



Teaching Portfolio

Yechen Zhu

Rhode Island School of Design
Industrial Design Department
yzhu06@risd.edu

Teaching Philosophy	2
Inclusivity Statement	4
Introduction to Interactive Product Design with Arduino	6
Course Information	6
Course Description	6
Course Information	7
Course Description	7
Student Learning Outcomes	8
Course Requirements	8
Materials, Estimated Costs	8
Grading Policy	9
Class Participation 20%	9
Attendance 10%	9
Work: 70%	9
Course Structure	9
Course Schedule	10
Evaluation Criteria	12
Academic Code of Conduct	13
Resources	14
Interaction and Connection with Sleep and Dream	15
Course Information	15
Course Description	15
Course Goals	15
Course Learning Outcomes & Grading Policy	16
Material Costs	16
Course Schedule	16
Course Resources	20
Class Assignment Proposal	21
Goals	21
Learning Outcomes	21
Methods	21
Assessment	21
Midterm Feedback Form	22
Course Assessment Rubric	23
Critique Statement	24

Teaching Philosophy

As an innovation design educator, I see the world through different lenses and imagine the world we haven't seen yet. I believe education should be a transformative journey where students not only acquire technical skills but also cultivate a deep understanding of the impact that design has on people and society. My teaching philosophy centers around fostering imagination, creativity, empathy, and a commitment to user-centered design. Through collaborative learning and critical thinking, my goal is to empower students to become thoughtful, innovative, and socially responsible interdisciplinary designers who can shape a brighter future through their work.

Interdisciplinary Excellence and Adaptability

Drawing from my background in digital media art and industrial design, I am acutely aware that excellence in crafting interactive installations and products demands a broad spectrum of interdisciplinary knowledge and technical skills. In an evolving society, businesses increasingly demand individuals with diverse abilities to tackle complex challenges effectively. Innovation design, at its core, represents a creative and problem-solving approach to product, service, process, and solution design. It places importance on addressing specific challenges and meeting the evolving needs of users and customers. This methodology requires a harmonious fusion of design, engineering, business strategy, and user experience to develop innovative, user-centered solutions. In the winter semester of the 2023-2024 academic year at Rhode Island School of Design, in the course "Air Materialized" that I taught, I designed an assignment that asked students to analyze the techniques used in the "aeroMorph" paper as well as its application scenarios, which involved perspectives from science, mathematics, materials, sociology, and design. By analyzing issues from various perspectives, students not only could gain a deeper understanding of the underlying principles but also could develop the foresight to anticipate potential applications and associated societal risks. Additionally, I am willing to adapt my curriculum to incorporate new information or emerging interdisciplinary connections if students express relevant aspirations and feedback.

Cultivating Creativity and Innovation

I view creativity as the heart of innovation design. My teaching approach encourages students to explore the boundaries of their creativity, think out of the box, and push the limits of conventional design. Taking my teaching course 'Air Materialized' during the winter semester at Rhode Island School of Design as an

example, I ensured students read papers about shape-changing materials and guided them to think about how to apply these techniques to their own research fields. Furthermore, I demonstrated how to use sensors to measure the degree of inflation and how to visualize the values into elements such as sound to inspire students. To better nurture unconventional thinking, I invite a guest speaker Hyejun Youn from Harvard Graduate School of Design to share her experience. I believe that by nurturing their creative potential, students can develop innovative solutions that address real-world problems effectively. I teach students to be observant and to pay attention to details in their surroundings and encourage them to keep journals or sketchbooks to document their observations. In addition, brainstorming and group discussion are indispensable links in my class.

Versatile Teaching and Tailored Progression

My teaching philosophy emphasizes adapting teaching methods according to the different levels of courses to meet the diverse needs of students. For introductory courses, I focus on establishing a solid foundation by simplifying complex topics through clear explanations and interactive workshops. My goal is to instill a passion for learning and provide a framework upon which more advanced knowledge can be built. Conversely, in advanced courses, I adopt a more specialized, nuanced approach. Recognizing that students in advanced courses have a deeper understanding of the subject, I am committed to cultivating critical analysis, independent research, and advanced problem-solving skills. The curriculum is designed to delve into details, explore cutting-edge developments, and inspire students to think beyond foundational knowledge.

Collaborative Learning and Critical Thinking

In my classroom, I often ask students to give an introduction to their background and interests in the first class. This is so they can get to know each other and perhaps think about project collaborators, which they can bring unique perspectives, skills, and knowledge to the table. This diversity of thought can lead to more creative and well-rounded solutions to problems. I implement Socratic questioning techniques during class discussions to stimulate critical thinking and ask open-ended questions that require students to analyze, evaluate, and synthesize information. I challenge them to think critically, question assumptions, and evaluate the ethical implications of their design choices. This encourages a holistic approach to design that considers both the individual and societal impacts.

