

USC Iovine and Young Academy

*Arts, Technology and the Business
of Innovation*

ACAD 499: Intro to Interactive Physical Computing

Units: 4

FALL || T, TH

Location: Iovine and Young Hall IYH

Instructor: Trent Jones

Office: Office hours and Zoom links are posted to Blackboard

Office Hours: By Request

Contact Info:

IT Help:

<https://uscedu.sharepoint.com/sites/IYASStudent/SitePages/IT-Resources.aspx>

Hours of Service: 9 a.m. – 6 p.m.

Contact Info: iyahelp@usc.edu

USC Technology Support Links

[Zoom information for students](#)

[Blackboard help for students](#)

[Software available to USC Campus](#)

Course Description

Interactive physical computing exists at the intersection of electronics, computing, and design. This course explores the domain of interactivity within the fields of consumer electronics and product design. This hands-on course will examine keynote examples of physical computing in our everyday lives and create prototype devices that leverage design and interactive principles using electronics.

Learning Objectives and Outcomes

Students in this course will gain the mindset and complementary hard skills to create physical prototypes that host features enabled by electronics, coding and digital fabrication.

Students will be introduced to the following:

- Interactive design principles for physical products
- Basic Electronics
- Sensors and Actuators
- Design Artifacts
- Digital Fabrication
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Prerequisite(s):

N/A

Co-Requisite(s):

N/A

Course Notes:

This course will make use of Blackboard for content and assignments. Lecture slides and any supplemental course content will be posted to Blackboard for use by all students. Any and all announcements for the course will be posted to Blackboard. All assignments will be posted to Blackboard and will be submitted through Blackboard or via email.

Communication:

Blackboard and Email will be the main means of course announcement and communications.

USC Technology Rental Program

The university realizes that attending classes online and completing coursework remotely requires access to technology that not all students possess. If you need resources to successfully participate in your classes, such as a laptop or internet hotspot, you may be eligible for the university's equipment rental program. To apply, please submit an [USC Technology Rental Program Application](#).

HOW TO PURCHASE SOFTWARE AT THE DISCOUNTED ACADEMY RATE

For classes that require them, the following software are available for purchase **online** through the USC Iovine and Young software catalog at the Academy discounted rate:

Software	IYA Short-Term License at USC Bookstore
Adobe Creative Cloud	\$70 2019–2020 annual license
Apple Logic Pro	\$35 semester licenses
Solidworks	\$35 semester license
Apple Final Cut Pro	\$35 semester license

To purchase:

- Visit: <https://commerce.cashnet.com/IOVINE>
- Select the software license(s) you would like to purchase by clicking “View Details” or the software title, and make your purchase
- You will receive an order confirmation receipt at the email address you provided
- You will be notified by email when the software license has been activated

If you have any questions about this process, please do not hesitate to contact Academy IT Support at iyahelp@usc.edu.

Required Materials

This course will require the purchase of an electronics kit and complementary building materials. All necessary course materials will be listed on Blackboard for each term.

Supplementary Text:

Getting Started with Arduino: The Open-Source Electronics Prototyping Platform

Arduino: A Technical Reference (A Handbook for Technicians, Engineers, and Makers. O’Reilly press, ISBN: 978-1-491-92176-0

Description and Assessment of Assignments

This course is primarily project and practiced based. Each project will have accompanying assignments that compose the total project grade.

Participation

This course will be highly collaborative. Presence and participation will have a considerable factor in grading and experience. Each project will have a participation grade component.

Grading Breakdown

Assignment	Points	% Of Grade
Weekly Inspiration	100	10
Practice Labs	100	10
Project 1	250	25
Project 2	250	25
Final Deliverable	300	30
TOTAL	1000	100

Grading Scale

Course final grades will be determined using the following scale:

A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	65-66
F	64 and below

Assignment Rubrics

Grading rubrics will be provided upon each project/assignment introduction.

Grading Timeline

Assignments will be graded within one week. This may not hold for the final project submissions.

Academy Attendance Policy

The Academy maintains rigorous academic standards for its students and on-time attendance at all class meetings is expected. Each student will be allowed two excused absences over the course of the semester for which no explanation is required. Students are admonished to not waste excused absences on non-critical issues, and to use them carefully for illness or other issues that may arise unexpectedly. Except in the case of prolonged illness or other serious issue (see below), no additional absences will be excused. Each unexcused absence will result in the lowering of the final grade by $\frac{1}{2}$ of a grade (e.g., an A will be lowered to A-, and A- will be lowered to a B+, etc.). In addition, being tardy to class will count as one-third of an absence. Three tardies will equal a full course absence.

