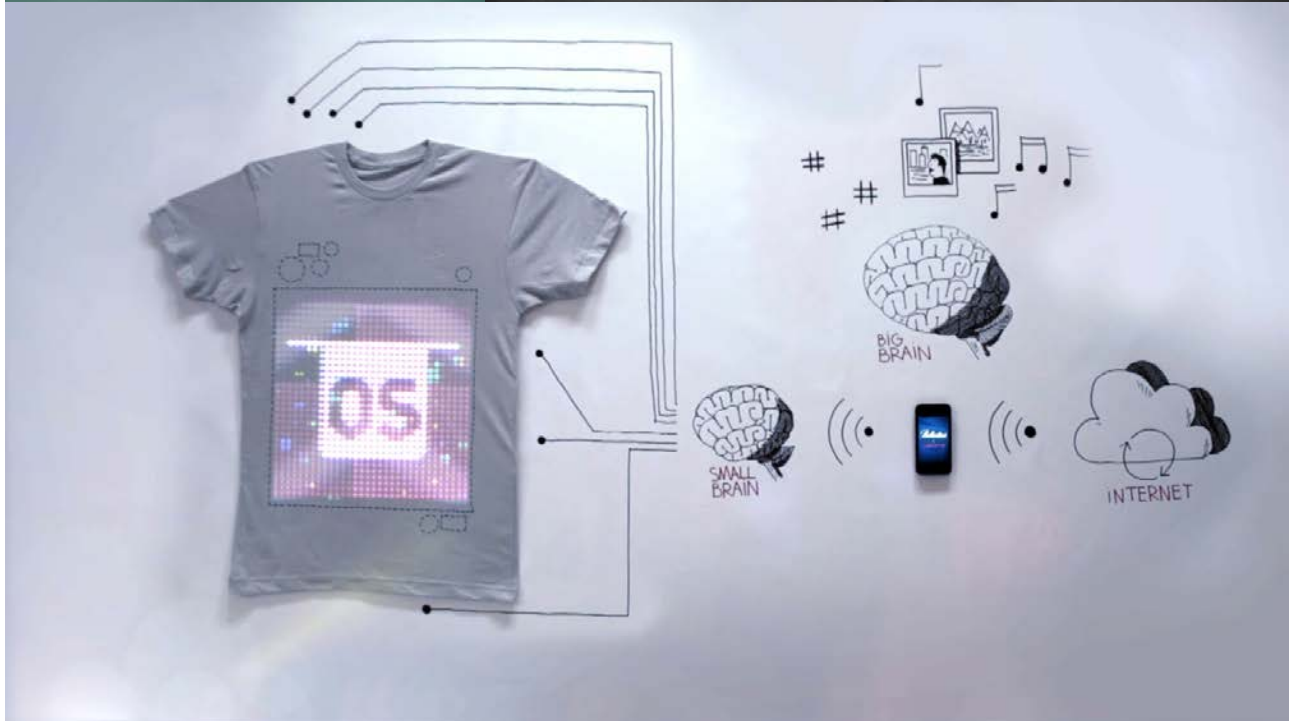


# 3

## PROJECT 3 - SENSORIUMS

### Wearables - Designing the Interface

#### Examples of Wearable Interfaces

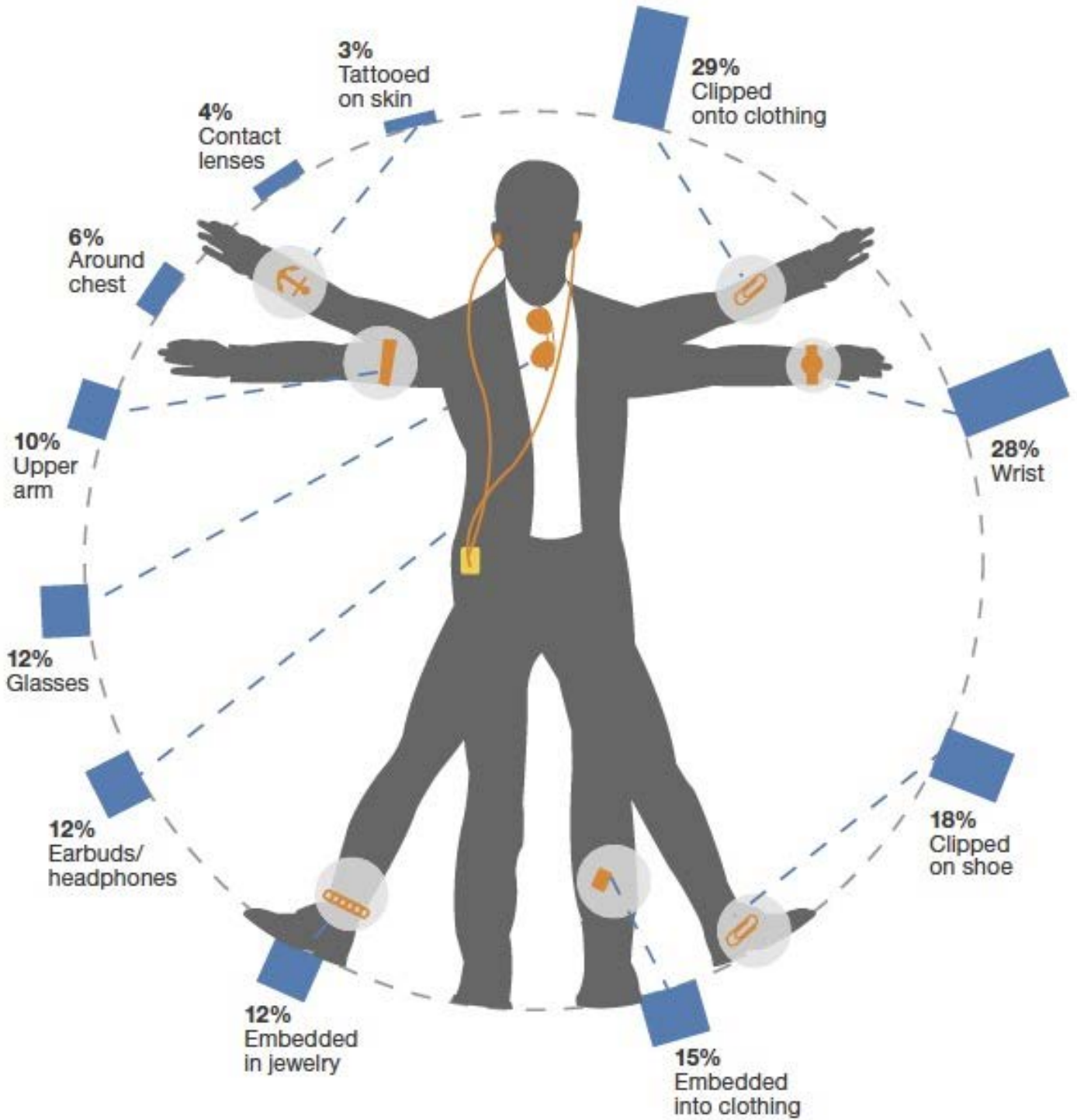


# 3

## PROJECT 3 - SENSORIUMS

### Wearable Interfaces - Personal Space and Limitations

“How would you be interested in wearing/using a sensor device, assuming it was from a brand you trust, offering a service that interests you?”