In conclusion, my teaching philosophy is centered around empowering students not just as individual designers but as collaborative innovators. I believe that by nurturing creativity, empathy, and the ability to work together effectively, students will be equipped to address the complexities of our ever-changing world.

Inclusivity Statement

As someone with a background in industrial design, I once chose to join the Landscape Architecture department for my thesis during my graduate studies. This serendipitous opportunity made me realize that today's education places increasing emphasis on interdisciplinary collaborative innovation. The two professors guided and motivated me based on my interests, and they made me feel less anxious despite my lack of certain professional knowledge. This experience underscored the importance of inclusivity in creating a safe and supportive environment for all learners.

As an international instructor with a commitment to fostering inclusive learning environments in the US, I recognize the diverse range of experiences and levels of understanding that students bring to the classroom. I approach teaching with patience and a dedication to ensuring that every student has the opportunity to grasp new knowledge, regardless of their initial familiarity with the subject matter. If the students are facing language barriers, I will implement various strategies to facilitate understanding. For instance, I will provide multilingual resources, such as translated materials or glossaries, to aid comprehension. Additionally, I will patiently listen and use both body language and translation tools to clarify concepts when needed.

In my classroom, inclusivity means valuing and respecting the unique learning journeys of each student. I understand that some students may require more time and repetition to fully comprehend new concepts, and I am more than willing to provide the support needed, such as encouraging them to email me outside of class hours. I view repetition as a valuable tool for learning and believe that revisiting and reinforcing key ideas can lead to deeper understanding. I am dedicated to employing real-world examples and practical applications to make abstract concepts more tangible. I will incorporate visual aids, hands-on activities, and case studies relevant to diverse cultural contexts, ensuring that the material is accessible and relatable to all students. Furthermore, I am open to feedback and encourage students to communicate their specific learning needs. In cases where individual support is required, I will offer one-on-one desk crits, additional resources, or alternative explanations to ensure that every student can grasp the material.

My commitment to inclusivity extends beyond just the classroom content. I strive to create an atmosphere where every student feels comfortable asking questions, seeking clarification, and expressing their individual learning needs. I encourage open communication and actively listen to students' concerns, ensuring that their voices are heard and valued. I firmly believe that every student, regardless of their starting point, has the potential to succeed. I am here to guide and support each student on their educational journey, offering assistance and guidance as they work toward their goals. I see myself as a partner in their learning process, and I am dedicated to helping them build confidence in their abilities.

In conclusion, my inclusive teaching approach centers on patience, understanding, and a commitment to meeting students where they are in their learning. I believe that by providing the necessary repetition and support, we can create an inclusive classroom where all students have the opportunity to thrive and reach their full potential.

Introduction to Interactive Product Design with Arduino

Course Information

Course Number: ID-1017

Course Schedule: Wintersession 2024

Credit Load: 3 Credits

Capacity: 12

Time: Monday 8:00 am - 1:00 pm

Location: CIT 203

Instructor Name: Yechen Zhu

Instructor's Contact: yzhu06@risd.edu

Course Website: N/A

Course Description

In our contemporary digital landscape, the once-distinct boundaries separating physical and digital realms have dissolved, paving the way for an exhilarating era in interactive product design. This course is meticulously curated to cater to the aspirations of burgeoning industrial designers who are poised to explore the captivating intersection of design and technology. Through hands-on projects and a voyage of creative discovery, participants will acquire the knowledge and expertise necessary to conceptualize, prototype, and develop interactive products that seamlessly respond to user inputs. By delving into Arduino, a versatile microcontroller platform, students will gain a comprehensive understanding of hardware-software synergy, enabling them to craft responsive and innovative experiences. The course is open to all level students.

Air Materialized

Course Information

Course Number: *ID-3780*

Course Title: ***Air Materialized***

Course Schedule: *Wintersession 2024*

Credit Load: **3 Credits**

Class meeting time and location: *RISD ID Room 300A*

Class Website: <https://zhuyechechen666.wixstudio.io/air-materialized>

Instructor Name: ***Yechen Zhu***

Office Hours: *(TBD)*

Instructor's Contact: *yzhu06@risd.edu*

Course Description

Inflatable structures (aka “pneumatic structures”) are broadly used in the human-computer interaction research field and realms of art and design. In this course, students will explore fabrication techniques such as a universal bending mechanism that creates programmable shape-changing behaviors with paper, plastics, and fabrics, as well as an origami structure to make inflatables with various materials. Furthermore, academic papers related to inflatable products, educational kits, sculptures, and experiences will be assigned to students to read each week. In general, it will include a mix of lectures, workshops, independent research, and the development of unique, personalized, tangible objects. The class will culminate in a final project catering to students’ individual interests and desired outcomes.

