

Course Name: Sculpture Studio: Arduino

Course Number: SC 3082 01

Class Meets: M, 1:00 PM - 6:00 PM, 01/22/19 - 05/14/19

Classroom Location: 119

Faculty Name: Severns, Benjamin

MCAD Email Address: ben\_severns@mcad.edu

MCAD Telephone Number, Academic Affairs: 612-874-3694

Office Hours: Monday - 1130-1230, Friday - 1130-1230

Office Location: 127 -or- 316

Faculty Biography:

Ben Severns is an interdisciplinary artist whose studio work centers on spectacle and communication. His studio production in a year's time includes writing, drawing, animation, sculpture, robotics, software, films, photographs, and publications. In addition to teaching at MCAD, Severns is also an adjunct at both Augsburg University and at PiM Arts High School.  
  
His work has been exhibited throughout the United States and internationally, including at Boston University, the Institute of Contemporary Art (Maine), the Science Museum of Minnesota, the Minneapolis Institute of Art, Public Functionary Gallery, the Walker Art Center, and others. It is held in private collections in the United States and Brazil.

Course Description:

This course presents the Arduino system as a tool for the actuation and augmentation of the object and installation. An open-source electronic prototyping platform, Arduino enables users to create interactive electronically controlled objects and spaces. Students learn this easily accessible and ubiquitous hardware and related code as a community while exploring open-source systems and creating time-based works that can actuate, control, and react to their environment. Prerequisite: Foundation: 3D

Outcomes:

Methodologies:

Lecture, Demonstration, Discussion, Readings, Research/Analysis, In-class Exercises, Interactive Tutoring, Individual Projects, Group Projects, Case Studies, Pro Prac, Written Proposals, Field Trips, Visiting Artists/Designers, Guest Lectures/Guest Critiques

Required Textbooks, Readings and Websites:

-none- though I would recommend Getting Started with Arduino by Massimo Banzi from Make Magazine. Mr. Banzi was one of the fundamental early players in the Arduino-world.

Library Reserve Information:

-none- though I will be working on getting more things about/by/for Arduino as the semester rolls on.

Materials and Tools list:

http://sfe.io/w149885 - Sparkfun list of things  
  
Soldering iron  
Solder  
Side cutters  
Multimeter  
Test wire

Blackboard:

learn.mcad.edu

Miscellaneous:

---max budget for first 5 weeks is $15

Course Calendar:

1/28/19 Week 1: Introductions

The Seven Basic Rules of Hacking by Nicolas Collins  
Rule #1: Never get into a conversation with anyone at Radio Shack.  
Rule #2: Don’t take apart anything that plugs directly into the wall.  
We will work almost exclusively with battery-powered circuitry. ACpowered  
things can kill you. AC adapters (“wall warts”) may be used  
only after you have displayed proper understanding of the difference  
between insulation and electrocution.  
Rule #3: It is easier to take something apart than put it back together.  
Objects taken apart are unlikely to function normally after they are put  
back together, no matter how careful you are. Consider replacement cost  
before you open.  
Rule #4: Make notes of what you are doing as you go along, not after.  
Most wires look pretty much alike. As you take things apart make notes  
on which color wire goes to where on the circuit board, or to what jack,  
etc. Especially important are the wires that go to the battery. Likewise,  
note what you add as you add it, what you change as you change it.  
Rule #5: Avoid connecting the battery backwards.  
This can destroy many circuits.  
Rule #6: Many hacks are like butterflies: beautiful but short lived.  
Many hacks you perform, especially early in your career, may destroy the  
circuit eventually. Accept this. If it sounds great, record it as soon as  
possible, and make note of what you’ve done to the circuit so you can try  
to recreate it later (see Rule #4.)  
Rule #7: In general try to avoid short circuits.  
Try to avoid making random connections between locations on a circuit  
board using plain wire or a screwdriver blade. This can destroy a circuit --  
not always, but inevitably at the most inconvenient time.  
  
Equipment expectations [laptop &&arduino/sensors &&other stuff]  
  
The class:  
  
Me:

ARTISTS

The environment:  
   
What are the tools that you are going to NEED  
Powering your project   
 USB v battery

\*Blink\* [play with delay intervals]

Examples/libraries where to find/what to use  
  
Hacking  
- Resistors/DC Power   
- \*Switch\*/blink   
- switch group/blink pattern   
- common voltage sources  
PIR example [just like a switch, but NORMALLY OPEN]

1st exercise:  
Use PIR in a small object [or space] and LEDs [or other low voltage thing] react to interaction from people.  
  