Base: 4,657 US online adults (18+)  
(multiple responses accepted)

Source: North American Technographics® Consumer Technology Survey, 2013

# 3

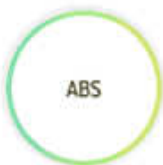
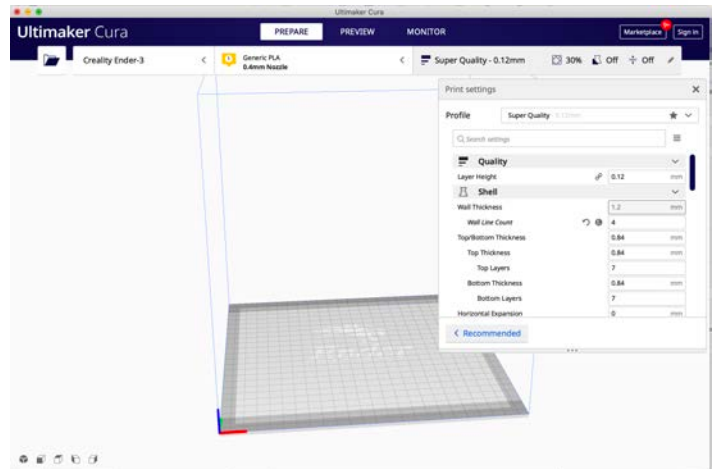
## PROJECT THREE - SENSORIUMS

### Designing the Interface - Basics of 3D Printing

#### 3D Printing Basics

3D printing, also known as additive manufacturing, is a method of creating a three dimensional object layer-by-layer using a computer created design.

3D printing is an additive process whereby layers of material are built up to create a 3D part. This is the opposite of subtractive manufacturing processes, where a final design is cut from a larger block of material. As a result, 3D printing creates less material wastage



# 3

# PROJECT THREE - SENSORIUMS

## EXTRA CREDIT - Kickstarter Campaign

### Research Paper - User Interface Design

Research and discuss on the current topics and considerations (e.g. physics, technology, psychology and sociology) behind your wearable user interface. Turn in your paper as a **KickStarter page**. Make the case convincing that investors should invest in your idea.

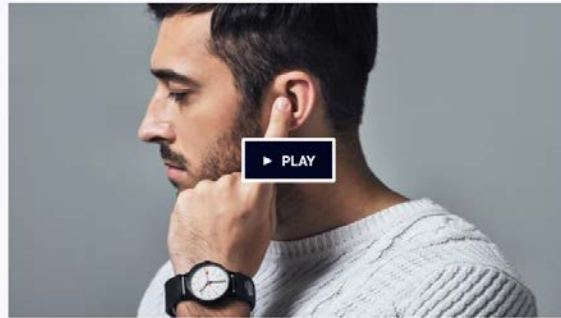


# KICKSTARTER

Discover Start a project About us KICKSTARTER Search Log in Sign up

## Sgnl - Make Phone Calls with Your Fingertip, literally.

by Innomdle Lab



6,919 backers

backers

\$1,237,470

pledged of \$50,000 goal

8

days to go

Back This Project

★ Remind me

Los Angeles, CA Wearables Project We Love

Sgnl is the smart strap that enables you to make calls by placing your fingertip on your ear. Connect with your watch to upgrade it.

Share: Tweet Share Embed Pin Post

This project will be funded on Sat, Oct 8 2016 7:00 AM PDT.

Innomdle Lab

First created | 0 backed  
mysgnl.com

Full bio Contact

Campaign Updates 10 Comments 493 Community

中文(繁體) | 中文(简体) | 한국어 | বাংলা | 日本語

Sgnl is the smart strap that enables you to answer phone calls through your fingertip. Simply place your fingertip to your ear while speak through the embedded microphone. Replace your existing watch strap with Sgnl and you're done, whether you wear a classic watch or an Apple Watch, Samsung Gear, or Pebble Time.



There's no one who never lost their earphone in their lifetime. With Sgnl, you can keep your cell phone alone in your pocket and simply raise your hand to answer a phone call without carrying any extra headset or earphone. When you place your finger to your ear, your finger not only transmits the sound but it also blocks out background noise. So you can hear very clear voice in a loud places without worrying about other people listening in.

### Pledge \$1 or more

#### Thank You!

Every dollar counts towards making Sgnl a reality! Thank you so much for your support!

As our backer, you will receive backer exclusive updates of Sgnl's development status!

