

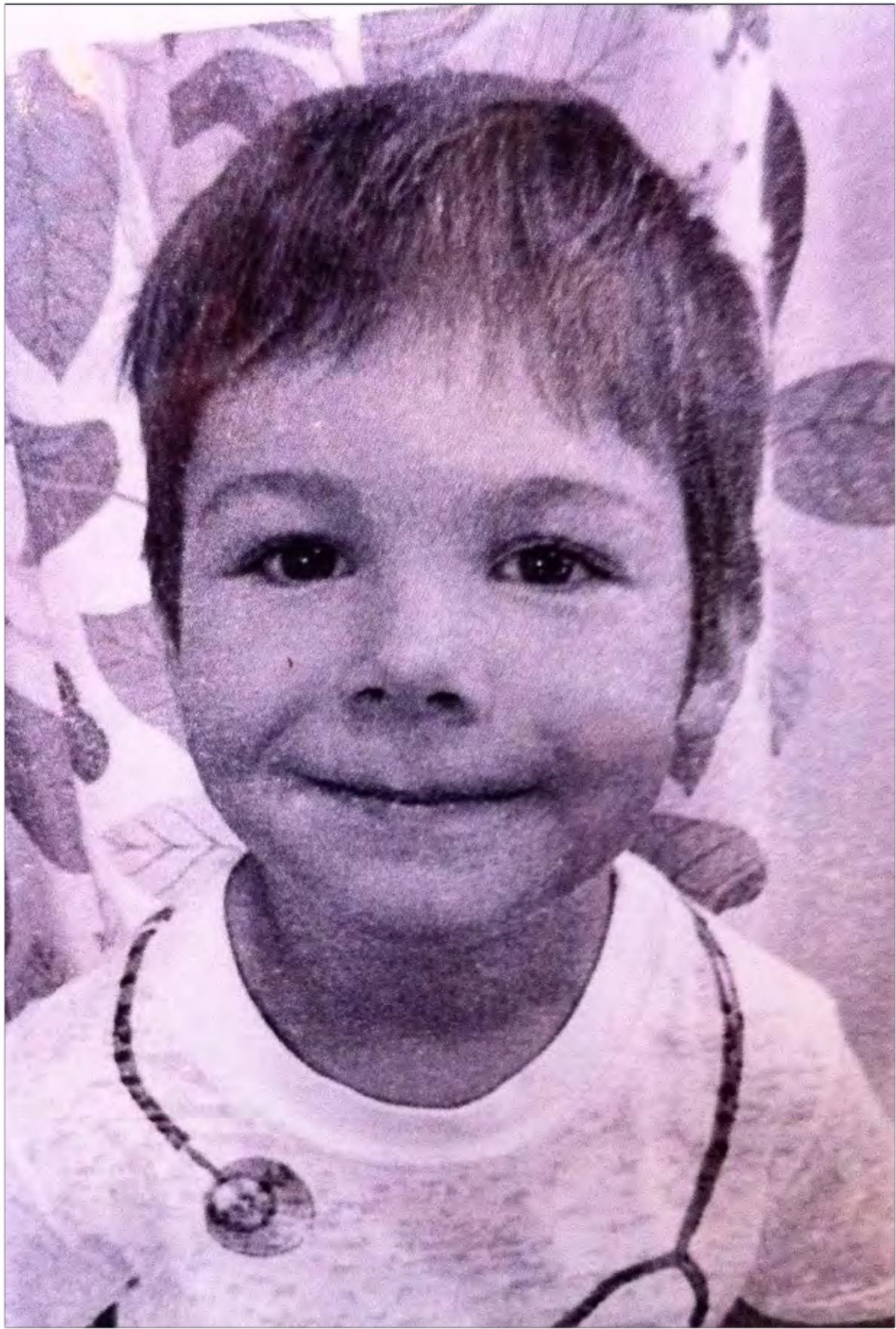
CRITICAL **MAKING** 2019

CRITICAL **MAKING** 2019

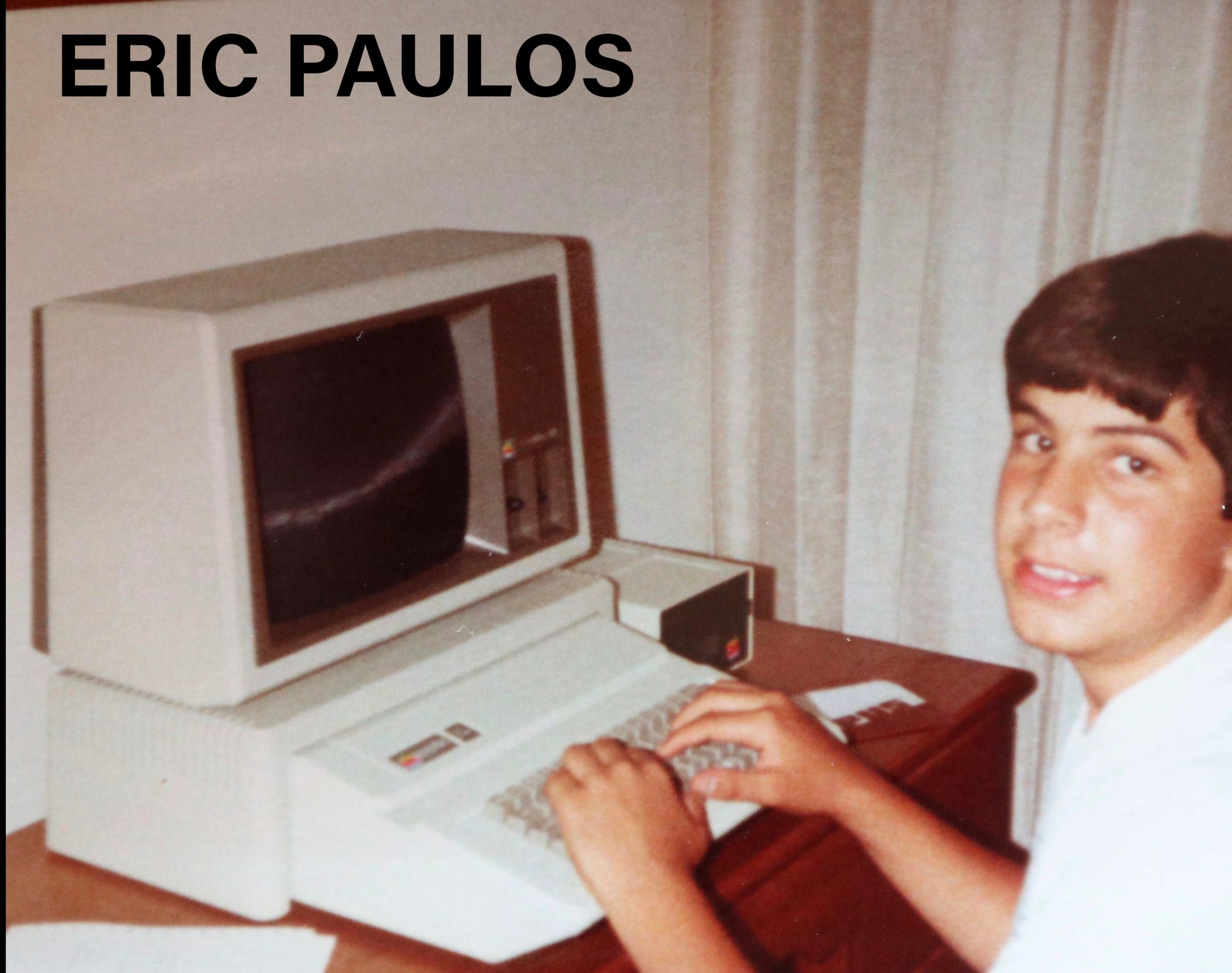


QUIZ





# ERIC PAULOS





apple IIe

SYSTEM SAVER

300



*Cal*

UNIVERSITY OF  
CALIFORNIA  
BERKELEY

1014

PAUL

PAULOS ERIC J

10045772

*Eric Paulos*

NON TRANSFERABLE - REPLACEMENT CHARGE

VALI-DINE SYSTEM





PROFESSOR

**ERIC PAULOS**

Top

Secret

ERIC'S

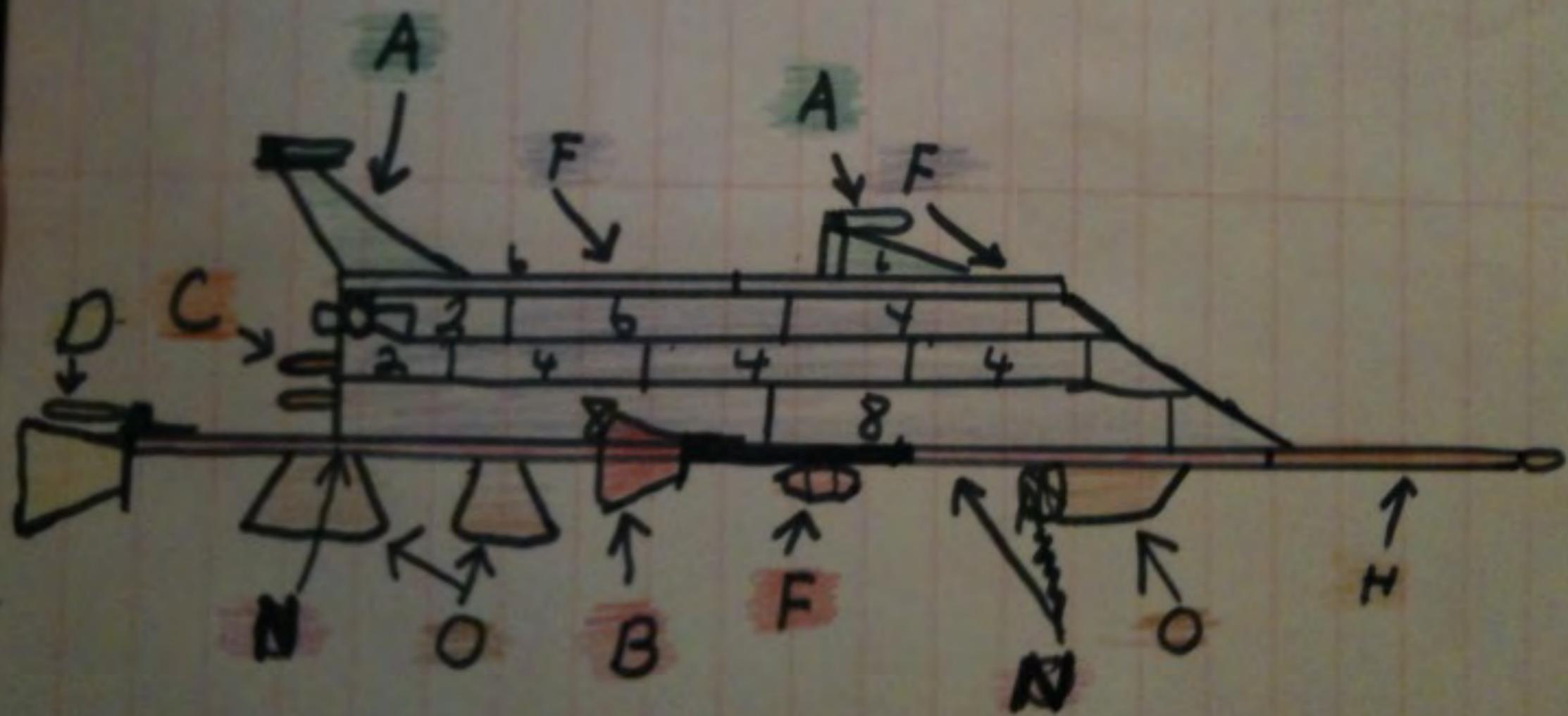
PLans

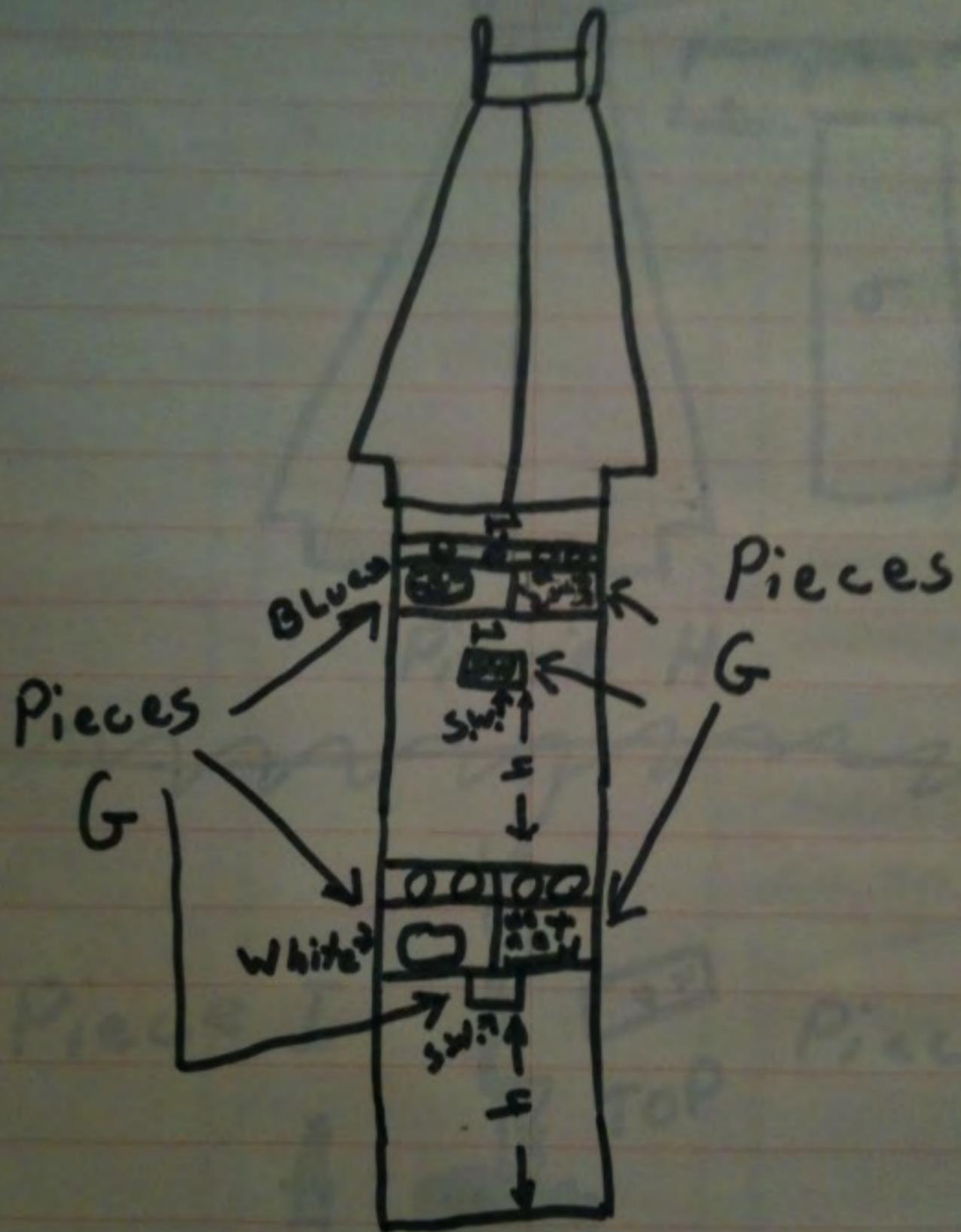
Do not

open

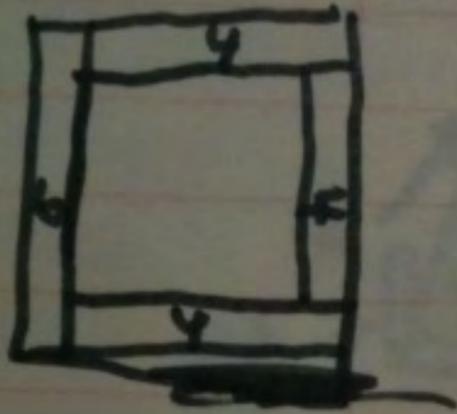
UNLESS

AUTHORIZED

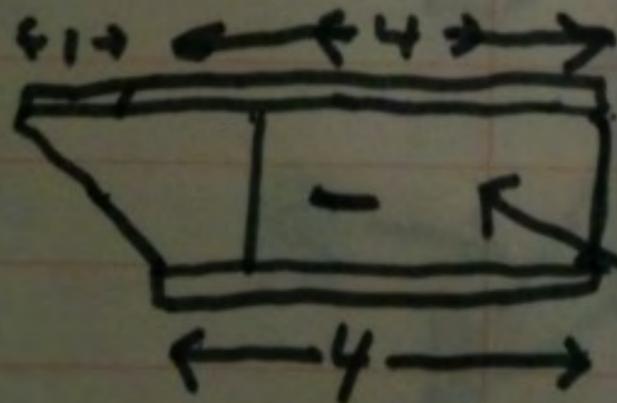




Part 0



TOP

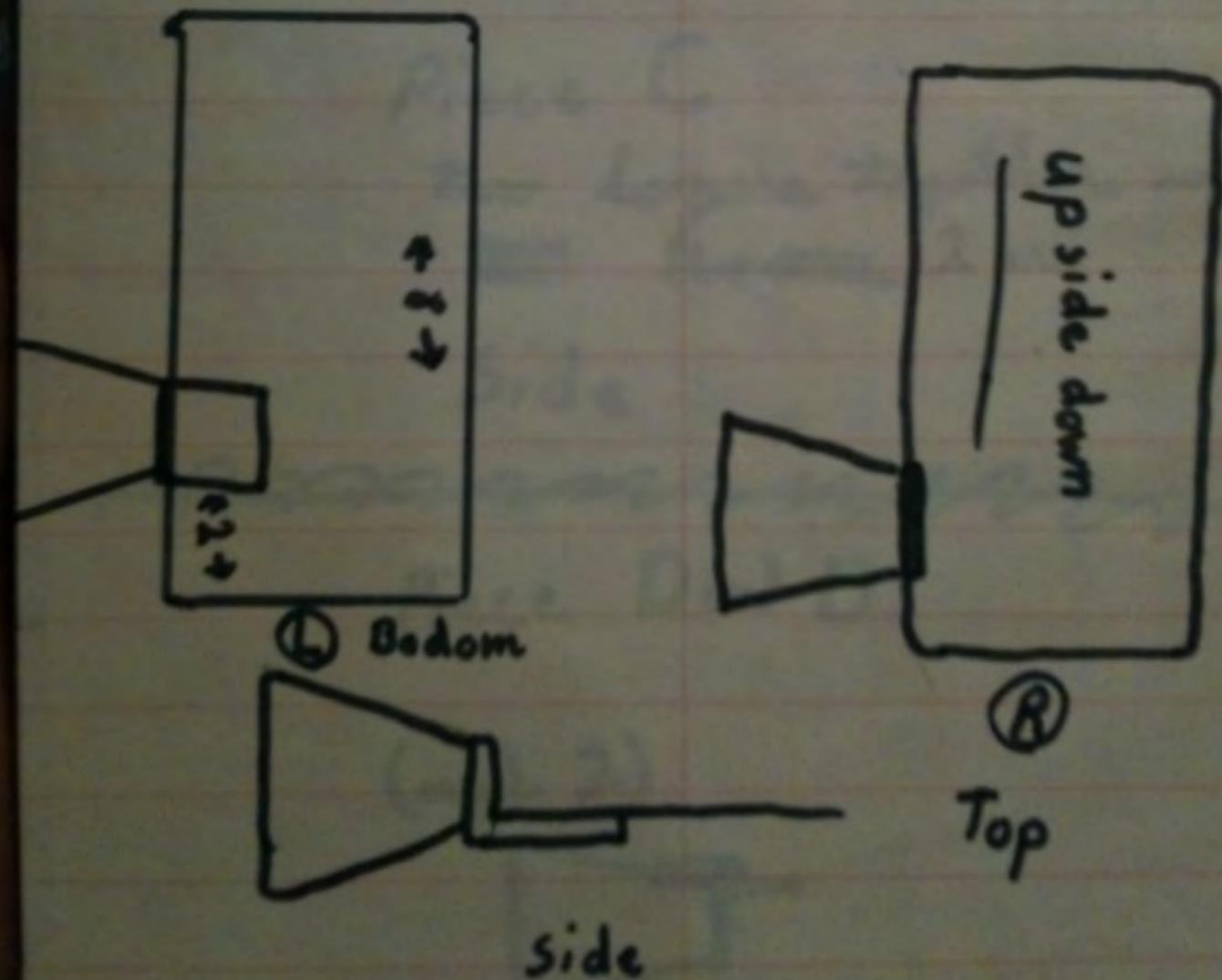