Student Learning Outcomes

- An understanding of using different heat sealing and sewing patterns to make shape-changing inflatables as well as the properties of different materials (vinyl, waterproof fabric, Urethane-coated nylon, TPU, etc.), and basic mold-making techniques and materials (silicone).
- An exploration of a technology that uses air as power to make objects change shapes.
- An understanding of multiple research methods: desk research, behavior observation, comparison study, and analogous experience.
- An understanding of methods to read and analyze papers to be able to experiment and test on your own based on the techniques described in the paper.
- A development of sketching and rapid prototyping skills.

Course Requirements

- Students are expected to attend all classes, critiques, and visits.
- Students are expected to complete all assignments on time.
- Students are expected to be active participants in classroom discussions and critiques.
- Students are expected to check the course Google Drive regularly (see Class [Google Drive Folder](#))
- Students need to willingly and consistently engage in the exploration of new materials and methods.

Materials, Estimated Costs

The Industrial Design department will purchase certain fabrics and electronics for students. However, students with different backgrounds and ambitions should expect to buy additional materials and will assume other costs associated with producing their work.

Estimated Additional Materials Cost: \$10 - \$50 (variable).

Grading Policy

Class Participation 20%

Participation is more than just talking in critique. It is about being engaged with the community that we are creating in this classroom. This includes the investment of one's attention, support, and communication (written and spoken) with the instructor and peers.

Attendance 10%

If you will be absent for any reason, or if you will be more than 10 minutes late please let me know in advance at yzhu06@risd.edu.

Work: 70%

This is not just the success of what is physically produced, but also the planning, thinking, documentation, and processes that embody projects in this class.

Final Project: 40%

Project Documentation: 15%;

Final Presentation: 15%;

A:90-100(4.0), **A-:**85-89.9(3.7)

B+:82-84.9(3.3), **B:**78-81.9(3.0), **B-:**75-77.9(2.7),

C+:72-74.9(2.3), **C:**68-71.9(2.0), **C-:**66-67.9(1.7),

D:64-65.9(1.5), **D-:** 60-63.9(1.0),

F:0-59.9(0).

Course Structure

This course will intertwine lecture-based instruction and hands-on workshops to impart fabrication skills, along with general knowledge of pneumatic structures. Lectures mainly include slideshow presentations on the technical and application scenario analysis of papers, as well as reading discussions. Workshops primarily involve designing shape-changing materials through pneumatic structures; making your own pressure sensor matrix; programming, data visualization, and sound design techniques.

Course Schedule

Week	Schedule A		A	Schedule B	
			B		
	Monday	Tuesday	Wednesday	Thursday	Friday
1	Jan. 1	Jan. 2	Jan. 3	B Jan. 4	B Jan. 5
2	A Jan. 8	A Jan. 9	A Jan. 10	B Jan. 11	B Jan. 12
3	Jan. 15 MLK – No Classes	A Jan. 16	B Jan. 17	B Jan. 18	B Jan. 19
4	A Jan. 22	A Jan. 23	A Jan. 24	B Jan. 25	B Jan. 26
5	A Jan. 29	A Jan. 30	B Jan. 31	B Feb. 1	B Feb. 2
6	A Feb. 5	A Feb. 6	A Feb. 7	Feb. 8	Feb. 9

Week 1

Class 1 (Jan.8, Mon.):

- Syllabus Introduction & Students Introduction
- HCI Academic Paper Introduction

(HCI paper reading methods, [Latex](#) introduction, [CV templates](#))

- Model shop heat sealing tools visit/introduction (10:30 am)
- Paper reading & analyzing ([aeroMorph](#), [Therms-Up!](#))

[Prepare 5-10 mins presentation: 1. Show some notes from the paper: What do you learn from the paper? 2. How will you test this new technology? 3. Does this technology help you in your research interests? 4. Design some patterns by yourself for tomorrow's workshop.]

- Reading Discussion

Class 2 (Jan.9, Tue.):

- Shape-Changing Material Workshop ([Workshop 1 Assignment](#))
- Paper reading & analyzing ([PneUI](#), [AuxeticBreath](#), [NugiTex](#))

Class 3 (Jan.10, Wed):

- [Soft Robotic lecture](#)
- Design several molds ([Workshop 2 Assignment](#))
- Workshop - [Elastomer Grippers](#) ([Soft Robotic](#)) making & cardboard diy
- Paper reading & analyzing ([PneuBots](#), [aSpire](#))

Week 2

Class 4 (Martin Luther King, Jr. Day, no class)

Class 5 (Jan.16, Tue): Class starts at 8:20 am

- Guest speaker [Kai Zhang](#)'s lecture (8:30-9:30) [Pneuhus Intern Log](#), [design report](#)
- Introduction to [Arduino](#) (Light sensor, Bend Sensor, Capacitive Sensor, RGB LED, Servo Motor)
- Workshop - Visualize the data from the sensors
- Workshop - Design sound using data from the sensors