ESTIMATED DELIVERY  
Feb 2017

193 backers

### Pledge \$99 or more

#### Earliest Bird (1 Set)

EARLIEST BIRD: Backers will receive ONE Sgnl smart strap set!

1 Sgnl Set includes:

- Sgnl
- Dummy Band
- Remover Tool
- Connection Parts
- Micro USB Cable

Thank you for supporting Sgnl!

ESTIMATED DELIVERY SHIPS TO  
Feb 2017 Only certain countries

Reward no longer available  
500 backers

# 3

## PROJECT THREE - SENSORIUMS

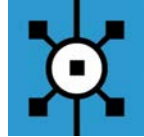
### Augmented Reality - Experience of Reality as Truth

Augmented reality is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory.

#### Possible Topics

Real or Imagined or Does it Matter?  
Impossible Spaces and Other Embodiments  
Space and Time: Fiction as Imaginative

TouchDesigner as AR Framework  
Imaginative 3D worlds in Blender



# 3

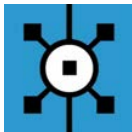
## PROJECT 3 - SENSORIUMS

Interactive and Reactive Spaces - Mapping *Interior* Spaces

### **Script, Shoot, Edit and Project a *Reactive Video into Small Scaled Space. Build Tableau Vivant***



#### ***Reactive Video Projection into Scaled Space.***



Breaking the Frame - 2D into 3D  
2D vs 3D Perception - Form, Movement, Space, Time, Scale. POV  
Interactivity/Movement/Reaction as Symbology  
Virtual Reality: Interactive Perceptions Object and Environment  
Tableau Vivant - Model Scale Design for Interactive Projection



Visual Forces, Positive-Negative Space, Shape, Scale  
as Comparison, Contrast and Meaning  
Audio/Visual Contract



**Premier/After Effects** Video Editing Basics. Green  
Screen/Chroma Keying. Compositing

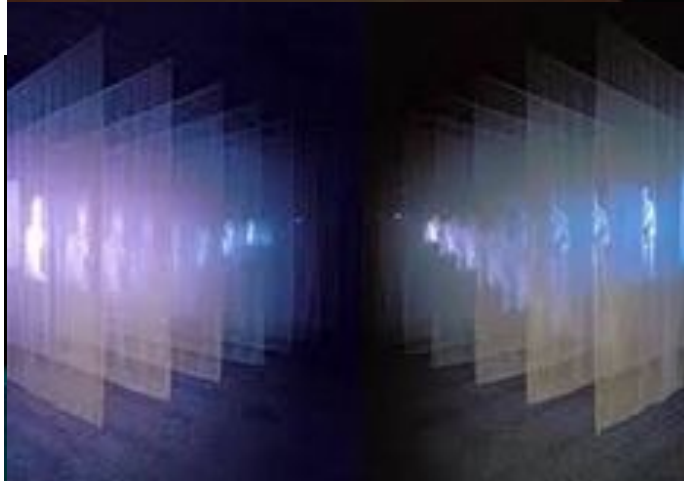
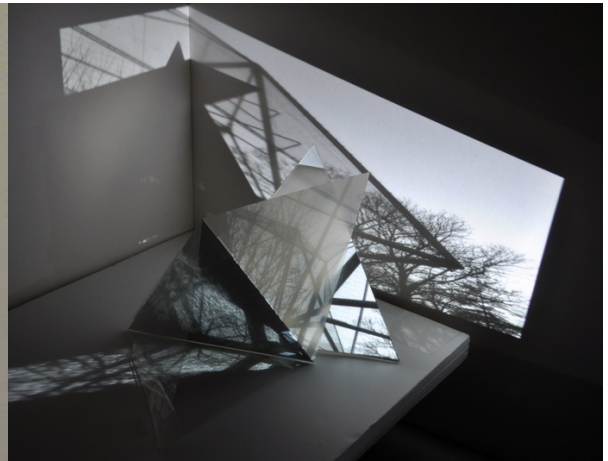
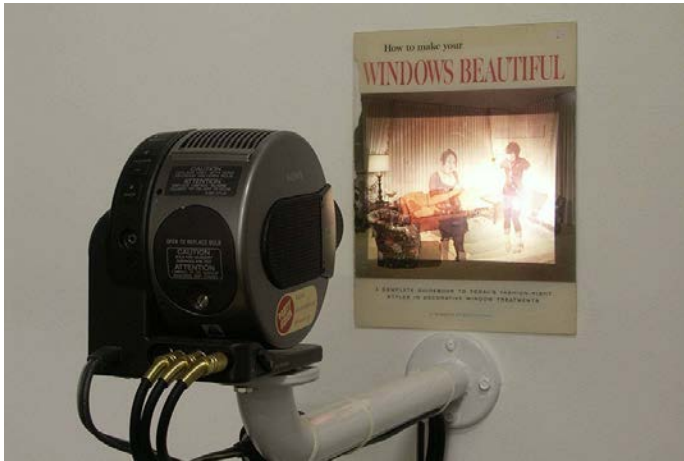