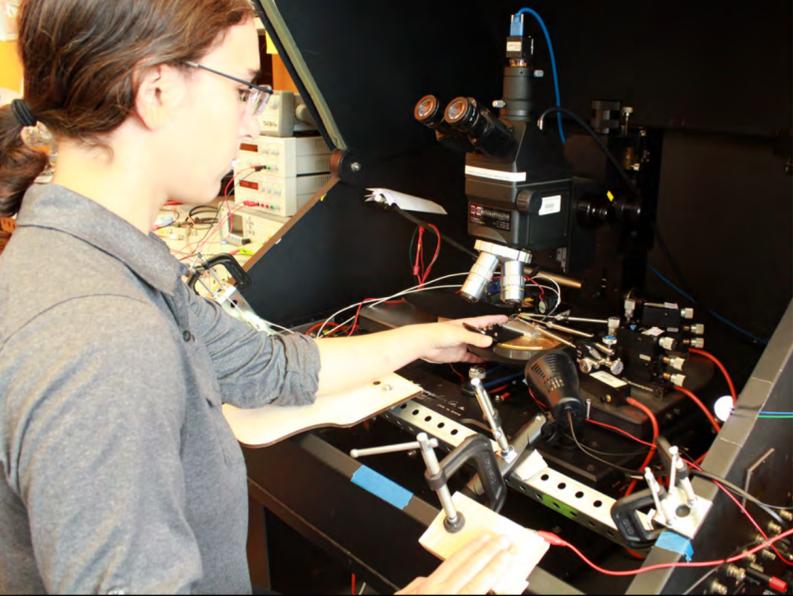
put a door on each side

SIDE

Piece B and B<sub>2</sub>

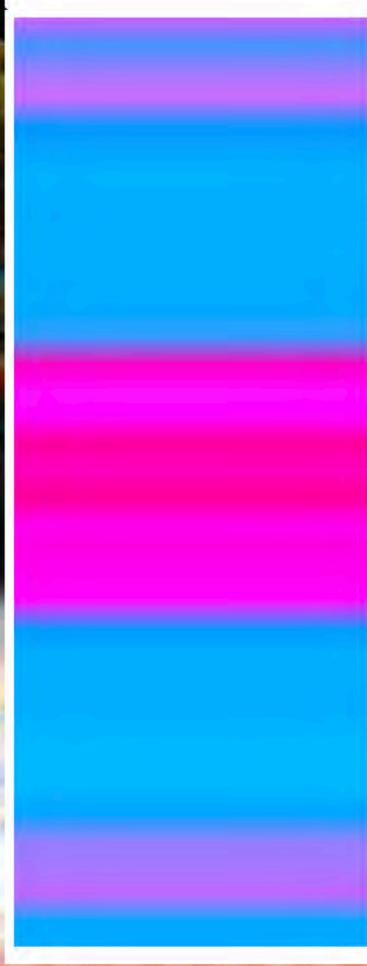
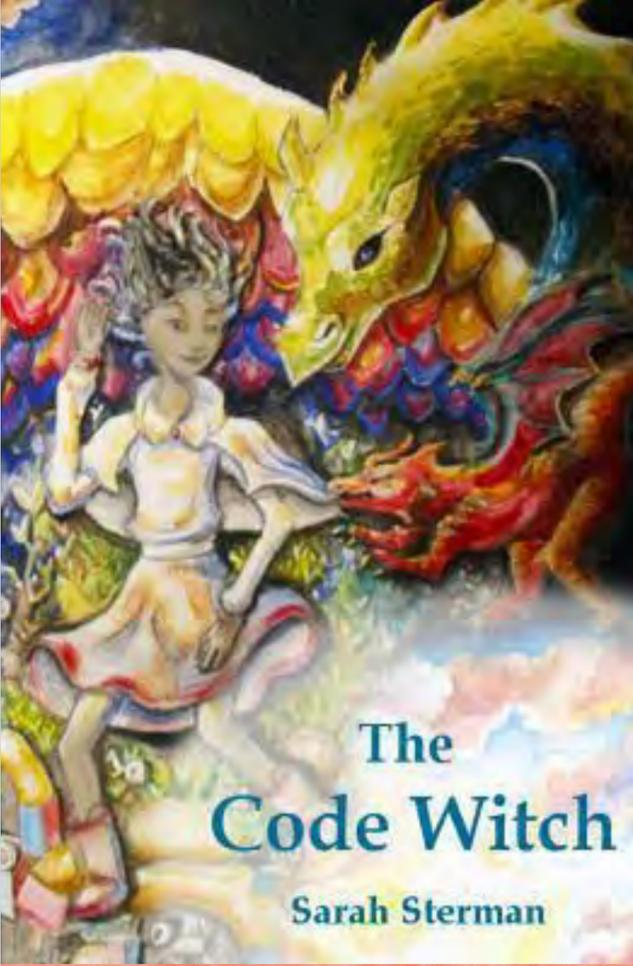
Engine and engine holder need  
to be reversed for right and  
left side



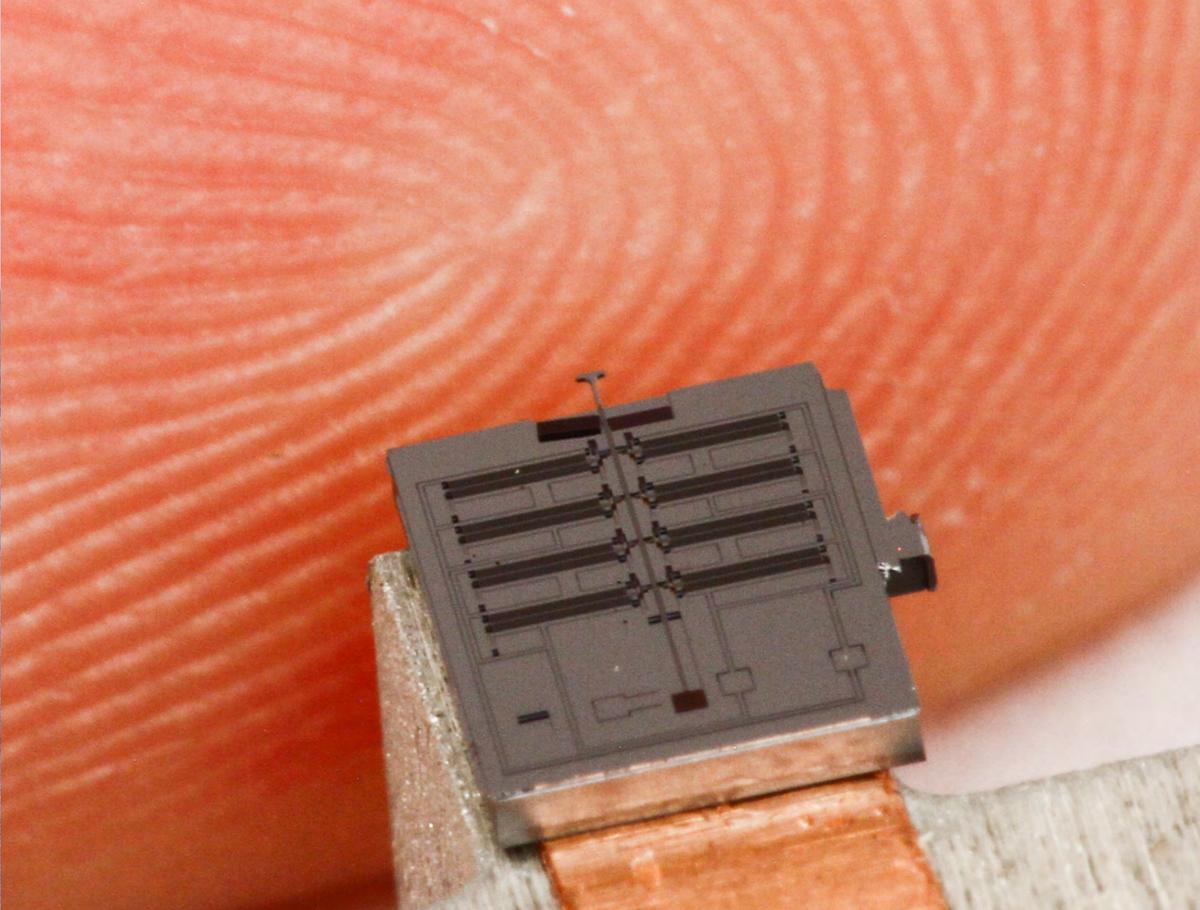


GSI

SARAH STERMAN



Why should y  
care nothing a  
INTRODUCT  
discussed in n  
more.From on  
material articu  
style in vague  
a layperson ex  
is absolutely f  
motivate our i  
curiosity, and  
style. We use r  
text not in our  
compelling vis  
This means ou  
etc). Similarly  
of written text  
genre, by time  
may have tren  
count, verb us  
while it can of  
interpret as sty  
to power our r