- Introduction to [Processing](#) (Data Visualization), Introduction to [Max/Msp](#) (Sound Design)
- [Introduction to Arduino PowerPoint](#)

Week 3

Class 6 (Jan.22, Mon): Class starts at 8:00 am

- Workshop - DIY pressure sensor ([using Velostat](#)), pressure sensor matrix, and capacitive sensor
- Guest speaker *Hye Jun Youn*'s lecture & workshop (10:00-13:00) [heat-sealing pattern](#)

Class 7 (Jan.23, Tue): Class starts at 8:30 am

- Show HCI works
- Final Project Ideation, Research, Sketch & Pitch ([Final Assignment](#))
- Final project Working Time (Research)
- Upload your [Design Statement Draft & Moodboard](#) (within 200 words)

Class 8 (Jan.24, Wed): Class starts at 8:30 am

- Final project Working Time (Research/Experiment)
- 1-on-1 ([Sign up sheet](#))
- [Links to 12v pumps, relay, oral inflation valve, etc.](#)

Week 4 (if you want to work outside, please let me know)

Class 9 (Jan.29, Mon): Class starts at 8:30 am

- Final project Working Time (Experiment)

Class 10 (Jan.30, Tue): Class starts at 9:00 am

- Final project Working Time (Experiment)

Week 5

Class 11 (Feb.5, Mon): Class starts at 9:00 am (if you want to work outside, please let me know)

Final project Working Time (Integrating)

Class 12 (Feb.6, Tue): Final Presentation starts at 9:00 am

- [Sign up sheet](#)

Class 13 (Feb.7, Wed): Final Submission: Google Drive, 4 pages, Letter size, Vertical orientation

Evaluation Criteria

	Excellent (A)	High Competent (B)	Competent (C)	Needs Work (D)
Participation	<ul style="list-style-type: none"> -Always shows up on time. -Active participation in general conversations. -Active conversation and feedback between peers in the class and during crits. -All the assignments were completed on time. 	<ul style="list-style-type: none"> -Mostly shows up on time. -Mostly participation in general conversations. -Often engages in conversation with peers during classes and crits. -Most of the activities were presented on time. 	<ul style="list-style-type: none"> -Some unexcused absences or mostly arrive late. -Punctual participation in general conversations. -Sometimes engages in conversation with peers during class and crits. -Some activities were unfinished or not presented on time. 	<ul style="list-style-type: none"> -Multiple unexcused absences or always arriving late. -Refuses actively to participate in general conversations. - Does not engage in conversation with other peers during the class or crits. - Most of the activities were unfinished, presented late, or not presented.
Presentation	<ul style="list-style-type: none"> -Effectively expresses their ideas and creative process. -Shows interest in the topic and provokes excitement in their peers. -Demonstrates on the Q&A a deep research and comprehension of their idea. 	<ul style="list-style-type: none"> -Present their ideas and process clearly. -Shows interest in their topic and generates some interest among their peers. -Shows during the Q&A a complete understanding of their topic based on their research. 	<ul style="list-style-type: none"> -Presents their ideas with some difficulties in the communication process. -Shows some interest in their ideas. -Has some problems with the Q&A showing a lack of previous research work. 	<ul style="list-style-type: none"> -Does not present their ideas, or their method of presenting is confusing. -Does not show interest in their topics or ideas. -Some or all of the questions on the Q&A are left unanswered as there is a big lack of in-depth research.
Conceptual	<ul style="list-style-type: none"> -Research evidently references historical context in art and design. -Ideas are clearly supported by deep and enriching research. 	<ul style="list-style-type: none"> -Research demonstrates an understanding of the historical context in art and design. -Ideas are supported by personal research. 	<ul style="list-style-type: none"> -Research demonstrates a lack of understanding of historical context in art and design. -Ideas are not clearly supported by the personal research. 	<ul style="list-style-type: none"> -Research does not show any understanding of historical context in art and design. -Ideas are not supported by any personal research or the links are not clear.
Technical	<ul style="list-style-type: none"> -Works safely. -Implements the software and techniques presented in the class and adds their personal use. -Final ideas present a thoughtful process with several iterations. 	<ul style="list-style-type: none"> -Works safely mostly. -Shows a general understanding of the software and techniques presented in the class. -Final ideas present a thoughtful process with some iterations. 	<ul style="list-style-type: none"> -Sometimes does not follow safety measures. -Shows a basic understanding of the software and techniques presented in the class. -Final ideas present a thoughtful process but without many iterations. 	<ul style="list-style-type: none"> -Usually does not follow safety measures. -Does not show evidence of understanding or practice of the software or techniques presented in the class. -Final ideas do not present a thoughtful process.

