Prototyping Methods Lab

Syllabus

INSTRUCTOR
Juan Flores
jflore6@artic.edu

SAIC
School of the Art Institute of Chicago

DEPARTMENT OF ARCHITECTURE, INTERIOR ARCHITECTURE, AND DESIGNED OBJECTS

DESOB 5162-001, SPRING 2025

LOCATION
SULLIVAN CENTER 1227

MEETING TIME
6:45 PM - 9:30 PM

Course Description

Designed Objects Prototyping Methods Lab (DOPML) is a technical practice class that uses a very narrow definition of "prototype". The class will not seek to explore and categorize an expansive collection of prototyping approaches. Rather, DOPML will support the making of prototypes and the development of skill with sensing and actuation within student practices.

The class will initiate and/or support micro controller based prototyping using the Arduino hardware and software environment with the goal of greatly increasing the set media, processes, actions, events, data and information that can be used as "material" for object design.

The term "object" can refer to a discrete physical thing in the world or some distinct component within an abstract system. In both scenarios it's becoming increasingly common for an object to act as an interface between two states - commonly a control interface where input actions or data are connected to output actions or information.

To experiment with this kind of interactivity, electronic prototyping offers a rich and ever-expanding collection of accessible tools and processes for designers to explore component systems (sensors and actuators) within creative practice. Throughout the semester, we will review and discuss the work of a number of artists, designers, and technologists that challenge traditional notions of 'making' in an age of significant and pervasive technological change.

The primary component of this course will be to learn to use the Arduino hardware / software environment and develop basic data manipulation to develop prototypes that define and collect input (of all sorts) and create and control output (of all sorts). Increasing in complexity, this effort will be informed by a series of small projects designed to learn fundamentals. At mid-semester, students will be required to propose a project of significant merit that will be developed throughout the remainder of the term.

Learning Objectives

Learning electronics and programming in one semester is no easy task. Not just to learn, but also to teach. While no previous experience is necessary, this is the type of course where you learn by doing. If you are not doing, you are not learning. What you get out of it is primarily dependent on how much time you decide to put outside of class meeting hours.

My goal is to give you an overview of what is possible in this area as well as teaching the fundamentals. This includes:

Basic Electronic Principles

- The basic circuit
- The basic electronic components

Programming Fundamentals

- Object Oriented Programming with the Arduino C++ variant
- Variables, For Loops, Functions, Conditional Statements
- Debugging; Printing to console/serial monitor
- Data processing, collection, manipulation, visualization, realization

Prototyping Processes with Microcontrollers

- Inputs: Interface design, interactivity
- Outputs: Actuation
- Breadboard to Protoboard
- Protoboard to PCB design*
- PCB design to manufacturing*

*These late stage prototyping methods will be touched on through visiting artist workshops.

Course Timeline

Week 1: Jan 27th

- Introduction to Class and Course Canvas + Website

Reading

- "The Design of Everyday Things" (1-13)

Week 2: Feb 3rd

Discussion

- Simple interfaces/programs in the real world.
- Introducing the Basic Circuit with TinkerCAD
- Electronics Fundamentals
- Parallel vs Series
- Resistors

Week 3: Feb 10th

- Before Learning How To Walk, First You Must Crawl
- Soldering and Basic Circuit Workshop.
- Vibration Motors.

Week 4: Feb 17th

- Introducing the Arduino Nano 33 IoT
- Arduino IDE
- Basic Sketches

Week 5: Feb 24th

- Learning How to Walk with the Servo Motor
- Sweep/Fade LED Sketches
- Pulse Width Modulation (Oscilloscope Demonstration)
- Programming Fundamentals
- For loops
- Printing to Serial Monitor

Week 6: March 3rd

- Inputs
- Difference between Analog and Digital signals
- Buttons
- Variable Resistors

Week 7: March 10th

- Buttons (Continued)
- Overview of Sensors
- Vin - Alternate Power Supplies
- [Guest Speaker 1] TBD