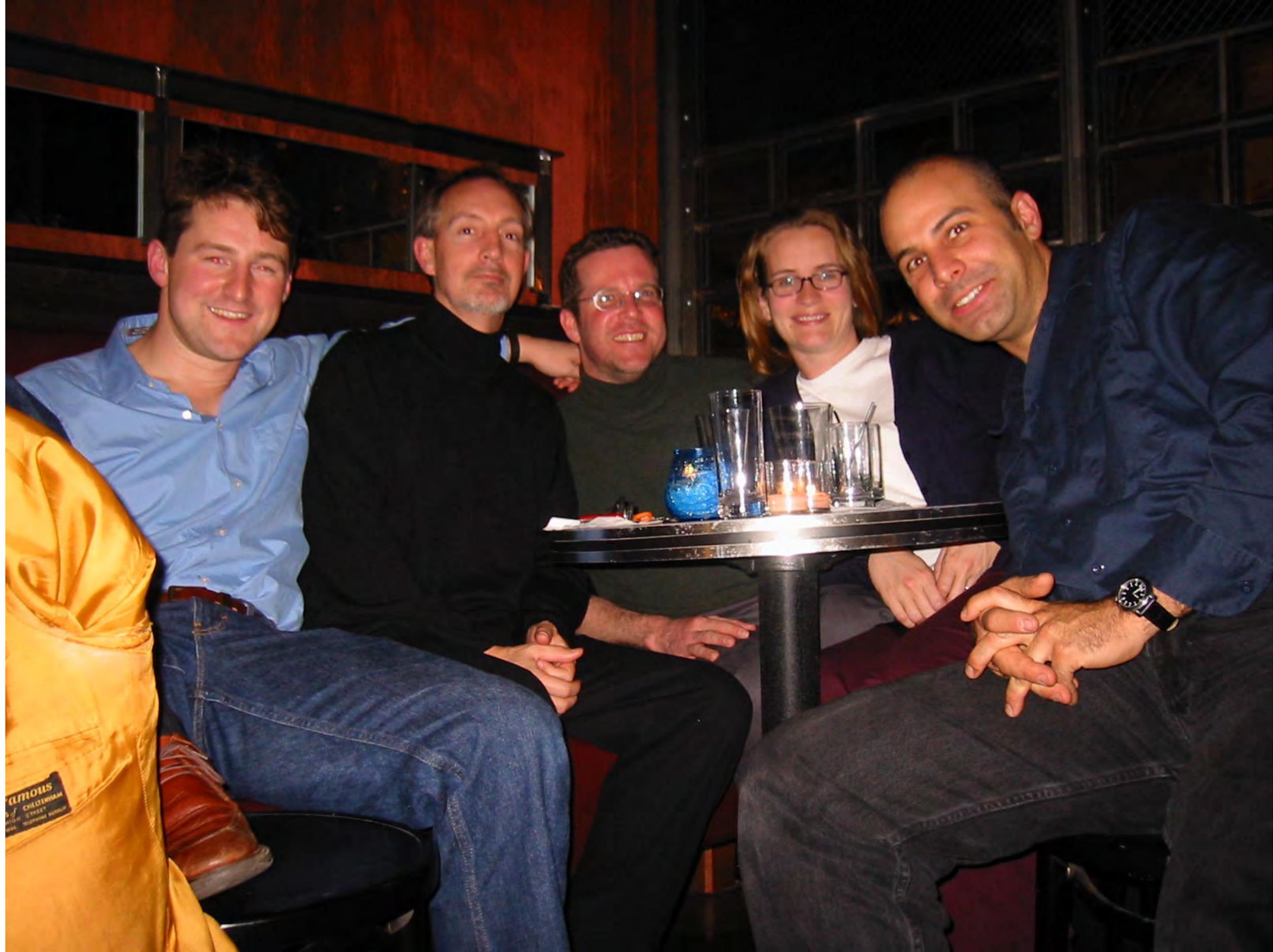




**CHRIS MYERS**

INVENTON LAB MANAGER





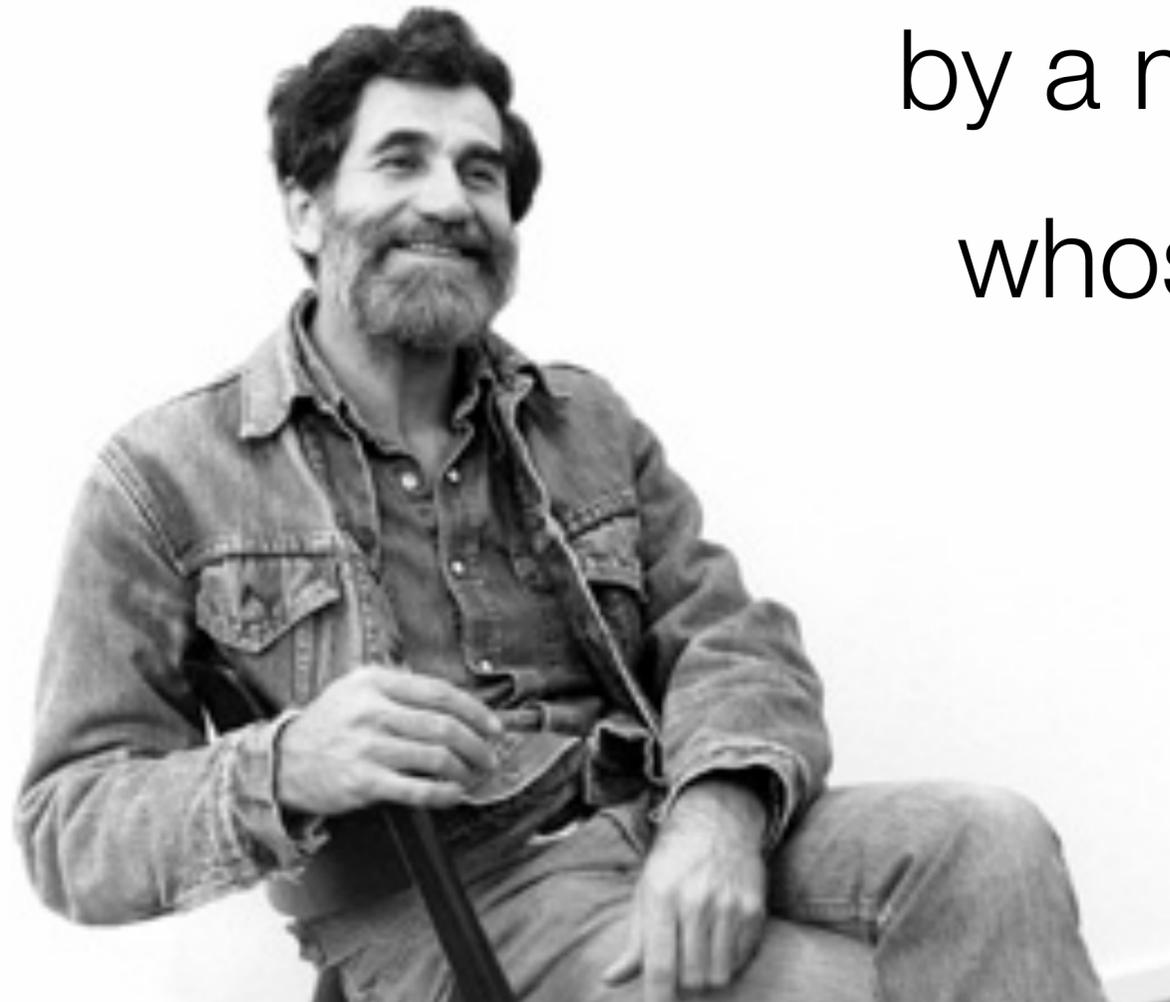


HELLO



Imagine something never done before  
by a method never before used  
whose outcome is unforeseen

— Allan Kaprow



# CRITICALMAKING



AI

# AI FUTURES

Will <b>AI</b> make us all geniuses?	<b>NO</b>
Will <b>AI</b> make us all morons?	<b>NO</b>
Will <b>AI</b> destroy whole industries?	<b>YES</b>
Will <b>AI</b> make us more empathetic?	<b>NO</b>
Will <b>AI</b> make us less caring?	<b>NO</b>
Will teens use <b>AI</b> for sex?	<b>YES</b>
Were they going to have sex anyway?	<b>YES</b>
Will <b>AI</b> destroy music?	<b>NO</b>
Will <b>AI</b> destroy art?	<b>NO</b>
But can't we go back to a time when...	<b>NO</b>
Will <b>AI</b> bring about world peace?	<b>NO</b>
Will <b>AI</b> cause widespread alienation by creating a world of empty experiences?	<b>WE WERE ALREADY ALIENATED</b>

# CRITICAL MAKING

- Will **Critical Making** make us all geniuses? **NO**
- Will **Critical Making** make us all morons? **NO**
- Will **Critical Making** destroy whole industries? **YES**
- Will **Critical Making** make us more empathetic? **NO**
- Will **Critical Making** make us less caring? **NO**
- Will teens use **Critical Making** for sex? **YES**
- Were they going to have sex anyway? **YES**
- Will **Critical Making** destroy music? **NO**
- Will **Critical Making** destroy art? **NO**
- But can't we go back to a time when... **NO**
- Will **Critical Making** bring about world peace? **NO**
- Will **Critical Making** cause widespread alienation by creating a world of empty experiences? **WE WERE ALREADY ALIENATED**

# PHYSICAL LEARNING



Without the opportunity to learn through the hands, the world remains abstract, and distant, and the passions for learning will not be engaged

**PLAY ON**



play is the  
greatest natural  
resource in a  
creative  
economy

# PLAY SUPERPOWERS



## **manipulate**

deconstruct and hack

## **morph**

think flexibly and be tolerant of change

## **move**

think with your hands and play productively

# FOREGROUNDING CREATIVITY

The world doesn't need more people with good grades.  
The world needs people who see the really tough  
problems as puzzles, and have the tenacity and creative  
capacity to solve them.

- Gever Tulley, TEDxKids, 2011

# BECOMING AN AMATEUR

**Innovation** happens when individuals go beyond their standard disciplines to learn new skills on their own

Breakthroughs often require us to become **amateurs** in a new field

# BECOMING AN AMATEUR

In almost all the varied walks of life, amateurs have more freedom to experiment and innovate. The fraction of the population who are amateurs is a good measure of the freedom of a society

– Freeman Dyson

# **AMATEUR**

*from amāre - to love*

*amātor - lover*

# CLASS CULTURE EXPECTATIONS

UC Berkeley Honor Code

<https://teaching.berkeley.edu/berkeley-honor-code>

Campus Principles of Community

<https://diversity.berkeley.edu/principles-community>

University Standards for Academic Integrity

<https://sa.berkeley.edu/conduct/students/standards>

# **CLASS CULTURE**

**“As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others.”**

# INCLUSIVE CLASSROOM



If you make a mistake, correct yourself

If someone else makes a mistake, correct them

If I make a mistake please correct me

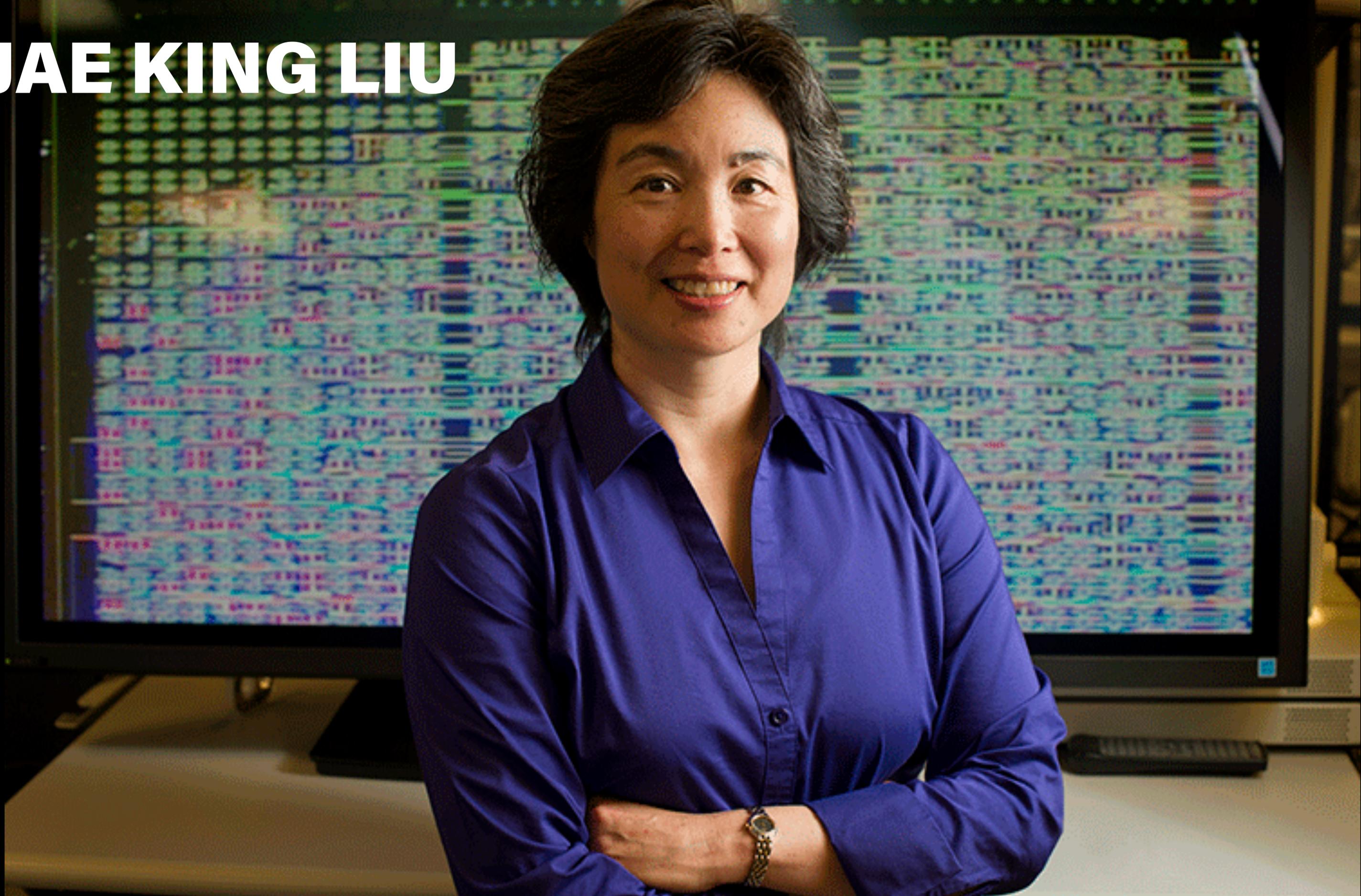
Going on as if it did not happen is actually less respectful than making the correction

# INCLUSIVE CLASSROOM?





**TSU-JAE KING LIU**



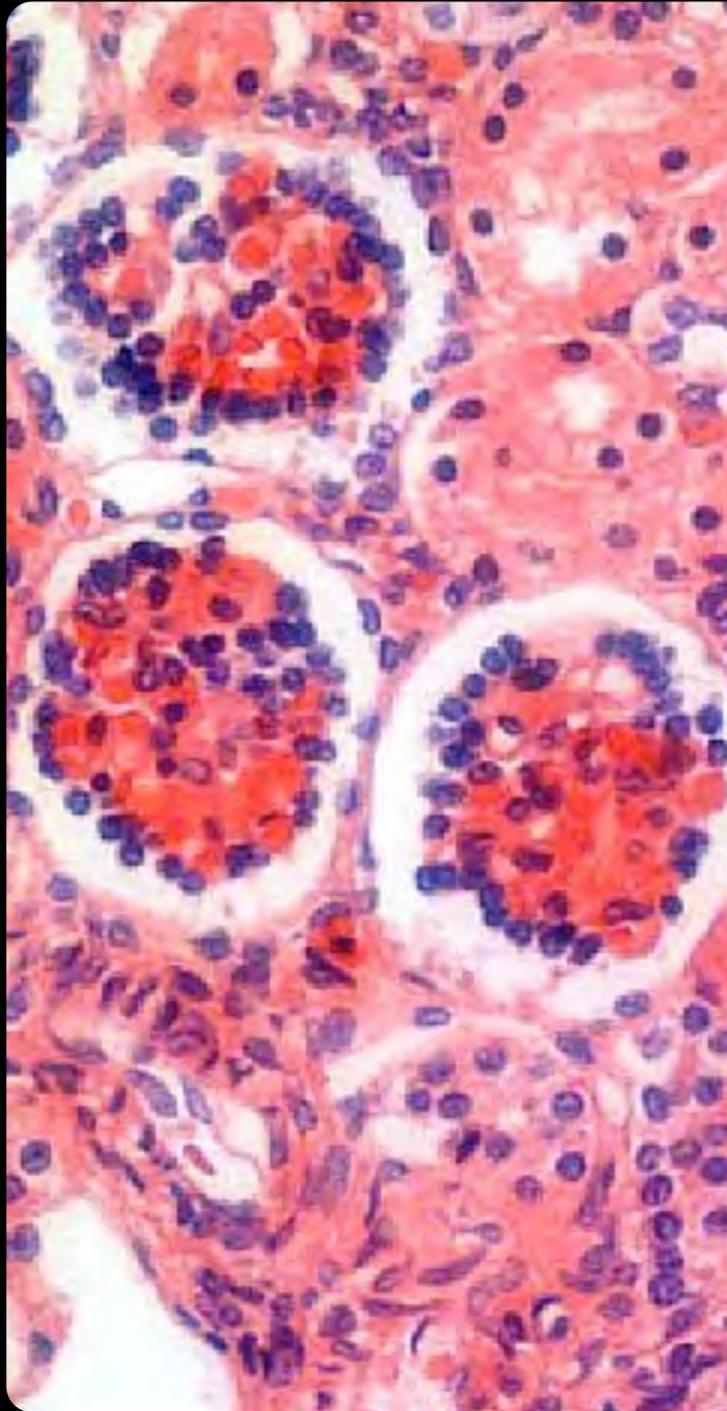
**OSCAR DUBÓN**





....And most important, we need not only the folks at [UC Berkeley or] MIT or Stanford or the NIH but also the mom in West Virginia tinkering with a 3-D printer, the girl on the South Side of Chicago learning to code, the dreamer in San Antonio seeking investors for his new app, the dad in North Dakota learning new skills so he can help lead the green revolution.