Academic Code of Conduct

Academic Misconduct (general policies required to be stated on the syllabus by RISD)

Academic misconduct compromises the academic integrity of the College and subverts the educational process. Primary, but not exclusive, kinds of such misconduct are:

Cheating The use of unauthorized information, study aids or other materials, or unauthorized communication with, or copying from another student on papers, projects, tests, or other academic work. It is the responsibility of students to consult with their faculty concerning what materials and types of collaboration are permissible.

Plagiarism The passing off of someone else's ideas, writing, or work as one's own is plagiarism. Appropriate methods and forms of attribution vary by discipline. Some courses will include instruction in appropriate conventions for citation and attribution within the field. Students are advised to seek out relevant guidelines on their own (the RISD Writing Center offers resources and guidance), to ask faculty when in doubt about standards, and to recognize that they are ultimately responsible for proper citation.

Falsification and Fabrication The attribution of information or material included in one's work to a false or fabricated source, or the falsification or fabrication of the information or materials themselves.

Unauthorized Reuse The submission of work to satisfy requirements for one course that has previously been submitted for another course. Students are expected to create new work in specific response to each assignment unless expressly authorized to do otherwise.

Unfair Academic Advantage For purposes of the Academic Code of Conduct, Unfair Academic Advantage is the theft, destruction, or defacement of, or other interference with the work of other students for the purpose of gaining the academic advantage. This includes but is not limited to engagement in activities that place other students at an academic disadvantage, such as theft, concealment, or alteration of needed resources or other materials; or other manipulation of the academic system in one's favor.

Noncompliance with Course Expectations The violation of specific course expectations set forth in a syllabus or otherwise provided to the student by the instructor whether verbal or written.

Resources

Inflatable in HCI

- Dani Clode, [Robotic Thumb](#)
- S. Leigh, [Hand Development Kit](#)
- S. Leigh, [Robotic Symbionts II](#)
- Kyung Yun Choi, [aSpire](#)
- Kyung Yun Choi, [Therms-Up!](#)
- Lining Yao, [PneUI](#)
- Jifei Ou, [aeroMorph](#)
- [NugiTex](#)
- [breatHaptics: Enabling Granular Rendering of Breath Signals via Haptics using Shape-Changing Soft Interfaces](#)
- [Baromorph, Paper](#)
- [A Preliminary Study to Design and Evaluate Pneumatically Controlled Soft Robotic Actuators for a Repetitive Hand Rehabilitation Task](#)
- [Chaos](#)
- [Bioinspired dual-morphing stretchable origami, video](#)

Sensory enhancement

- Neil Harbisson, TED Talk, [I listen to color](#)
- Jinhyun Jeon, [Tableware as Sensorial Stimuli](#)
- Tod Machover, TED, [Inventing instruments that unlock new music](#)
- [What Do Plants Sound Like? Plants and the Audible Spectrum](#)
- Vivian Xu, [The Electric Skin Project](#)
- [Can we create new senses for humans?](#)

Sound Design

- [KnittedKeyboard II](#)
- [Tapis Magique: A Choreomusical Interactive Carpet](#)

Interaction and Connection with Sleep and Dream

Course Information

Course Number: ID-1017

Course Schedule: Wintersession 2024

Credit Load: 3 Credits

Capacity: 12

Time: Wednesday 8:00 am - 1:00 pm

Location: CIT 203

Instructor Name: Yechen Zhu

Instructor's Contact: yzhu06@risd.edu

Course Website:N/A

Course Description

A new wave of emerging technologies has the potential to revolutionize our sleep patterns, influence our dreams, and even reshape our waking thoughts. This course will serve as your introduction to Engineering Sleep and Dreams, with a primary focus on Innovation Design and Media Art perspectives. We will dive into intriguing questions, such as: How might sounds, aromas, and other sensory stimuli provided to individuals during sleep transform the cognitive processes occurring in our minds overnight, subsequently affecting our daytime behaviors? Furthermore, we will explore the possibilities of utilizing these interventions to enhance sleep quality, alleviate nightmares, and manipulate our memories. Students will make interactive objects based on their skills and interests related to the theme as the final project. The course structure flows in a logical sequence, starting with case studies, followed by technical introductions, instructor lectures, guest speakers' lectures, and concluding with the final project. Several papers related to dream engineering, such as "Dormio: Interfacing with Dreams," will be analyzed and studied during the course. Physiological sensors, sound design, as well as projection mapping technologies will be introduced and explored in the course. Guest speakers related to using sensory intervention to improve sleep, change nightmares, and alter memories will be invited, including but not limited to Dr. Adam Haar Horowitz and Dr. Judith Amores Fernandez. Final works will be shown in the format of a hotel-style exhibition with everyone's works in an independent and closed space, allowing the audience to experience them in an immersive way. This course requires basic computational skills such as Arduino and it is open to seniors and above.