Students remain responsible for any missed work from excused or unexcused absences. Immediately following an absence, students should contact the instructor to obtain missed assignments or lecture notes and to confirm new deadlines or due dates. Extensions or other accommodations are at the discretion of the instructor.

Automatically excused absences normally may not be used for quiz, exam or presentation days. Using an excused absence for a quiz, exam or presentation, such as in the case of sudden illness or other emergency, is at the discretion of the instructor.

In the case of prolonged illness, family emergencies, or other unforeseen serious issues, the student should contact the instructor to arrange for accommodation. Accommodation may also be made for essential professional or career-related events or opportunities. Additionally, students who need accommodations for religious observations should provide advanced notice to instructors and student athletes should provide Travel Request Letters. All accommodations remain at the discretion of the instructor, and appropriate documentation may be required.

Fall 2022 addendum:

- Unless students provide an accommodation letter from USC's Office of Student Accessibility Services (OSAS) or a letter from IYA Student Services detailing visa or travel restrictions, attendance and active participation is expected in the classroom. Any student with such accommodations should submit their accommodation document to the instructor as soon as possible to discuss appropriate accommodations. Either classroom recordings or live remote access to the class via Zoom will be provided.
- Students who are experiencing illness should not attend class in person. Please inform the instructor in advance of any class sessions that you can't attend for medical reasons, and accommodations will be arranged to view recorded lectures and submit alternatives to any missed class participation. Students will not be penalized for not attending class in person under these circumstances.
- In the event that you find yourself experiencing COVID-19 related symptoms, in keeping with university recommendations, you should Stay home! This is the best way to prevent spreading COVID-19 as supported by scientific evidence; Please do not come to an in-person class if you are feeling ill, particularly if you are experiencing symptoms of COVID-19.

Iovine and Young Hall Cleanout

The Academy is unable to store student projects and materials beyond the end of the semester. Students must remove all projects and personal materials from the Creators Studio, lockers/locker room, and other classrooms by the end of each semester. **All projects and materials left in Iovine and Young Hall will be discarded two days after final exams end. No exceptions.**

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities
Week 1	Day 1: Course Introduction: Applications of Interactive Physical Computing Day 2: Creator Studio Training
Week 2	Day 1: Principals of Interactive Design and Physical Computing Day 2: Introduction to Arduino and Prototyping with Electronics, Syntax and Vocabulary
Week 3	Day 1: Analog & Digital Signal Inputs and Outputs, Conditional Statements and Loops Day 2: Understanding and Creating Diagrams + Prototyping Demo 1
Week 4	Day 1: Timed Events, Common Functions Day 2: Prototyping Demo 2
Week 5	Day 1: Product Analysis, Project 1 Introduction Day 2: Using modules- Communication methods

Week 6	Day 1: Interaction Outputs Overview- Light Day 2: Expanding IO, Project Studio Time
Week 7	Day 1: Interaction Outputs Overview- Motion Day 2: Prototyping Demo 3, Project Studio Time
Week 8	Day 1: Interaction Outputs Overview- Sound Day 2: Storing data, Project Studio Time
Week 9	Day 1: Project 1 Presentations Day 2: Powering Projects
Week 10	Day 1: Wireless Capabilities Day 2: Design Fiction, Project 2 Introduction
Week 11	Day 1: Finalizing Projects- Prefboards & PCBs Day 2: Project Proposal Presentations
Week 12	Day 1: Using Displays Day 2: Prototyping Demo 4
Week 13	Day 1: Effective User testing + Studio Time Day 2: Guest Speaker
Week 14	Day 1: Project Documentation Best Practices Day 2: Studio Time
Week 15	Day 1: Studio Time Day 2: Final Presentations
FINAL	

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on [Research and Scholarship Misconduct](#).

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call

Studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086

eetix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776

osas.usc.edu

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, **HSC:** (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, **HSC:** (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

ombuds.usc.edu

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-3340 or otfp@med.usc.edu

chan.usc.edu/otfp

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.