That's how we will overcome the challenges we face: **by unleashing the power of all of us for all of us.** Not just for those of us who are fortunate, but for everybody. That means creating not just a quicker way to deliver takeout downtown but also a system that distributes excess produce to communities where too many kids go to bed hungry. Not just inventing a service that fills your car with gas but also creating cars that don't need fossil fuels at all.



Dilemmas in a General Theory of Planning, 1973  
Horst Rittel and Melvin Webber

*Policy Sciences* 4 (1973), 155-169  
© Elsevier Scientific Publishing Company, Amsterdam—Printed in Scotland

# Dilemmas in a General Theory of Planning\*

**HORST W. J. RITTEL**

*Professor of the Science of Design, University of California, Berkeley*

**MELVIN M. WEBBER**

*Professor of City Planning, University of California, Berkeley*

## ABSTRACT

The search for scientific bases for confronting problems of social policy is bound to fail, because of the nature of these problems. They are "wicked" problems, whereas science has developed to deal with "tame" problems. Policy problems cannot be definitively described. Moreover, in a pluralistic society there is nothing like the undisputable public good; there is no objective definition of equity; policies that respond to social problems cannot be meaningfully correct or false; and it makes no sense to talk about "optimal solutions" to social problems unless severe qualifications are imposed first. Even worse, there are no "solutions" in the sense of definitive and objective answers.

George Bernard Shaw diagnosed the case several years ago; in more recent times popular protest may have already become a social movement. Shaw averred that "every profession is a conspiracy against the laity." The contemporary publics are finding as though they have made the same discovery. Modern professionals seem to be immune from the popular attack—social workers, educators, housers, public health officials, policemen, engineers or physicians. Our restive clients have been offering national programs that schoolmen have been offering. Social agencies have been offering alternative behavior of the welfare agencies, the streets, and the political against the professions' governmental in

# WICKED PROBLEMS



*Dilemmas in a General Theory of Planning,*  
1973  
Horst Rittel and Melvin Webber

There can be no agreed-upon definition of a wicked problem

For wicked problems, there is no stopping rule

There is no immediate nor ultimate test of a “solution” to a wicked problem

Every wicked problem is unique

Every wicked problem can be considered as a symptom of another problem

Wicked problems are discrepancies between a present state and a future one

wicked problems



street crime

disarm police?

repeal laws that define crime?

substitute ethical self-control for police and courts?

shoot criminals and thus reduce the numbers  
who commit crimes?

give away free loot to would-be-thieves to  
reduce incentive?

affirmative

problem solving

provides answers

in the service of industry

for how the world is

science-fiction

futures

fictional functions

change the world to suit us

anti-art

research for design

applications

design for production

fun

consumer

user

makes us buy

critical

problem making

asks questions

in the service of society

for how the world could be

social-fiction

parallel worlds

functional fictions

change us to suit the world

applied art

research through design

implications

design for debate

satire

citizen

person

makes us think

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social-fiction

parallel worlds

functional fictions

change us to suit the world

applied art

research through design

implications

design for debate

satire

citizen

person

makes us think

# DESIGN RESEARCH

The process of knowledge  
production that occurs  
through the act of design



**critical** design

**speculative** design

**reflective** design

**disruptive** design

**critical making**

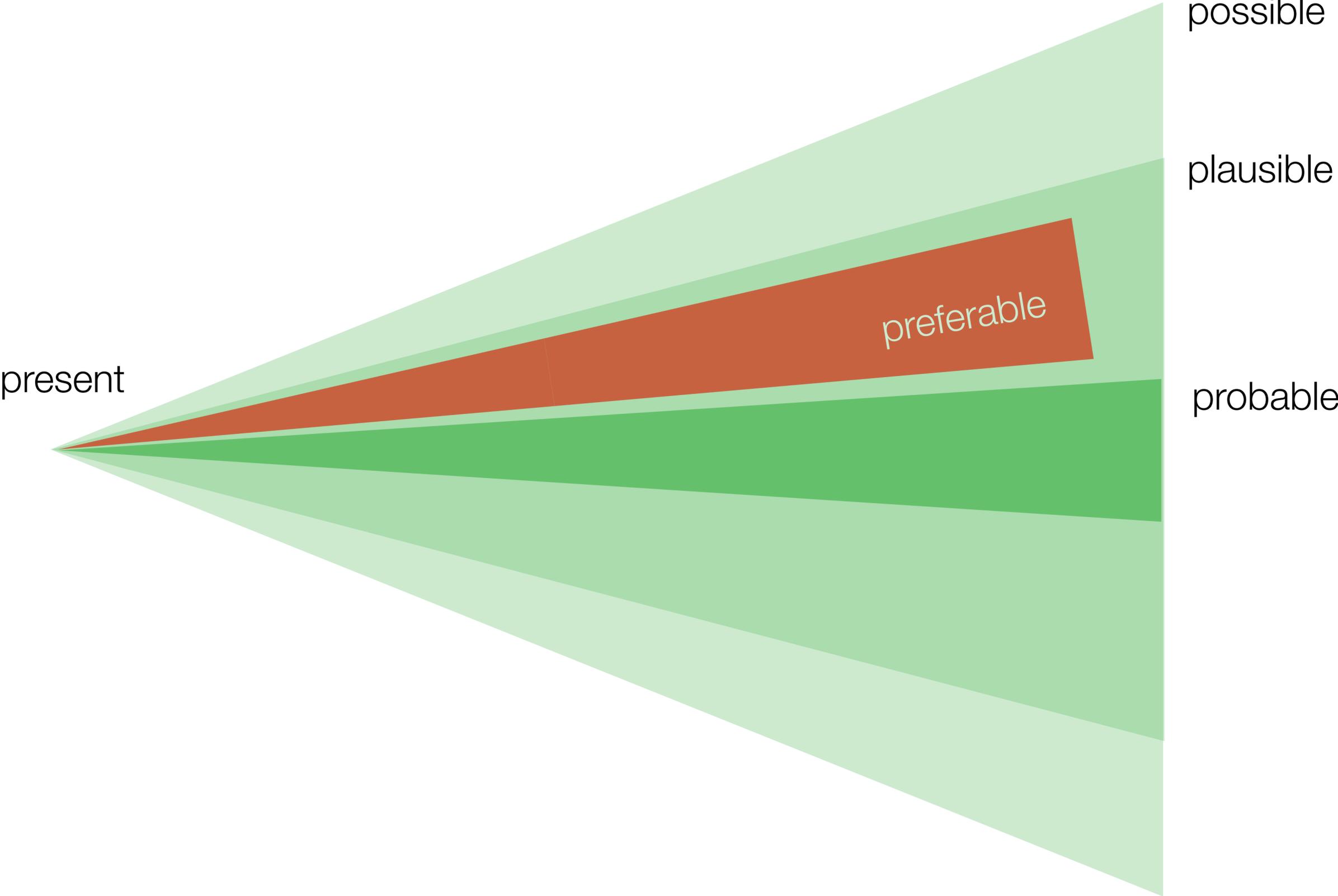
**adversarial** design

**new media art**

**tactical media**

design **noir**

# CRITICAL DESIGN





WHAT  
IS  
DESIGN?

I believe design is an intention, purpose, plan: and that good design is therefore by inference, where such plan has been well conceived, well executed, and of benefit to someone

– Milner Gray, Designer



WHAT  
IS  
DESIGN?

Design is all around us –  
either we control it – or it controls us  
– Wally Olins



WHAT  
IS  
DESIGN?

Design is the difference between doing  
it, and doing it right.

– Mark Fisher



WHAT  
IS  
DESIGN?

With art - if you like, you can be really weird. But  
in design you have to think about what other  
people will like. – Ghisli, age 10



WHAT  
IS  
DESIGN?

Design is in everything we make,  
but it is also between those things.  
It's a mix of craft, science, storytelling,  
propaganda, and philosophy.

– Erik Adigard

*What is your definition of design?*

A plan for arranging elements in  
such a way as to best  
accomplish a particular  
purpose



*Is design an expression of art .... an art form?*

The design is an expression of the purpose. It may ... if it is good enough ... later be judged as art.



*Is design a craft for industrial purposes?*

No - but design may be a  
solution to some industrial  
problems



*What are the boundaries of design?*

What are the boundaries of  
problems?



*Does the creation of design admit constraint?*

Design depends largely on  
constraints



## *What constraints?*

The sum of all constraints.

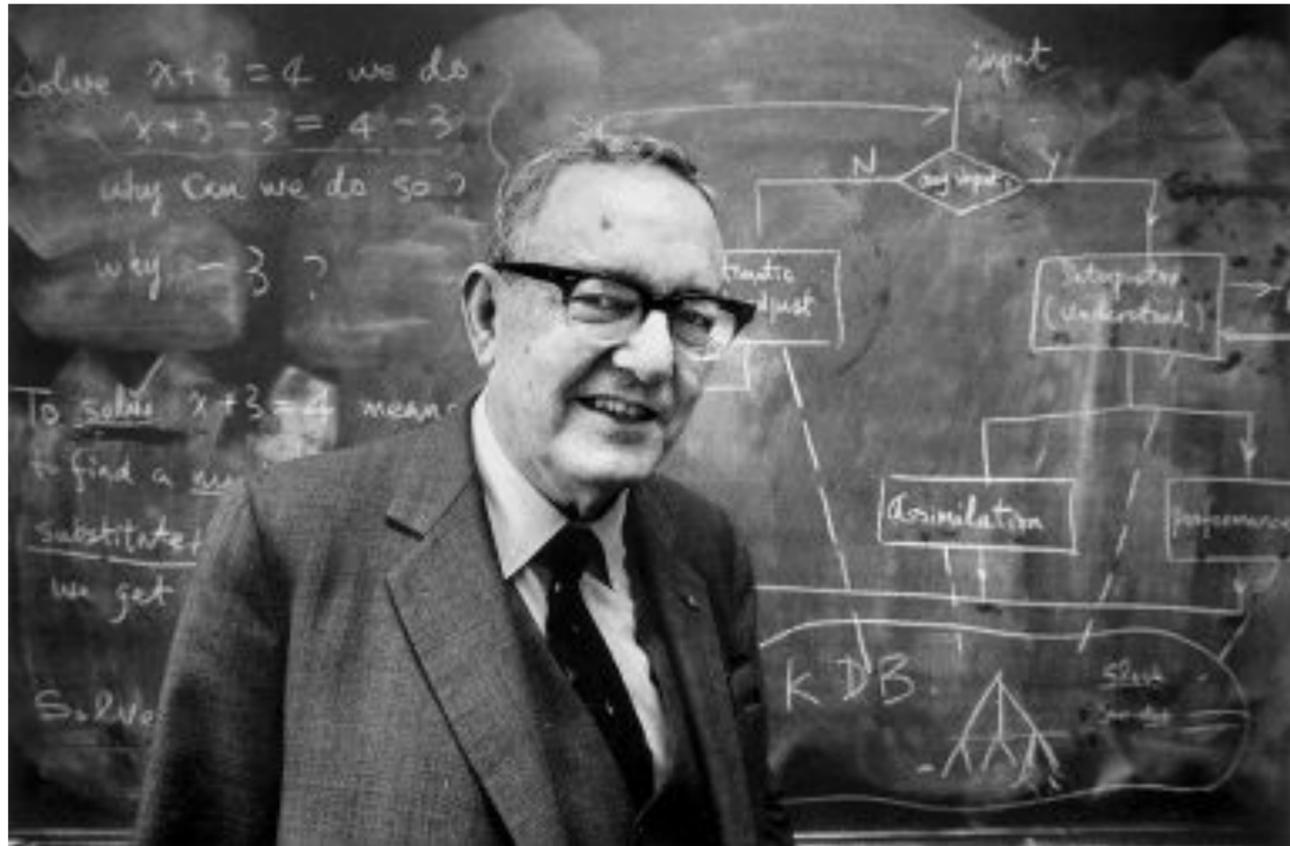
Here is one of the few effective keys to the design problem - the ability of the designer to recognize as many of the constraints as possible - his/her willingness and enthusiasm for working within these constraints - the constraints of price, of size, of strength, of balance, of surface, of time, etc ... each problem has its own peculiar list



*Does design obey laws?*

Aren't constraints enough?