Due Next Week:

- Prototype Project Presentation (Sketches/Ideas/Proposal/Elevator Pitch)

Week 8: March 17th

Presentations

- Initial Ideas and Design Presentations

Week 9: March 24th

- Sensor Deep Dive Workshop: TBD
- Accelerometer/Gyroscope
- Real Time Clock

Week 10: March 31st

- [Guest Speaker 2] TBD

Week 11: April 7th

- Interfaces
- Internet of Things
- Bluetooth
- [Guest Speaker 3] TBD

Week 12: April 14th

- Studio Day

Week 13: April 21st

- Studio Day

Week 14: April 28th

Critique Week

- No Class

Week 15th: May 5th

- Final Project Critiques

Required Materials and Resources

Class Website

This class will use a website that I made to keep track of all topics that we will go over and more. It will be your main resource. The link is available on the course Canvas homepage.

Arduino

We will be working with the Arduino Nano 33 IoT. I ask that you buy this as soon as you can so that it arrives before we work with it on week 4.

Make sure you also get a micro USB cable and any adapter if needed for your computer!

Electronics Kit

A starter electronics kit will suffice for the class. This should at least include:

- Breadboard
- Jumper Wires
- LEDs
- Resistors
- Buttons
- Variable Resistors (Potentiometers, Photoresistors)

Recommended Kits

https://a.co/d/1y1t3Hv

On top of the kits, you will also need a Standard Rotation Servo Motor. They may have these in stock at Material Source. Otherwise I recommend this Amazon Link.

Soldering Kit

Lastly you will need equipment for soldering. The department has some available for use and checkout, but there are soldering kits available on Amazon for a decent price that come with a good amount of useful things.

Recommended Kits

https://a.co/d/arKzJm6
https://a.co/d/dB2is3v

If you are interested in working with electronics after this class, I really recommend a good soldering iron with heat control. It will make a lot of difference.

Suggested Materials

Anything in this list will make your life easier. Note that some of these may be included in the kits above.

Solder Flux Paste
Soldering Iron Tip Cleaner
Variable Power Supply With Different Connectors
Compartment Box

SAIC ENGAGEMENT, PARTICIPATION, AND ATTENDANCE POLICY EXCERPT

Students are expected to attend all classes regularly and on time. Other than in-person activities, which are missed due to illness, all students are expected to fully participate in each of their courses, including in-person classes, synchronous online sessions, and regular, independent work and study.

At the discretion of the instructor, students may be permitted a maximum of two absences per semester. In the case that a student registers late for a class (during add/drop) the student is responsible for making up content and assignments and the instructor may count missed classes as absences. The instructor gives credit to students officially enrolled in a course only if they have responded adequately to the standards and requirements set.

Students who are ill should email their faculty member or leave a message for the instructor in the department office the day they are absent. For an extended absence of multiple classes due to illness, the student should contact Health Services. Notification is then sent to all instructors informing them of the student's absence. For other extenuating circumstances, students should contact the Academic Advising office. Please note that the written notification does not excuse a student from classes.

Federal Financial Aid Attendance Requirement: Recipients of federal aid must have begun attendance in classes for which their eligibility is based upon at the time of disbursement and, in the case of Federal Direct Loans (Stafford and PLUS), be enrolled at least half-time.

Religious Holiday Observance: SAIC recognizes the diverse religious and cultural practices of our community. Students are expected to notify their instructors early in the semester to discuss reasonable accommodations for holidays they observe.