**Photoshop** 3D Image manipulation - Interaction  
between objects. Selection - Adjustment Layer  
Blending - **Basic 3D Control** Tilt Shift Photography



# 3 PROJECT THREE - SENSORIUMS

## Interactive and Reactive Spaces

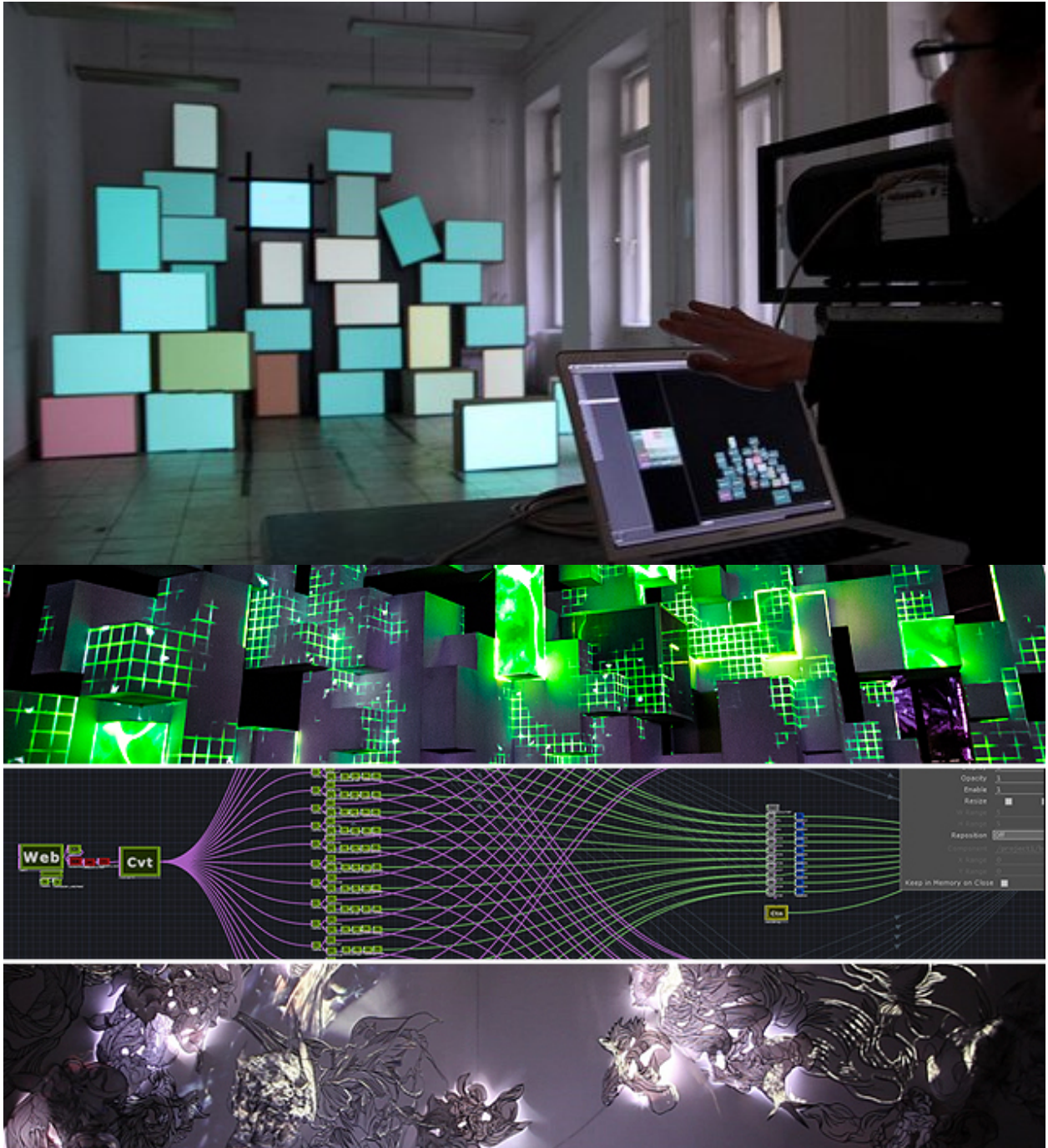


# 3

## PROJECT THREE - SENSORIUMS

### Video Mapping

#### Video Mapping. TouchDesigner and Other Apps



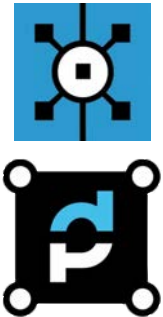
Object Video Mapping – Video mapping projections on **geometric forms**.

Cubes, pyramids, prisms, spheres, cars, masks and face, trees, curved forms objects.

Interior projection mapping – the indoor 3d video mapping on walls of the venue. Could be in panorama (360 grad).

Full Dome projections – video mapping projections on every surfaces inside the venue. Walls, floor, ceiling. Main time the **full dome projections** are using for domes (spherical venues, dome, oblong etc.)