Course Goals

- To acquire knowledge in both the scientific and artistic aspects of sleep and dreams.

- To understand interdisciplinary collaborative innovation.
- To learn multiple research methods: desk research, behavior observation, comparison study, and analogous experience.
- To advance the ability to read and analyze papers to be able to experiment and test on your own based on the techniques described in the paper.
- To develop sketching and rapid prototyping skills.

Course Learning Outcomes & Grading Policy

- An understanding of how sounds, smells, and other sensory stimulation given to sleepers change what information processing is happening in our minds overnight and consequently impacts daytime behavior and how these interventions improve sleep, change nightmares, and alter memories. **40%**
- An exploration of computational methods for interactions through assignments such as: converting physiological sensor input into sensory output using a microcontroller, sound design using Max/MSP, and projection mapping using Touch Designer/Processing. **20%**
- An understanding of how to communicate their design and mission by utilizing narrative and visual methods and storytelling skills. **30%**
- An expiration and practice of strategies for researching, contextualizing, and documenting the outcomes. **10%**

Material Costs

The Industrial Design department will provide appropriate funds to help students purchase certain advanced luxury sensors. However, students with different backgrounds and ambitions should expect to buy additional materials and will assume other costs associated with producing their work. Estimated Additional Materials Cost: \$50 - \$100 (variable).

Course Schedule

WEEK/ DAY	ROTATING REPEATABLES	DETAILS
Week One		
Day One	<ul style="list-style-type: none"> • Course Introduction; • Instructor Introduction; • Students Introduction; 	Assignment 0 (before class): Each student is required to include a one-page self-introduction and course

		<p>interests in the PowerPoint</p> <p>Assignment 1: Sleep and dream. Try to express the dream in your own way after you wake up. It can be represented in a concrete or abstract form, and there are no limitations on the artistic expression.</p>
Day Two	<ul style="list-style-type: none"> • Dream Review; • Introduction to electric computing: Input & Output; Digital & Analog; Wireless Communication; Sensors (ECG, EEG, EMG, FSR, etc.) 	<p>Assignment 2: Technical Exercises: Choose any physiological sensor, use a microcontroller to read its data, and design a simple sensory output based on the sensor's readings.</p> <p>Reading 1: Divcap: A Smart Nightcap that Promotes Sleep through the Five Senses</p>
Week Two		
Day Three	<ul style="list-style-type: none"> • Technical Exercise Review; • Reading Discuss; • Introduction to Sound Design (Max/Msp), including sound synthesis 	<p>Assignment 3: Technical Exercises: Integrate the physiological sensor's data into Max/MSP, design an electronic music composition, and record it.</p> <p>Reading 2: Dream engineering: Simulating worlds through sensory stimulation</p>
Day Four	<ul style="list-style-type: none"> • Technical Exercises: Review • Reading Discuss • Introduction to Projection Mapping (Touch Designer/ Processing) 	<p>Assignment 4: Technical Exercises: Integrate the physiological sensor's data into Touch Designer or Processing, and design an interactive animation.</p> <p>Reading 3: Essence: Olfactory Interfaces for Unconscious Influence of Mood and Cognitive Performance</p>
Day Five	<ul style="list-style-type: none"> • Technical Exercises: Review • Reading Discuss • Guest Speaker Dr. Judith Amores Fernandez's lecture about altering 	<p>Assignment 5: Capture a dream of yours. Consider carefully what it means to bring your dream into the material world, to remember it, and to share it with others, in the context of readings and RISD</p>

	<p>memories in sleep through olfactory interfaces</p> <ul style="list-style-type: none"> • A visit to the RISD Museum to look at images of sleep and dreams in the collections (Prints, Drawings and Photographs) 	<p>Museum visit.</p> <p>Furthermore, draft a project proposal. Think about the theme you want to express and the purpose of the design: do you want to show the dreaminess of the dream, visualize the dream, or focus on people with sleep disorders?</p> <p>Reading 4: Dormio: Interfacing with Dreams</p>
--	--	---

Emerging Learning Outcomes:

- Acquire computational methods for interactions through assignments such as: converting physiological sensor input into sensory output using a microcontroller, sound design using Max/MSP, and projection mapping using Touch Designer/Processing.
- Enhancing rapid prototype capabilities.
- Understanding knowledge about sensors relevant to sleep and dream-related applications.
- Understanding sleep science and dream science.