CLASS PROGRESS REPORTS (CPRS)

Class Progress Reports (CPRs) are used to communicate between faculty, students, and academic advisors to give feedback on class performance. You may receive a CPR if you have missed class, or missed an assignment, critique, etc. These communications are intended to help you understand what you need to do to stay on track or get back on track and succeed in this class.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

SAIC is committed to full compliance with all laws regarding equal opportunities for students with disabilities. Students with known or suspected disabilities, such as a Reading/Writing Disorder, ADD/ADHD, and/or a mental health condition who think they would benefit from assistance or accommodations should first contact the Disability and Learning Resource Center (DLRC) to schedule a virtual appointment. DLRC staff will review your disability documentation and work with you to determine reasonable accommodations. They will then provide you and your instructors with a letter outlining the approved accommodations via email. You must request accommodations for each course before any accommodations will be implemented. You should contact the DLRC as early in the semester as possible. The DLRC can be reached via phone at 312.499.4278 or email at dlrc@saic.edu.

WRITING CENTER

Tutors are available in person and online to help students achieve their writing goals at any stage of their writing process. All students are welcome, and they can work on essays, artist statements, application materials, presentation texts, theses, proposals, creative writing, or social media posts. The Writing Center tutors are kind, encouraging, and interested!

Writing Center Hours (CST) Monday – Thursday: 9 AM - 7 PM and Friday: 9 AM - 5 PMThough drop-ins are welcome, the best way to guarantee an appointment is to schedule one via Navigate.

Email: wcente@saic.edu
Location: 116 S. Michigan Avenue, 10th FloorPhone 312-499-4138

ACADEMIC MISCONDUCT

From the SAIC Student Handbook, page 12

Academic misconduct includes both plagiarism and cheating, and may consist of: the submission of the work of another as one's own; unauthorized assistance (as defined by individual instructors and laid out in the course syllabus) on a test or assignment; submission of the same work for more than one class without the knowledge and consent of all instructors; or the failure to properly cite texts or ideas from other sources. Academic misconduct also includes the falsification of academic or student-related records, such as transcripts, evaluations and letters of recommendation.

Academic misconduct extends to all spaces on campus, including satellite locations and online education.

Academic integrity is expected in all coursework, including online learning. It is assumed that the person receiving the credit for the course is the person completing the work. SAIC has processes in place, including LDAP authentication, to verify student identity.

SUPPORT RESOURCES FOR STUDENTS

The Office of Students Affairs is here to help students achieve success in and outside of the classroom and studios. Staff members are available to assist students with a wide-range of issues and concerns, including mental and physical health concerns, food and housing insecurity, conflicts with others, and much more. We are available during typical business hours (9-5pm, Mon-Friday); however, we also have staff available after-hours to address emergency concerns.

In case of an emergency, please contact SAIC Campus Security, 24 hours a day, by visiting any campus security desk or calling 312.899.1230. They can assist you and/or connect you with a staff member who can provide support for you.

FOOD AND HOUSING RESOURCES

If you have difficulty affording groceries or accessing food every day, and/or do not have a safe and stable place to live, please contact the Office of Student Affairs - (312) 629-6800 / studenthelp@saic.edu during business hours. If you contact them after hours, someone will respond the next business day.

You can also find links and resources at this site, curated by Student Affairs: Student Support Resources and Information.

SAIC FOOD PANTRY

Spoonful Food Pantry is available to current SAIC students who are experiencing difficulty accessing food because of a financial emergency or ongoing constraints. Students can request a pre-packaged bag of non-perishable groceries (vegan and gluten free available) by completing the online form (https://www.saic.edu/student-support/staying-healthy/food-pantry)

Once approved, students will receive a pre-packaged bag of non-perishable groceries.

WELLNESS CENTER

The SAIC Wellness Center, which includes Counseling Services, Health Services and the Disability and Learning Resource Center, is also here to support students' mental health, health and accessibility needs. You may contact them at:

- Counseling Services: counselingservices@saic.edu and 312-499-4271 (press 1 to speak to a counselor after hours)
- Health Services: healthservices@saic.edu and 312-499-4288 (After hours contact the 24-Hour Nurse Line at 877-924-7758)
- Disability and Learning Resource Center: dlrc@saic.edu and 312-499-4278