**AM-CB video mapping performance** - <http://projection-mapping.org/inspiration/>



# 3 PROJECT THREE - SENSORIUMS

## Projecting Immersive Environments as Sensorial Space

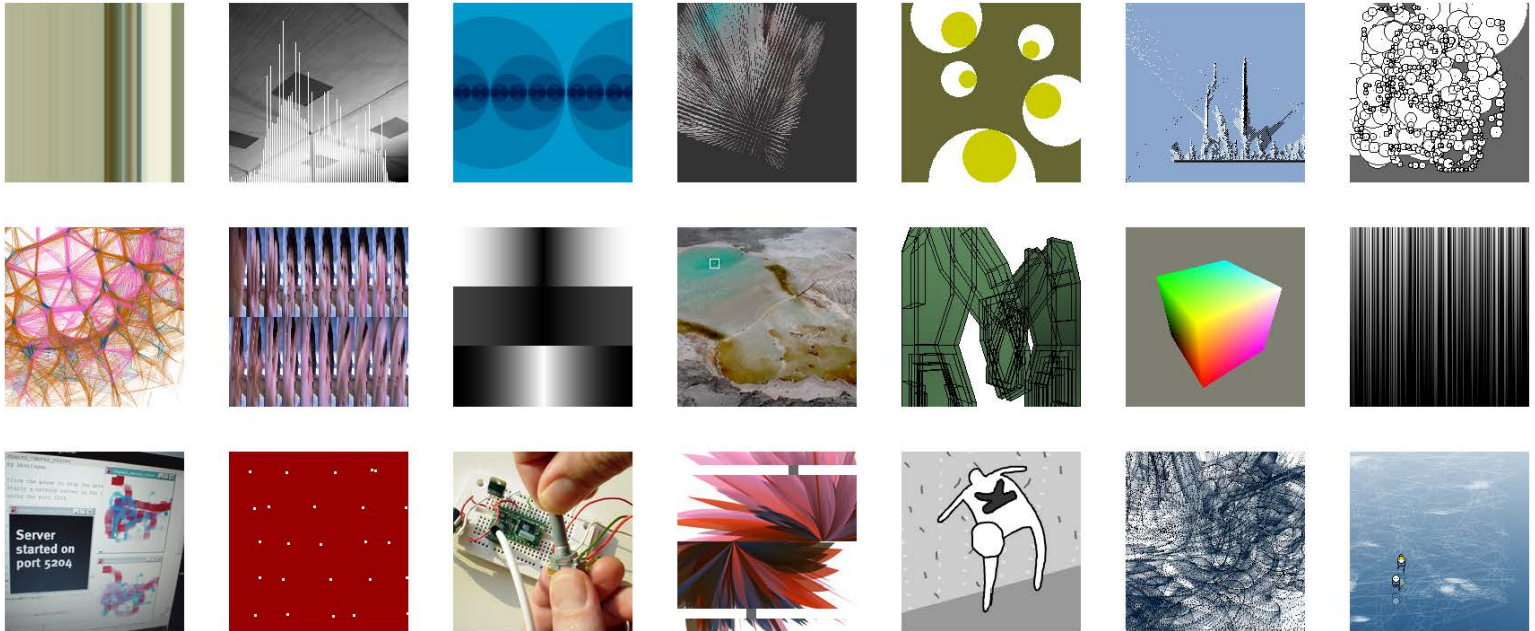
### Immersion using Generative Art

#### Possible Topics

Personal/Social/Cultural Space as Interactive Experience  
Using Algorithmic Art and Sensors to build a reactive Space  
Feeling Space as Emotion

#### Physics as Generative

Vectors, Forces, Oscillations, Particle Systems, Steering Forces, Complexity - Flocking, Cellular Automata, Fractal Patterns, Intelligence, Evolution, Neural Networks  
Watch Nature of Code Videos by Daniel Shiffman - <https://natureofcode.com>



# 3

## PROJECT THREE - SENSORIUMS

### Using Processing as Coding IDE - Generative Art

Beginning Processing - Coding Generative Art

#### Tour of the Processing Sketch

Run - Stop

Related "Classes"

Helpful DeBugging

**Declaring Instances**

```
ParticleSystem ps;  
PImage sprite;
```

**Required Functions**

**setup()**

**draw()**

**Console**

```
void setup() {  
  size(1024, 768, P2D);  
  orientation(LANDSCAPE);  
  sprite = loadImage("sprite.png");  
  ps = new ParticleSystem(10000);  
  
  // Writing to the depth buffer is disabled to avoid rendering  
  // artifacts due to the fact that the particles are semi-transparent  
  // but not z-sorted.  
  hint(DISABLE_DEPTH_MASK);  
}  
  
void draw () {  
  background(0);  
  ps.update();  
  ps.display();  
  
  ps.setEmitter(mouseX,mouseY);  
  
  fill(255);  
  textSize(16);  
  text("Frame rate: " + int(frameRate), 10, 20);  
}
```