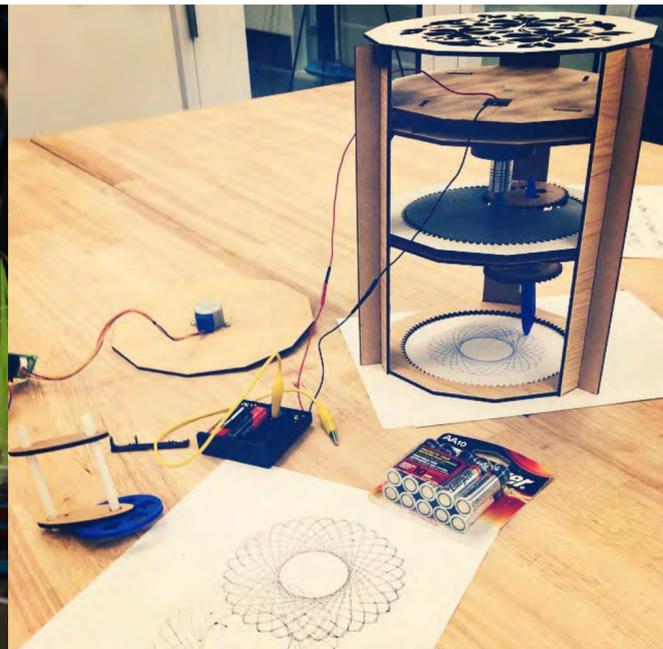
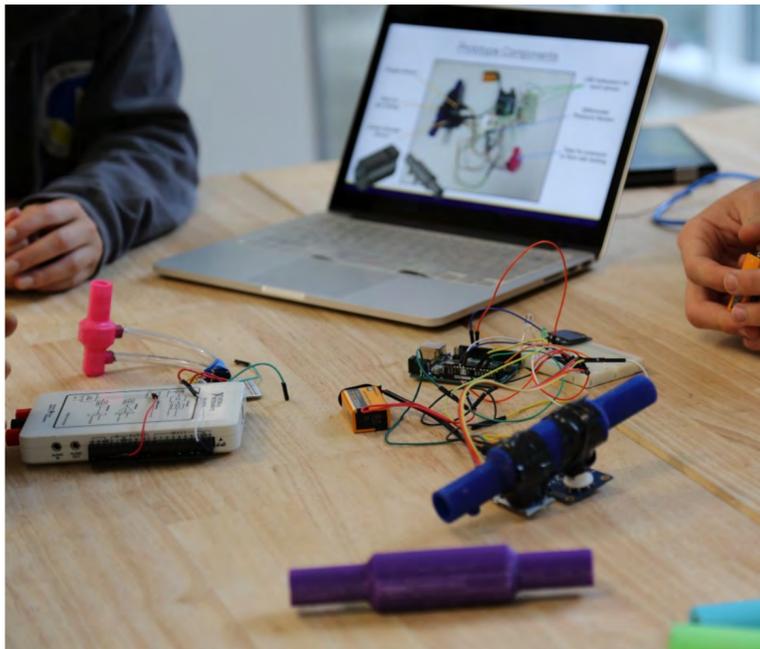
Everyone designs who  
devises courses of action  
aimed at changing  
existing situations into  
preferred ones

- Herb Simon



# JACOBS INSTITUTE FOR DESIGN INNOVATION

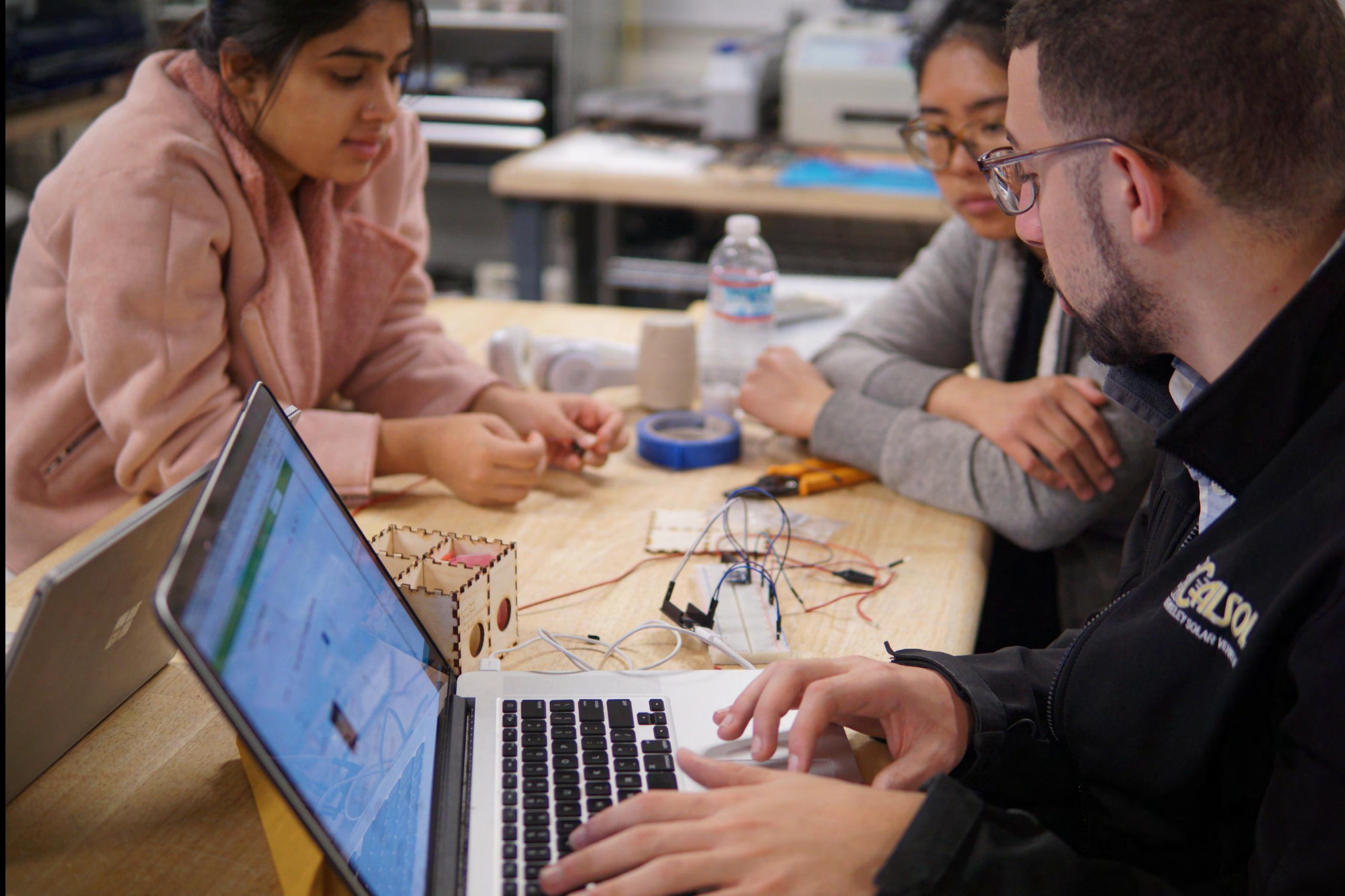
Educating leading innovators at the intersection of design and technology

















Early History of Computing  
Design History  
Computing History

PLEASE CLEAN WHITEBOARD  
AFTER CLASS







Maker Pass



# CITRIS INVENTION LAB



berkeley  
certificate  
in  
design  
innovation



College of Engineering • College of Environmental Design • Haas School of Business  
• College of Letters and Science – Arts and Humanities Division



This Certificate introduces design as the creative and critical means to innovate — to define, to imagine, and to advance a globally just future.

[designinnovationcertificate.berkeley.edu](https://designinnovationcertificate.berkeley.edu)

APPROVED COURSES FOR THE BERKELEY CERTIFICATE IN DESIGN INNOVATION

BERKELEY CERTIFICATE IN DESIGN INNOVATION		
I lower division course	DESIGN FOUNDATIONS	
must be taken outside of home College or School	ART 8- Intro to Visual Thinking ART W23AC- Data Arts DES INV 10- Discovering Design DES INV 15- Design Methodology	ENV DES 1- People & Environmental Design ENV DES 4A- Design & Activism ENV DES 104- Design Frameworks THEATER 60- Intro to Technical Theater & Production UGBA 190T- Needfinding in the Wild
choose 2 (2+ units)	DESIGN SKILLS	
	ARCH 11A- Intro to Visual Representation & Drawing ARCH 150- Introduction to Structures ARCH 160- Introduction to Construction BCNM 185- Interdisciplinary Drawing Design DES INV 21- Visual Communications & Sketching DES INV 22- Prototyping & Fabrication DES INV 190-001- Methods, Skills & Mindsets DES INV 190-002- User Experience Design ENGIN 25- Visualization for Design ENGIN 26- 3D Modeling for Design ENGIN 27- Intro to Manufacturing & Tolerancing	LD ARCH 1- Drawing a Green Future LD ARCH 189- Contemporary Approaches to Visualization and Communication in Landscape Architecture MUSIC 158A- Musical Applications of Computers and Related Technologies THEATER 173- Scenic Design for the Theatre THEATER 174- Costume Design for the Theatre THEATER 175- Lighting Design for the Theatre THEATER 177- Sound Design & Media Theater THEATER 178- Video Production for Performance UGBA 190T- Innovation and Design Thinking in Business
I upper division (3+ unit course)	ADVANCED DESIGN	
	ART 178- Game Design CIV ENG 186- Design of Cyber-physical Systems COMPSCI 160- User Interface Design & Development COMPSCI 194/ DES Inv 190-001— Interactive Device Design COMPSCI 194/NWMEDIA 203- Critical Making CY PLAN 140- Urban Design- City Building & Place Making DES INV 190/NWMEDIA 19- Critical Practices DES INV 190-3- Reimagining Mobility	IEOR 170- Industrial Design and Human Factors INTEGBI C32- Bioinspired Design LD ARCH 111- Plants in Design ME 150A- Solar Powered Vehicles ME 178- Designing the Human Body MUSIC 158B- Situated Instrument Design for Musical Expression THEATER 175B- Advanced Lighting Design UGBA 190T/ ME 110- Intro to Product Development UGBA 190T/TDPS 100/ ART 100- Collaborative Innovation

# SPICE PRINTER

kylan nieh  
victor sandberg  
hurshal patel



# DARK MAZE

brittany cheng  
jonathan cotte  
hurshal patel  
curtis hwang



# MOSSED UP

jonathan cotte  
noah pitts



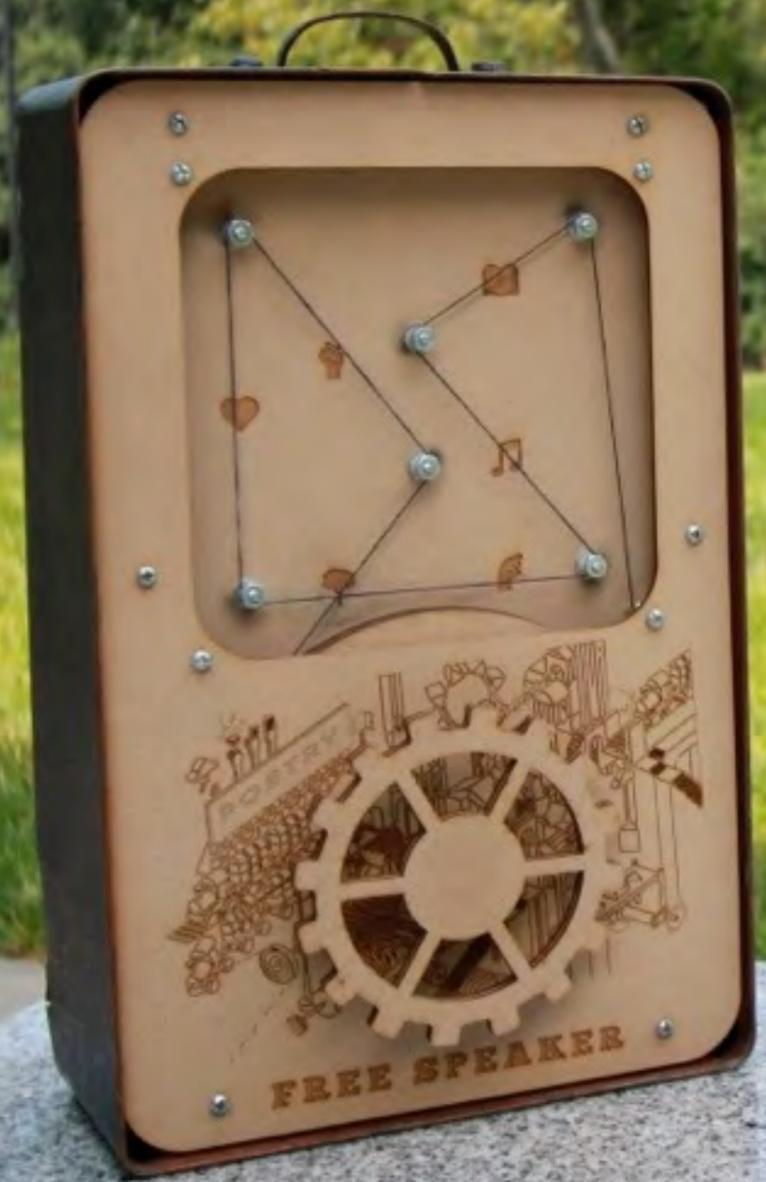
# MY CITY

karl landin  
victor sandberg  
kylan nieh  
alice lee



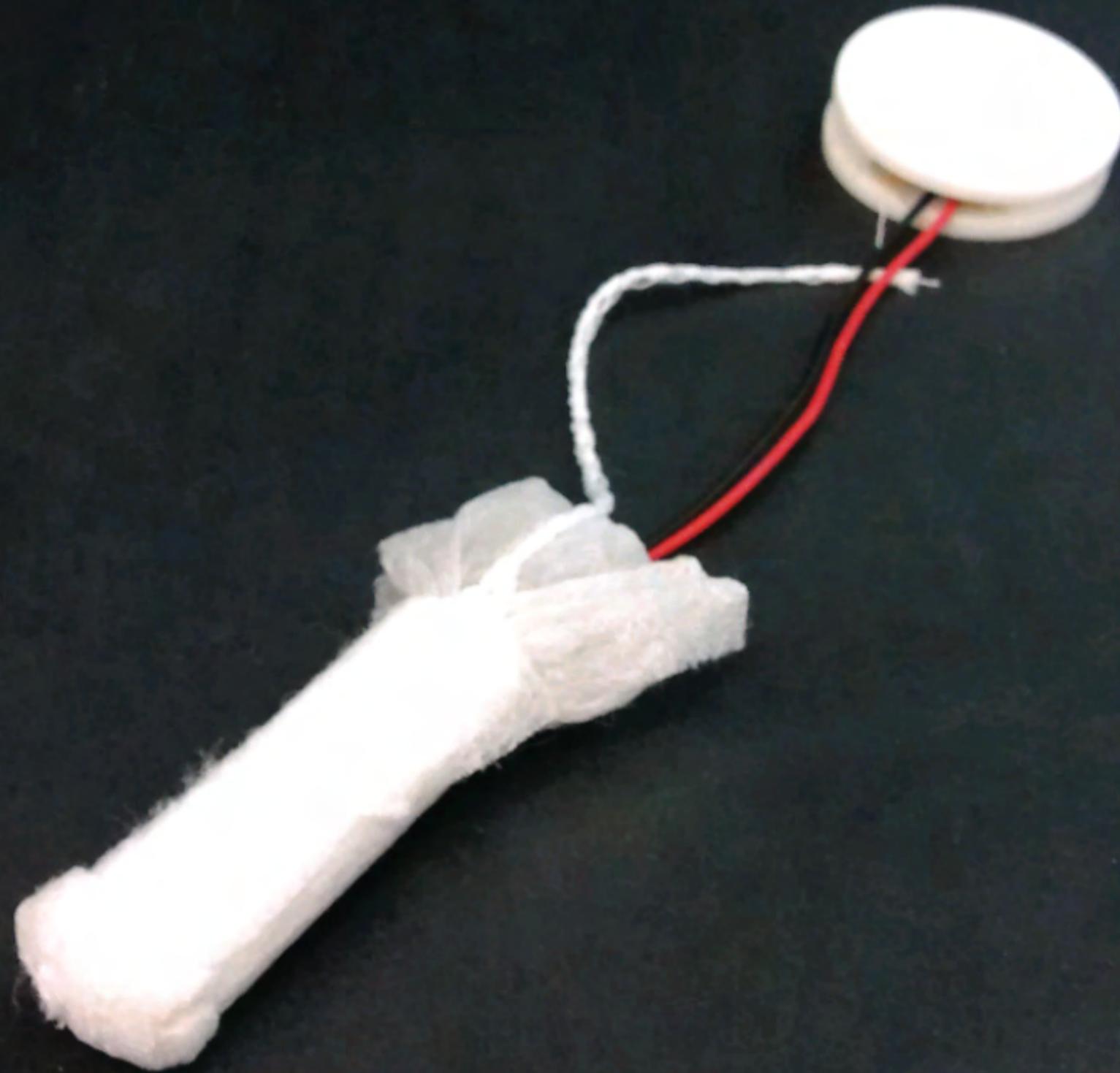
# FREE SPEAKER

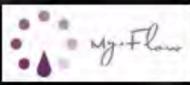
ben ortiz  
brandon young  
cassie seo  
noor al-samarrai



# MY.FLOW

tomas vega  
madeeha ghor  
katie chen  
drake myers  
amanda brief





HOME & RECOGNITION

MISSION

MY FLOW

BLOG & NEWSLETTERS

ABOUT

# Peace of Mind. Period.

my.Flow is a monitor that tells you when your tampon is full.