Week Three		
Day Six	<ul style="list-style-type: none"> • Reading Discuss • Dream Review • Draft Proposal Review • Guest Speaker Dr. Adam Haar Horowitz's lecture about dream incubation 	<p>Assignment 6: Improve project proposal and plan</p> <p>Reading 5: Flying dreams stimulated by an immersive virtual reality task</p>
Day Seven	<ul style="list-style-type: none"> • Instructor Lecture: Building sleep interfaces for the body • Lucid Dream Experiment In-Class • Sleep & Dream theme brainstorming 	<p>Assignment 7: Do some experiments related to your project.</p> <p>Reading 6: MIT Media Lab Daydream Night</p>
Week Four		
Day Eight	<ul style="list-style-type: none"> • One-on-one critique • Final Project Working 	

Day Nine	<ul style="list-style-type: none"> • Final Project Working 	Prepare for the next day's presentation
Day Ten	<ul style="list-style-type: none"> • Work-In-Progress Presentation 	

Developing Learning Outcomes:

- Understanding how to use sensory stimuli to influence our sleep and dreams.
- A reflection of multiple ways to incubate dreams.
- Developing your own design language.

Week Five		
Day Eleven	<ul style="list-style-type: none"> • One-on-one brainstorming and critique • Final Project Working 	
Day Twelve	<ul style="list-style-type: none"> • Final Project Working • Work Installation • Work Documentation 	Prepare for the final presentation
Day Thirteen	<ul style="list-style-type: none"> • Dream Hotel Final Critique & Exhibition 	

Advanced Learning Outcomes:

- Mastering end-to-end design capabilities: from initial research to design and all the way to prototype manufacturing.
- Advancing the ability for interdisciplinary thinking and collaboration.
- Understanding how to communicate their design and mission by utilizing narrative and visual methods and storytelling skills.

Course Resources

Sleep & Dream

- [Divcap: A Smart Nightcap that Promotes Sleep through the Five Senses](#)
- [Dream engineering: Simulating worlds through sensory stimulation](#)
- [Dormio: Interfacing with Dreams](#)
- [Flying dreams stimulated by an immersive virtual reality task](#)

Sensory enhancement

- Neil Harbisson, TED Talk, [I listen to color](#)
- Jinhyun Jeon, [Tableware as Sensorial Stimuli](#)
- Tod Machover, TED, [Inventing instruments that unlock new music](#)
- [What Do Plants Sound Like? Plants and the Audible Spectrum](#)
- [Essence: Olfactory Interfaces for Unconscious Influence of Mood and Cognitive Performance](#)

Class Assignment Proposal

Capture a dream of yours. Consider carefully what it means to bring your dream into the material world, to remember it, and to share it with others. Try to express the dream in your own way. It can be represented in a concrete or abstract form, and there are no limitations on the artistic expression.

Goals

- Maintain intention in the ordinary moments, and cultivate curiosity about familiar surroundings.
- Cultivate a language for sleep and dreams.
- Master the ability to quickly transform ideas into sketches or prototypes.
- Learn how to transform abstract concepts into tangible entities.

Learning Outcomes

- A tangible prototype that visualizes the dream. 40%
- Communicate the design by utilizing narrative and visual methods and storytelling skills. 40%
- Well organized the thinking journey and experient documents. 20%

Methods

- Regarding the time for dreaming, it can occur during nighttime sleep as well as during a lucid dream, which is a brief nap in the morning.
- Sometimes it's difficult to have dreams, so it's helpful to set an intention before sleeping. You can also create the right atmosphere in your sleeping environment by using specific scents like lavender.
- Record the items and scenes you dream of in text and then use your skills in your own field to visualize them - whether through intricate paintings, 3D models, or transforming sleep-collected data into tangible objects through visualization.

Assessment

Basic Competency

- Complete dream expression using visual methods.

Advanced Competency

- Have unique thinking about the visualization of dreams.
- Employ a variety of materials and expressive techniques.
- Express the ideas clearly and vividly through the work.

Midterm Feedback Form

Interaction and Connection with Sleep and Dream

Instructor: Yechen Zhu

Course goals:

- To acquire knowledge in both the scientific and artistic aspects of sleep and dreams.
- To understand interdisciplinary collaborative innovation
- To learn multiple research methods: desk research, behavior observation, comparison study, and analogous experience.
- To advance the ability to read and analyze papers to be able to experiment and test on your own based on the techniques described in the paper.
- To develop sketching and rapid prototyping skills.