**Declare size of Sketch in setup()**

**draw() loops at 60 fps. Develops Movement**

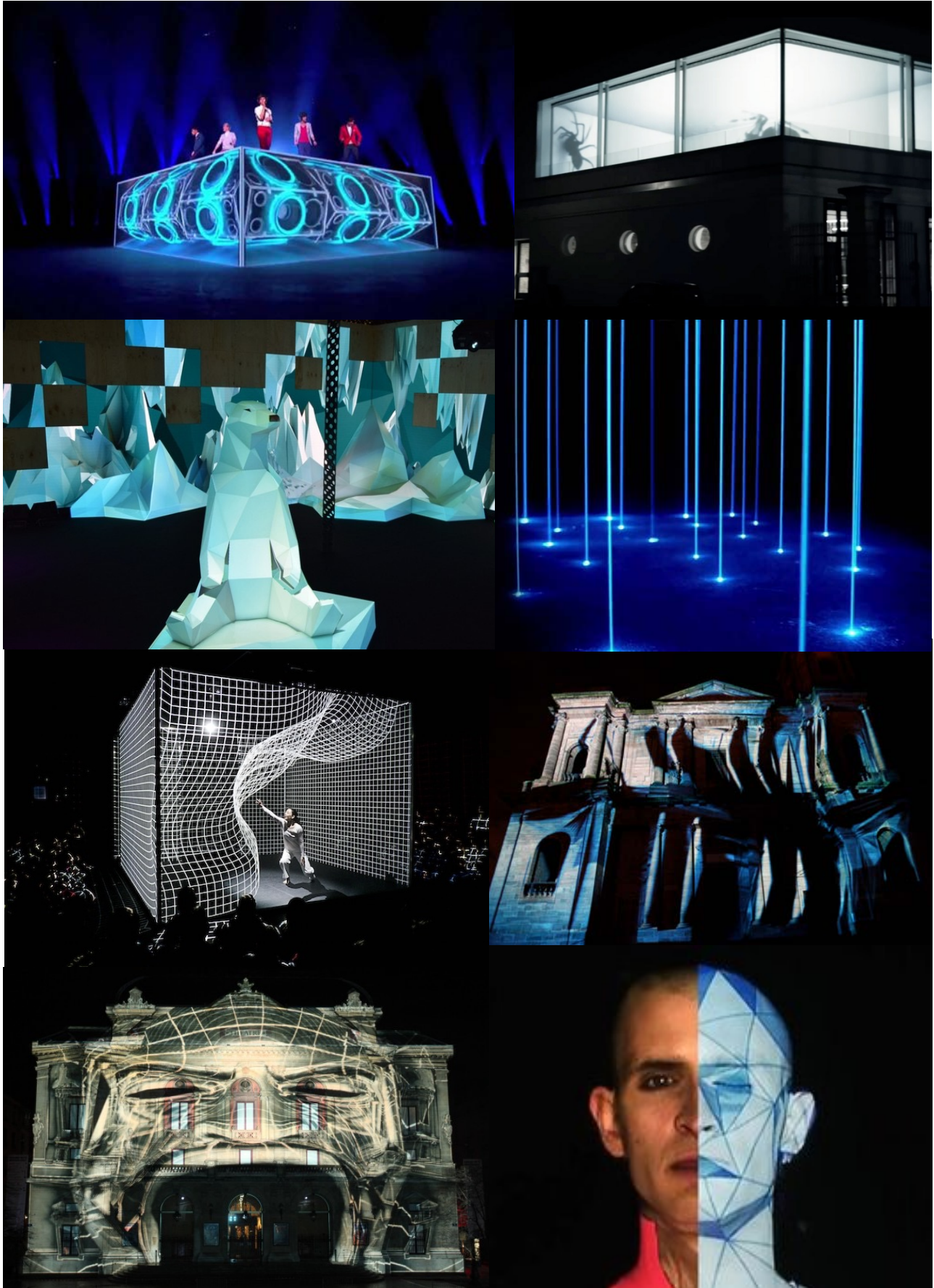


# 3

## PROJECT THREE - SENSORIUMS

### Projecting Immersive Environments as *Personal Space*

#### Examples of Immersive Projections using Personal Interactions



# 3

## PROJECT THREE - SENSORIUMS

### Depth as Expression - Using Depth Sensors and Generative Art

#### Possible Topics

Depth as Perception as Idea

Recording the *ID* - Pulling deeply from Personal Space.

Incorporate Depth Sensors (Kinect) which allow you to create more complex physical and emotional interactions

Processing, Kinect and the Arduino

Interactive Particles with TouchDesigner

Particle Displacement