SIGN UP TO LEARN MORE

Check out my.Flow's Pitch at HAX Demo Day in May!



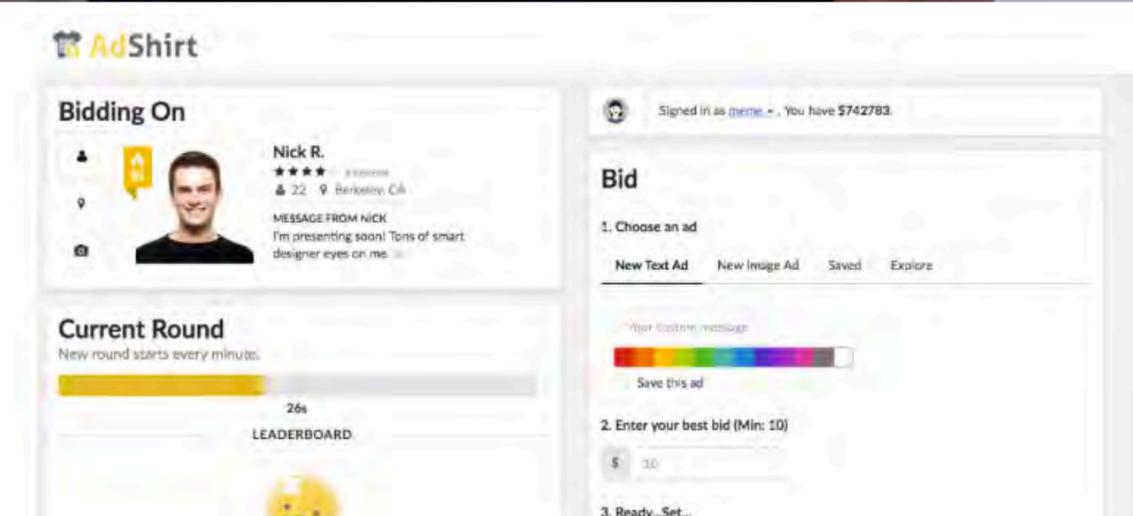
## we've been featured in:

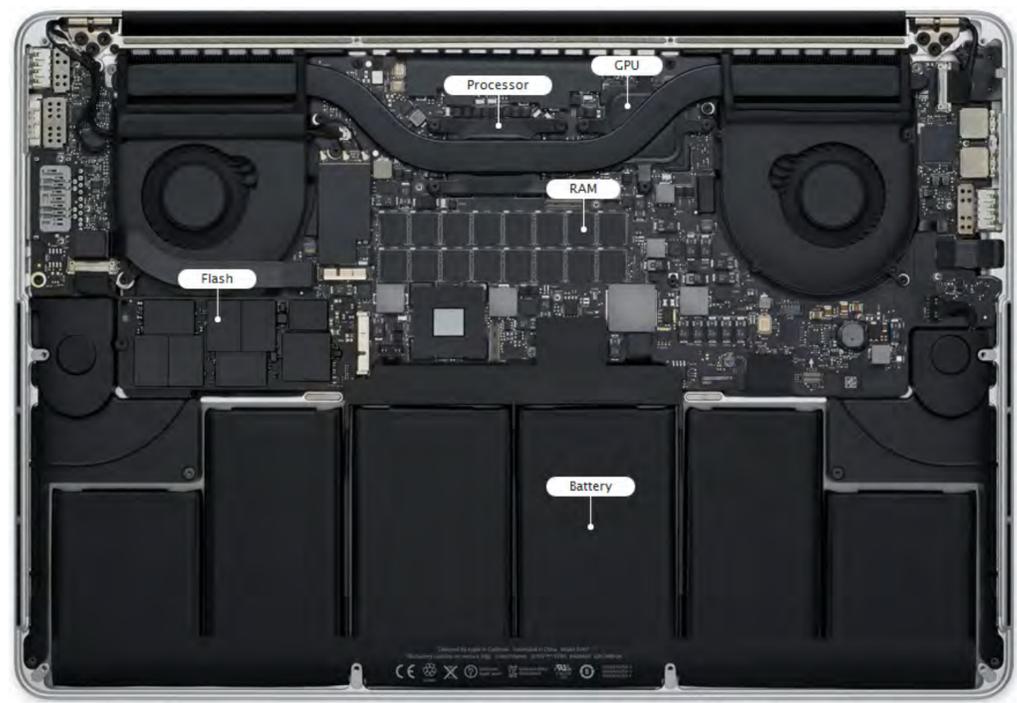




# AD SHIRT

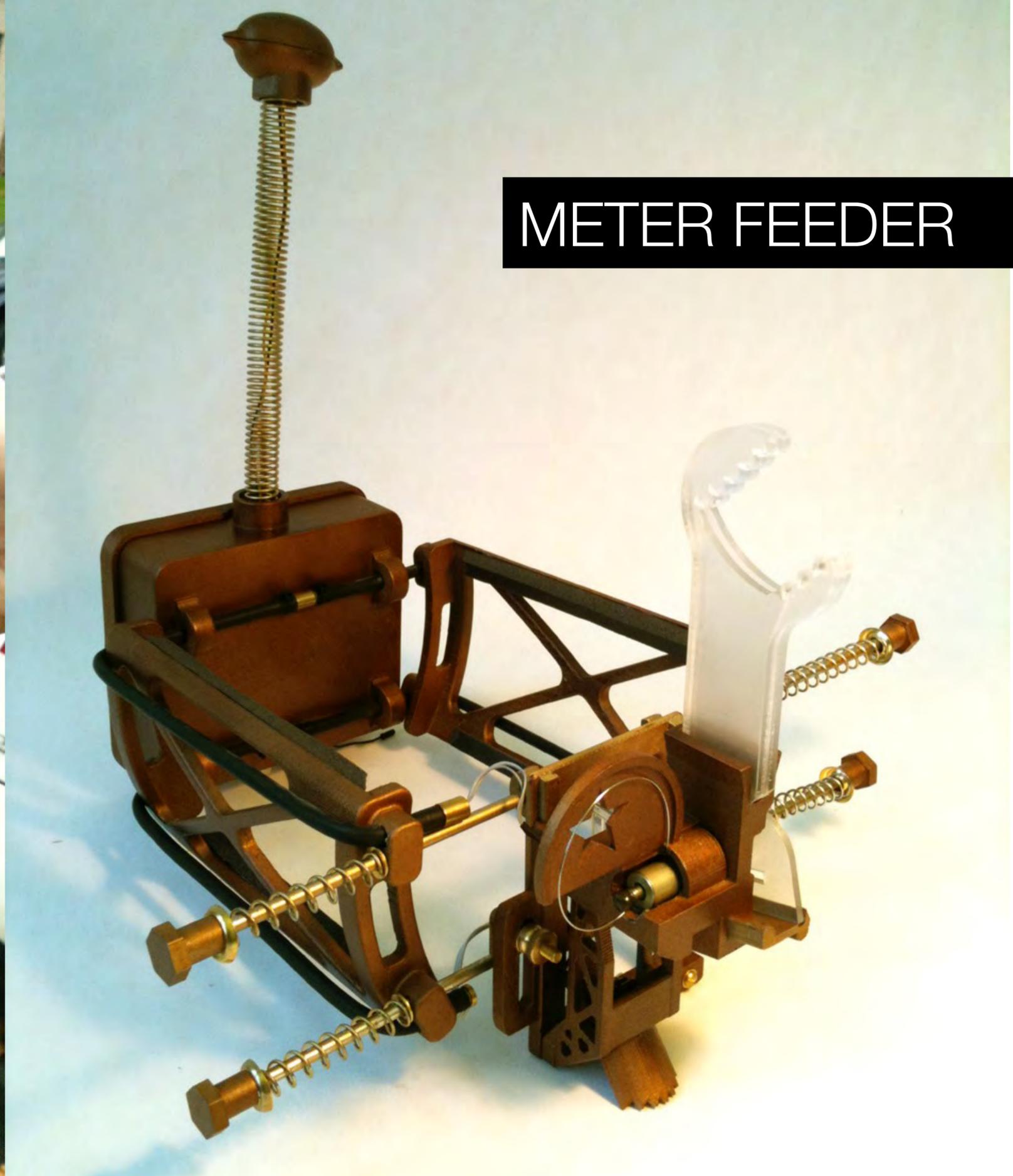
Jingyi Li  
Michelle Nguyen  
Diane Wang  
Nick Renda  
Joanne Lo



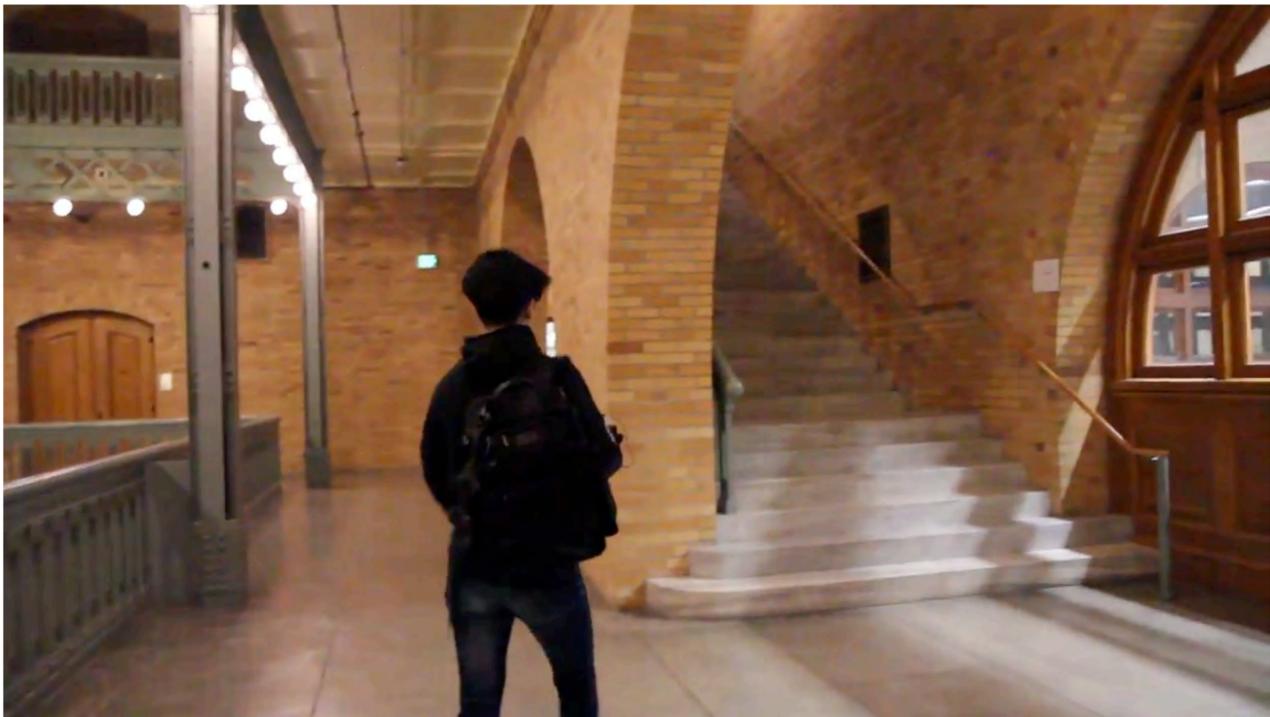




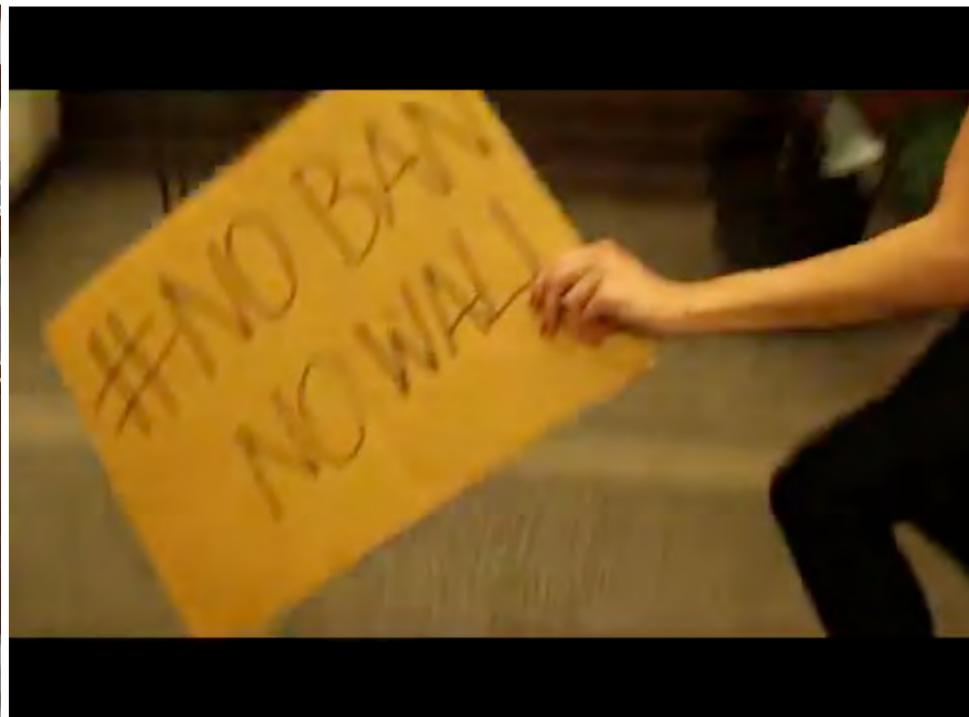
METER FEEDER



# PROTEST DESIGN



Light the Way



Protest Torch



Hands Off

All i

Average annual GDP losses from removing unauthorized immigrant workers by industry in (billions of dollars).

\$435  
billion  
loss in GDP

Immigrants  
are swarming  
our country.

In 2008, the total contribution to U.S. state & local tax revenue by undocumented immigrants was \$11 billion.

Service	Percentage
Construction	11.6%
Production	11.1%
Administration	10.5%
Professional	10.4%
Sales	7.0%
Office support	6.9%
Management	6.0%
Farming	4.1%
Maintenance	3.0%

Nearly a third of  
unauthorized  
immigrants work  
in the service sector  
(compared with  
10% of U.S. born workers).

All immigrant  
are illegal.



SKRT



SPARK





# FARM TO LABEL



# IDENTITY ARMOR



# KIT CAST





**STORMENT**



**BUMP LIKE BUNNIES**



EYERIS

# PERSPECTACLES



# THEMES

**PHYSICAL SKETCHING** – learning to give form to ideas using drawing, sketching, cutting, folding, as well as modeling software tools and digital fabrication

**MATERIALS** – fluid use of new materials for making such as paper, cardboard, foam core, fabrics, textiles, string, wire, moss, etc.