1. Given resources (reading / guest speakers) were applicable for understanding sleep and dream knowledge

1	2	3	4
Strongly disagree			Strongly agree

2. The different assignments are connected and helpful to understand the learning process of the topic

1	2	3	4
Strongly disagree			Strongly agree

3. The organization (technique demos, reading discussion, guest speakers) of the course helps you learn

1	2	3	4
Strongly disagree			Strongly agree

4. Feedback from the instructor was consequential and meaningful

1	2	3	4
Strongly disagree			Strongly agree

5. What have you learned so far in the class, especially for your development of ideas and practice?

6. Have you found that this course challenged your usual ways of thinking? In what ways?

7. What has been the most useful activity, and why?

8. What would you like the instructor to do for further resources?

Course Assessment Rubric

Interaction and Connection with Sleep and Dream

	Excellent (A)	High Competent (B)	Competent (C)	Needs Work (D)
Participation (10%)	<ul style="list-style-type: none"> -Always shows up on time. -Active participation in general conversations. -Active conversation and feedback between peers in the class and during crits. -All the assignments were completed on time. 	<ul style="list-style-type: none"> -Mostly shows up on time. -Mostly participation in general conversations. -Often engages in conversation with peers during classes and crits. -Most of the activities were presented on time. 	<ul style="list-style-type: none"> -Some unexcused absences or mostly arrive late. -Punctual participation in general conversations. -Sometimes engages in conversation with peers during class and crits. -Some activities were unfinished or not presented on time. 	<ul style="list-style-type: none"> -Multiple unexcused absences or always arriving late. -Refuses actively to participate in general conversations. - Does not engage in conversation with other peers during the class or crits. - Most of the activities were unfinished, presented late, or not presented.
Presentation (20%)	<ul style="list-style-type: none"> -Effectively expresses their ideas and creative process. -Shows interest in the topic and provokes excitement in their peers. -Demonstrates on the Q&A a deep research and comprehension of their idea. 	<ul style="list-style-type: none"> -Present their ideas and process clearly. -Shows interest in their topic and generates some interest among their peers. -Shows during the Q&A a complete understanding of their topic based on their research. 	<ul style="list-style-type: none"> -Presents their ideas with some difficulties in the communication process. -Shows some interest in their ideas. -Has some problems with the Q&A showing a lack of previous research work. 	<ul style="list-style-type: none"> -Does not present their ideas, or their method of presenting is confusing. -Does not show interest in their topics or ideas. -Some or all of the questions on the Q&A are left unanswered as there is a big lack of in-depth research.
Conceptual (30%)	<ul style="list-style-type: none"> -Research evidently references historical context in art and design. -Ideas are clearly supported by deep and enriching research. 	<ul style="list-style-type: none"> -Research demonstrates an understanding of the historical context in art and design. -Ideas are supported by personal research. 	<ul style="list-style-type: none"> -Research demonstrates a lack of understanding of historical context in art and design. -Ideas are not clearly supported by the personal research. 	<ul style="list-style-type: none"> -Research does not show any understanding of historical context in art and design. -Ideas are not supported by any personal research or the links are not clear.
Technical (40%)	<ul style="list-style-type: none"> -Works safely. -Implements the software and techniques presented in the class and adds their personal use. -Final ideas present a thoughtful process with several iterations. 	<ul style="list-style-type: none"> -Works safely mostly. -Shows a general understanding of the software and techniques presented in the class. -Final ideas present a thoughtful process with some iterations. 	<ul style="list-style-type: none"> -Sometimes does not follow safety measures. -Shows a basic understanding of the software and techniques presented in the class. -Final ideas present a thoughtful process but without many iterations. 	<ul style="list-style-type: none"> -Usually does not follow safety measures. -Does not show evidence of understanding or practice of the software or techniques presented in the class. -Final ideas do not present a thoughtful process.

Critique Statement

Critique serves as a valuable tool for self-reflection through the lens of another person's perspective. Engaging in the critique process allows you to refine your skills in articulating your ideas and effectively conveying them to an attentive audience. It's crucial to maintain an open-minded approach, even when confronted with perspectives that differ from your own, as this openness is essential for cultivating well-rounded insights. From the very outset of this course, students will be made aware that critique is an integral component, and active participation is an expectation. Actively listening and comprehending presentations demonstrate respect for fellow participants. Additionally, the ability to constructively provide feedback and express it within a critique framework is a fundamental skill anticipated from every student in this class.

Formal group critiques within this context commence with a presentation delivered by the student under review. This experience not only provides a platform for the student to showcase their work but also imparts valuable skills in presentation, articulation, and facilitating productive discussions. The content of the presentation is at the discretion of the student and may encompass diverse elements, such as research findings, conceptual ideation, technical specifics, and explanations of the creative process. Regarding the specific process, each student has a total of 30 minutes. Students can independently choose the proportion of time for their presentation and receive feedback. However, it is recommended that the presentation time does not exceed 10 minutes to ensure they can receive as much feedback as possible to help improve their projects. During the critique process, the student under evaluation is advised to use a notebook to record the feedback. Other students are also required to provide their feedback in written form on paper and hand it over to him/her after the critique is concluded. Critics will evaluate students' work through verbal analysis in three aspects: highlighting the strengths of the piece, providing suggestions for improvements, and outlining its future development direction.