**SENSING AND EXPRESSION** – skills in electronics from programming simple microcontrollers to attaching sensors and actuators in the design of novel, compelling interactive objects

# IN THIS STUDIO COURSE YOU WILL...



get your hands dirty

make real physical objects

cut paper

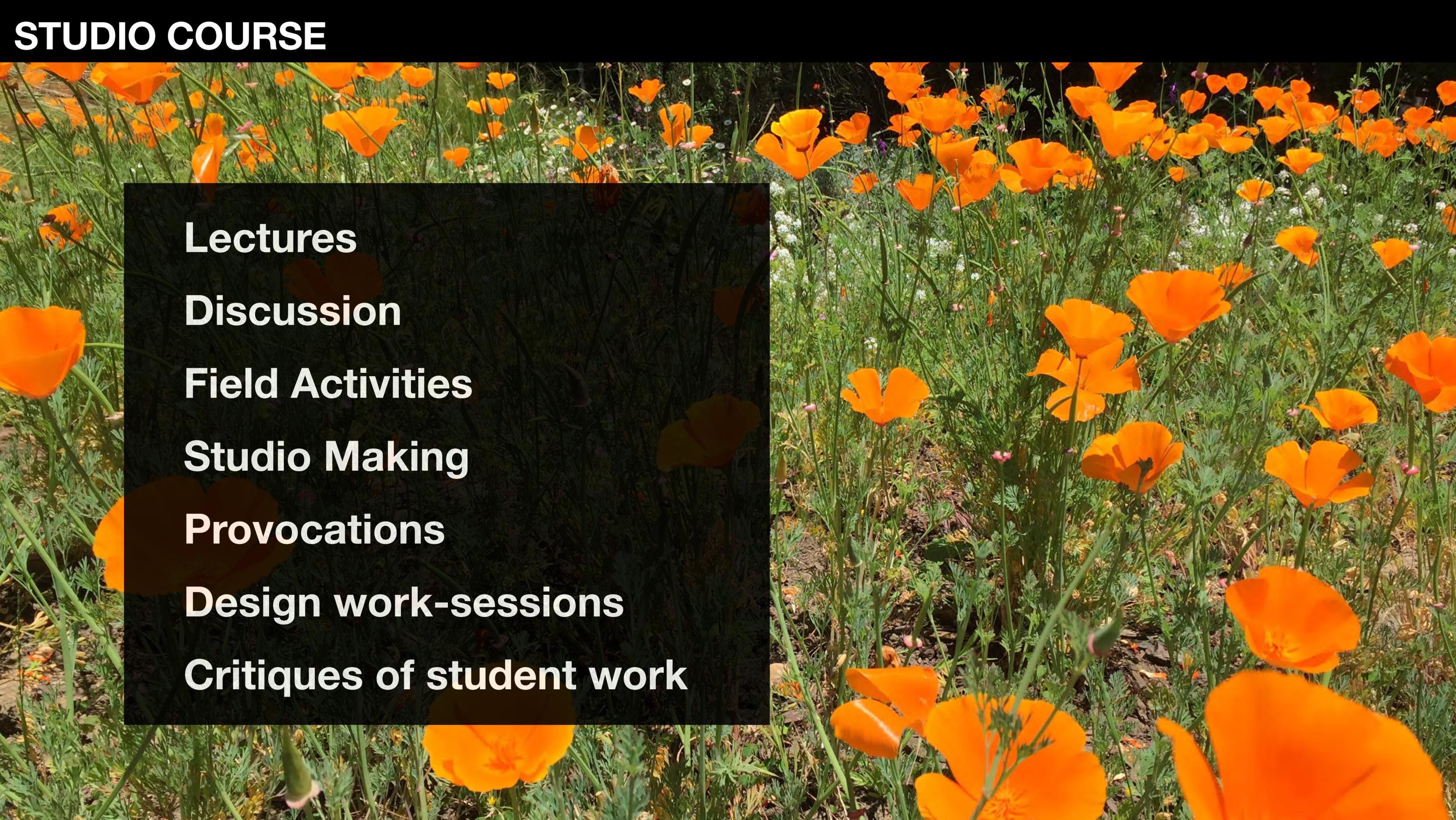
design circuits

cut forms

create 3D forms

program sensors

# STUDIO COURSE



**Lectures**

**Discussion**

**Field Activities**

**Studio Making**

**Provocations**

**Design work-sessions**

**Critiques of student work**

# FIELD TRIPS...



American Steel

# FIELD TRIPS...

# Designed in California

...centered, ecologically conscious, and  
...hibition explores the discipline's changing  
...igital revolution. In the 1960s and 1970s  
...om the midcentury excess of Modern-  
...to California, they worked with renewed  
...awareness and created alternatives to  
...iving lost crafts. Digital advancements  
...sed more personal control of informa-  
...uch developments designers found  
...social and economic changes.

...ornia Modernism has  
...by turns shap  
...es. As yest  
...ollection  
...he users  
...velop  
...ell as  
...res  
...e p  
...e

...rt by SFM  
...Andrew N



# YOU MUST!

The course will result in a final show of student final prototyped interactive physical technologies

**20 Feb** Provocation 01 Critique

**20 Mar** Provocation 02 Critique

**07 May** Final Provocation Critique

**09 May** Final Showcase

**Maker Field Trips** You Must Attend One

**Get a Maker Pass \$75 and Safety Training**

**No overlapping classes — Attendance (classes are not recorded)**

**Work with your team in lab and outside of class**

**Maker Faire 17 — 19 May (optional)**

MAKER FAIRE 2014



MAKER FAIRE 2016



YOU ARE EXPECTED TO BUY VARIOUS HARDWARE



We will also begin each class with two zip.crits

A zip.crit is a rapid critique of an interface, object, design, etc

You must signup to do at a zip.crit at the start of class

You will select an interface, object, design, artpiece, landscape, kickstarter, toy, etc.

At the beginning of class you will **briefly** introduce the object, interface, design to us

The class will collectively critique the artifact

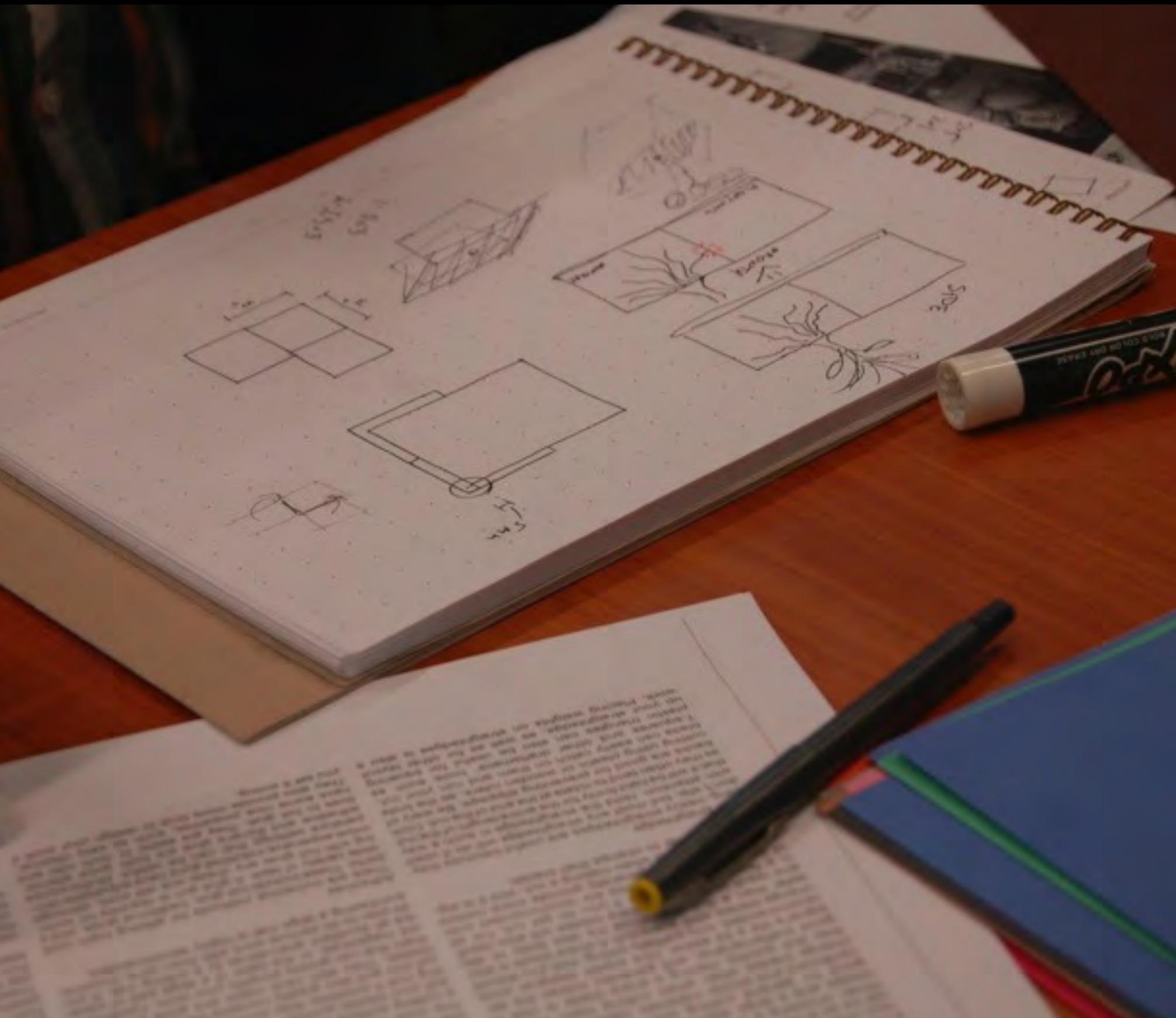
3

SLIDES

5

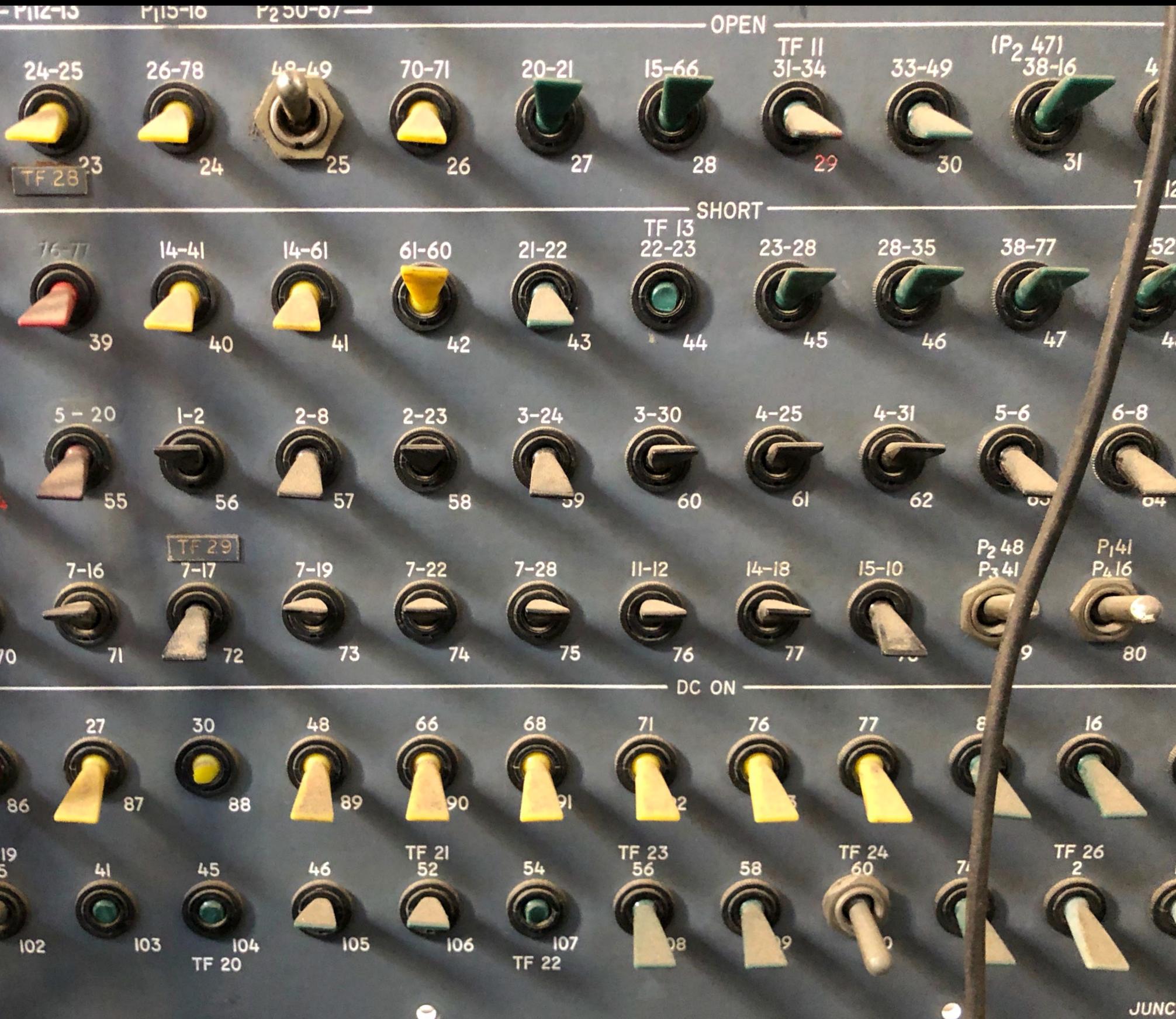
MINUTES

# READINGS



Readings will be assigned throughout the semester. Everyone is expected to read the readings. Two people will be selected for each reading to prepare a class presentation. Each student is expected to engage in class discussions when readings are assigned. You will also need to submit a written reading response the night before the readings are due. **This counts towards your class participation grade.**

# CRITIQUE



One of the main learning exercises in this course is the critique

We will be building this skill throughout the semester

Assignments will be critiqued in class

# RULES OF ENGAGEMENT



## **Be there!**

Critique days mandatory attendance

If you are not in class or late we will deduct from your attendance grade.

**There will be no exceptions**

# RULES OF ENGAGEMENT



## **Be active!**

During the in class critique  
**everyone** is expected to be  
engaged in the discussion

# RULES OF ENGAGEMENT



## **Be attentive!**

no laptops, phones, electronics  
out or used during critique and  
selected other parts of class

# SECOND HAND SMOKE



# SECOND HAND SCREEN



# RULES OF ENGAGEMENT



Attendance of all classes is mandatory

**You are allowed two absences for the semester without penalty (except critique days);** thereafter you will receive zero credit for the missed studio.

To receive an additional excused absence, you must ask in advance, and receive an acknowledgment from the instructor or GSI.

# RULES OF ENGAGEMENT



Excusable absences include family emergencies, job interviews, and presenting at a conference.

It **does not** include wanting to leave early for long weekend or vacation.

To receive credit for attendance, you must arrive on time.

No late assignments will be accepted

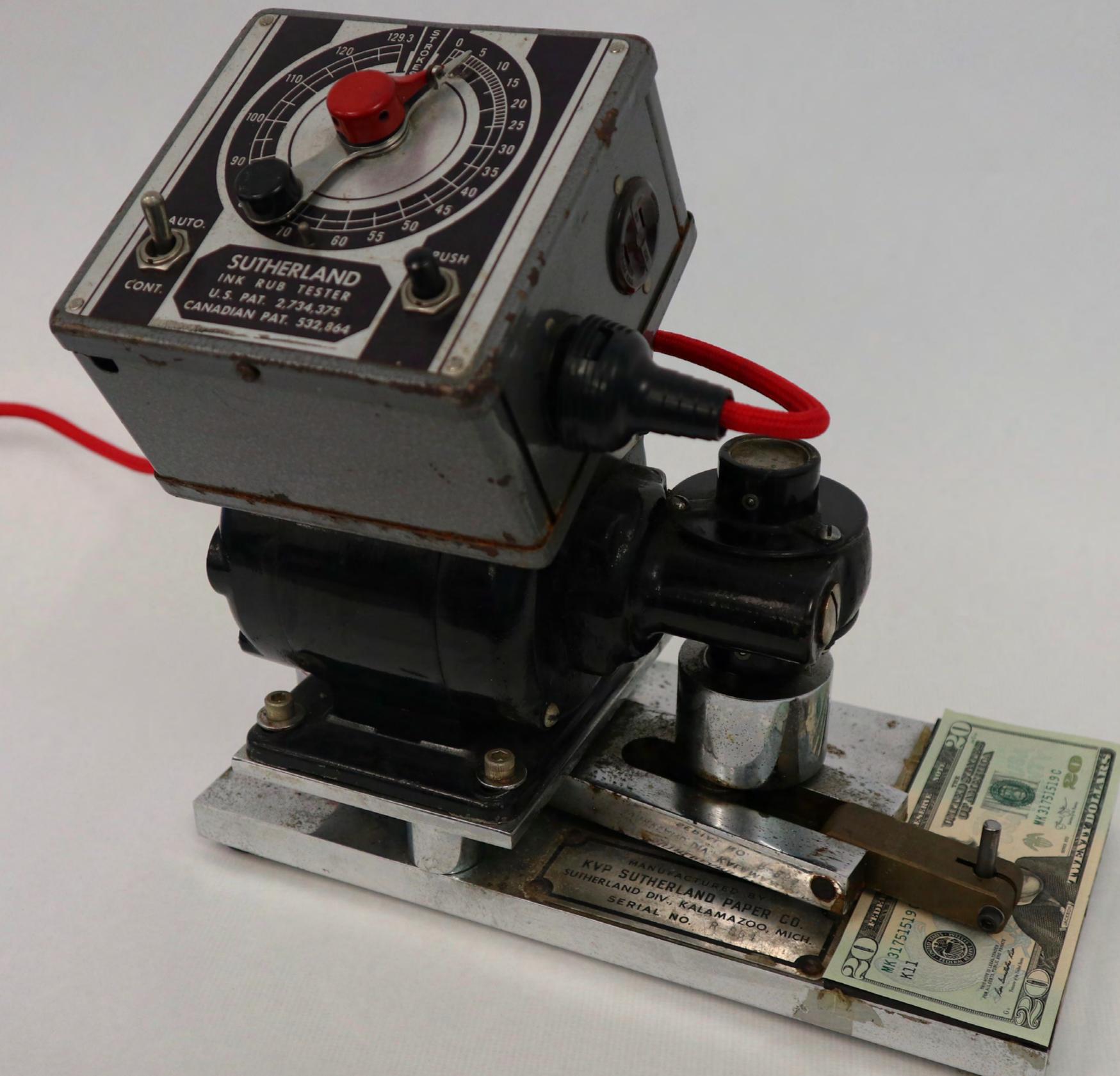
# EVALUATION



Assignments, timely attendance, and in-class and team participation are a critical part of the grade

Bringing examples from outside of the class is considered to be an assignment and is also important

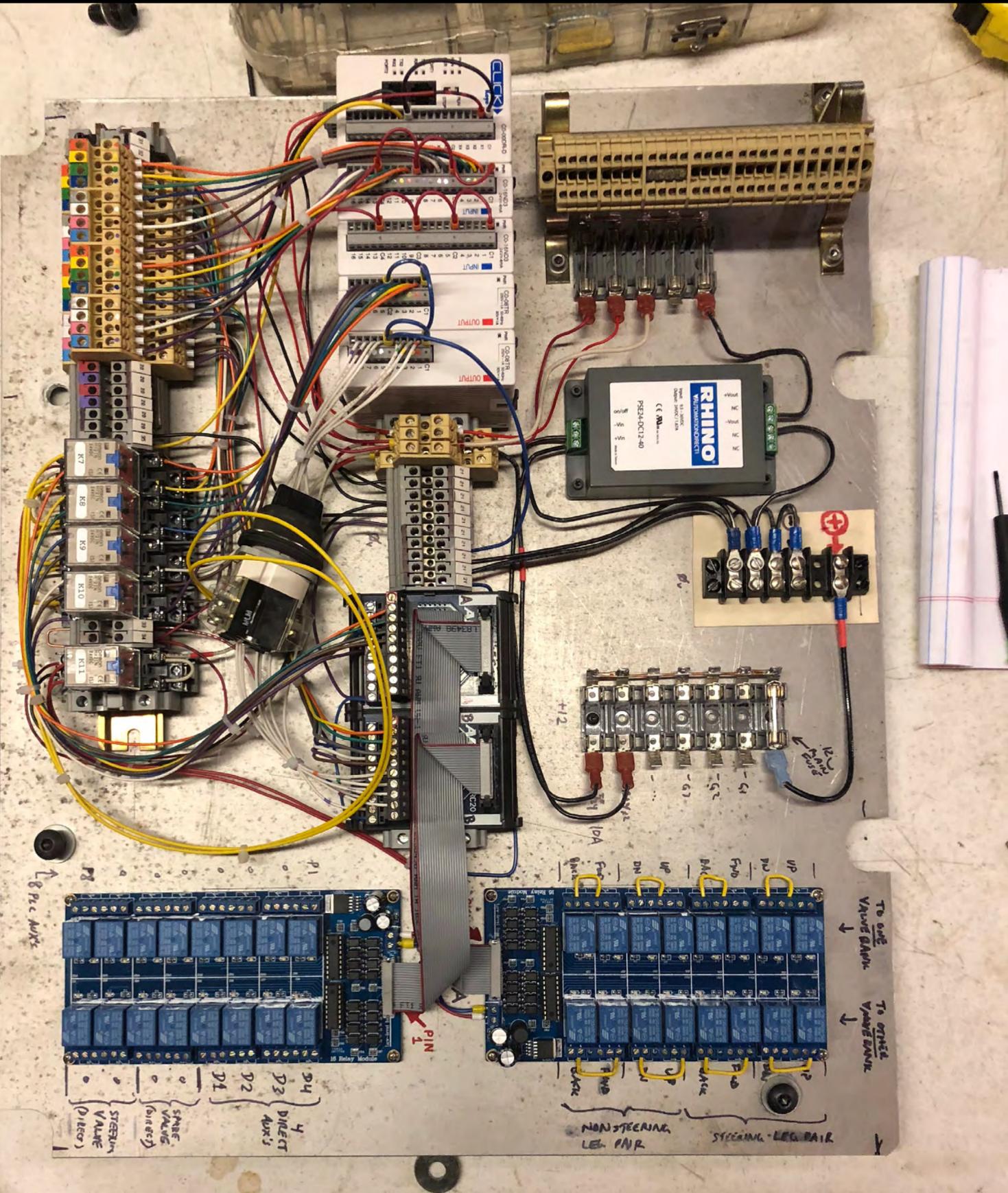
# EVALUATION



In addition, the process of exploration is as important as the final product, so it is important that students manage time well and devote time to working on the projects during the course of the week

If class time is given as a worksession and is not put to good use, students' grades will be penalized.

# EVALUATION



For projects done in teams, students will be graded on individual contributions as well as synthesis with the team

# GRADING



15% PARTICIPATION

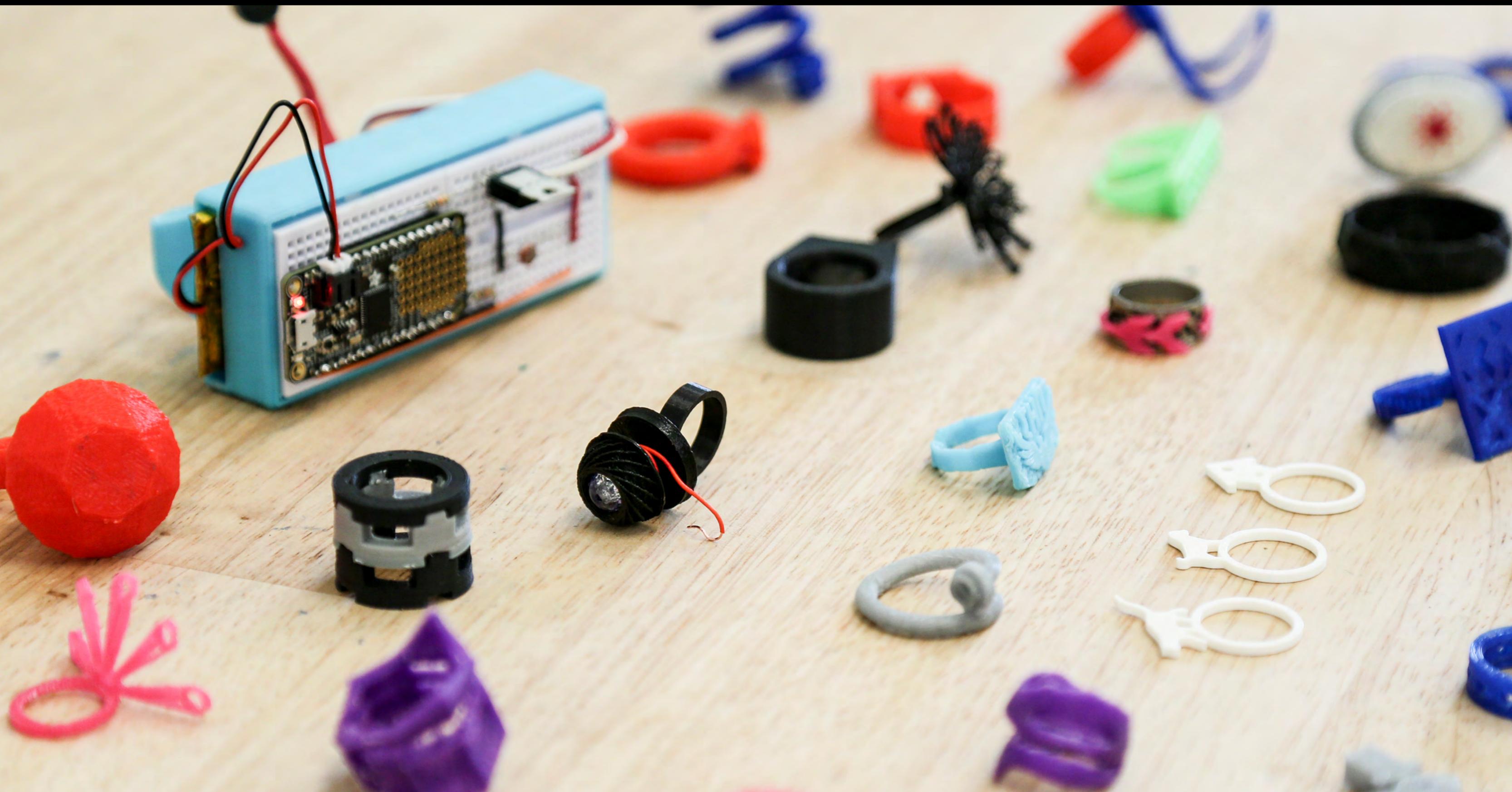
15% FIELD ACTIVITIES

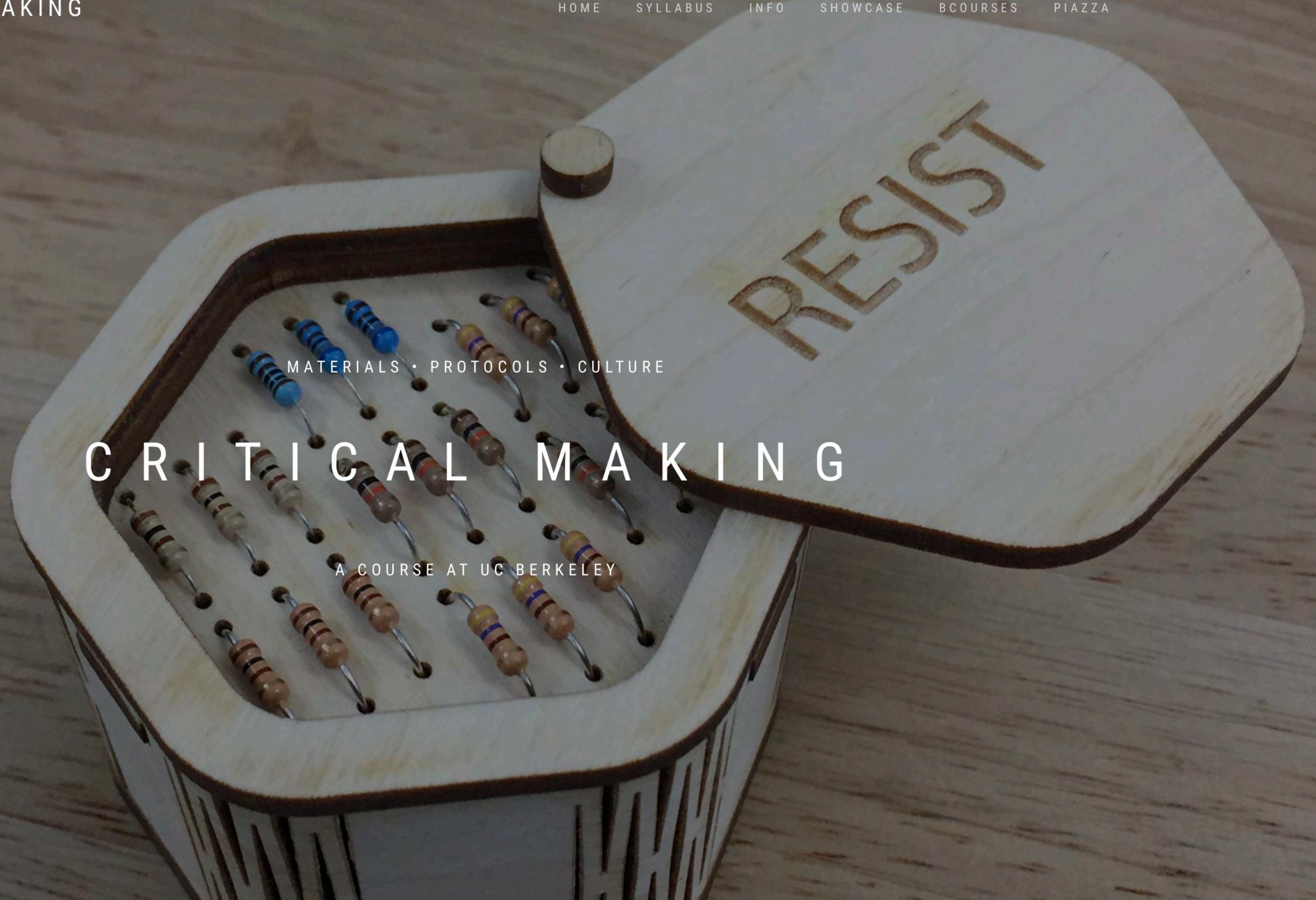
10% PROVOCATION 1

20% PROVOCATION 2

40% FINAL PROVOCATION

# FIELD ACTIVITIES





MATERIALS • PROTOCOLS • CULTURE

# CRITICAL MAKING

A COURSE AT UC BERKELEY