  
2/4/2019 Week 2 : MCAD Mouse v2.0  
Kinetic/Machine Principles  
  
----breadboards out-----  
Electronic Circuit Design Crash Course v0.5 [link] - 30 min  
Kinetics/machines/etc. - the rules of hacking - 45  
AX MAN FIELD TRIP - Leave @245 Back @430  
  
Servo/Motor control [ H-bridge control ] &&attaching “wheels” to cheap hobby motors  
  
Hypersonic sensor  
  
2nd exercise:  
Mount a hypersonic sensor to a frame and use your arduino to drive until it is about to make contact with a wall, have it stop moving forward, turn, then try to move forward again - magic roomba  
  
  
2/11/2019 Week 3: Sounds about right  
  
Check in/share in main gallery - 45  
  
Workshop time: higher power control circuits

[Electronic Circuit Design Crash Course v0.5 [[transistors/diodes/capacitors]]]  
  
ARTISTS  
  
Piezo/knock sensor [installation - cabinet]   
Flex [object - stuffed bear]  
  
Creating lasting circuits/soldering [soldering irons]  
  
LittleSoundie examples/work time   
  
3rd exercise:  
Design/work toward an object or space that reacts to sensor input with sound. Use LittleSoundie card.  
  
  
2/18/2019 Week 4: Being heard by everyone and still not seen  
  
ARTIST   
  
What about software????   
  
-Serial library  
-Processing sketch with animations   
- MIDI controller example   
- LiveGlitch breadboard/switches/sensors  
  
Wait….. More open source stuff????? [download Processing//sketches from server]  
  
“Better than wait()” [getting multiple things to happen at the same time]  
  
[AVR chips] installation/object planning  
  
Exercise 4:  
Complete your sound reactive piece from 3^^^^ using amp built in class ˇˇˇˇ  
  
Contribute toward class sonic archive [group installation planned for week 5]  
  
\*\*\*Building audio amplifiers out of those LM358s/caps/resistors\*\*\*  
-circuit boards from axman-  
  
  
2/25/2019 Week 5: Public Installation/Performance  
  
Group install time - how/where do we mount and help help help this thing doesn’t solder right!!!!  
  
Independent Studio Project 1:  
[Installations/Objects in space]  
Must utilize control of an Arduino board  
Must be reflective of your formal, conceptual interests.  
  
Questions??? Tips on setting up a workspace?  
  
  
3/4/2019 Week 6: You MOVE me  
  
ARTISTS  
  
Mechanisms, in review again  
  
DEMO: relays/powerswitch tail  
  
Studio Time - work on code/work on machines!!!  
  
Combine exercise from #2 with exercise from #1 and bring to class next week  
  
  
3/11/2019 Week 7: RAINFOREST MF CAFE  
  
Field trip : MOA - let’s look at things that are controlled by computers!  
  
  
3/25/2019 Week 8: Mid-term  
  
Different types of arduino - Pro Mini, Nano, Uno, etc.  
Shields - what are they/good for what? GSM/Motor shield/Ethernet/etc.  
  
Studio Visits - in-progress crit  
  
  
4/1/2019 Week 9: Projects happening elsewhere as well  
  
ARTISTS  
  
Check in/Meetings/Studio visits  
  
AVR microinstallation assigned  
  
Studio time  
  
  
4/8/2019 Week 10: Critique #1  
  
Critique: Individual Studio Project #1  
[Installations/Objects in space]

4/15/2019 Week 11: SKYnet, but for artists  
  
Crit recap  
  
DEMO: Ethernet/Wifi Shield - connecting to p5.js/web animation  
  
Student Meetings  
  
Studio time  
  
Individual Studio Project #2 Proposals Due by end of class  
  
  
4/22/2019 Week 12: Raspberry! :::fart noise:::  
  
Demo - Linux computers - RPi/Gallileo  
  
Artist Research Presentations  
  
Studio time

4/29/2019 Week 13: Sight unseen  
  
AVR Microinstallation Review  
  
Demo - Computer Vision  
  
Studio time

5/6/2019 Week 14: ~~~~~  
  
In-progress partner crits  
  
Studio time

5/13/2019 Week 15: Critique #2 // So long, and thanks for all the fish  
Critique: Individual Studio Project #2 [Guest Critic: Jack Pavlik]  
  
Closing thoughts

Email Usage: Email is used at MCAD as the official means of communicating with the student body. Official college announcements regarding policy, classes, registration, deadlines, etc. are delivered via email. Students are expected to check their MCAD email frequently and are held responsible for all official information communicated to them via the email system. Misuse or misrepresentation of official communications by students will result in disciplinary action.

Attendance: MCAD students are expected to attend and participate in all enrolled courses in order to complete the courses successfully. To uphold this expectation, there are no unexcused absences. Students have a responsibility to the group and for their own learning. Participation and performance are factored into the course grade. Absences and repeated tardiness have consequences that will result in lowered or failing grades. Students are responsible for obtaining class materials. Faculty are not obligated to reteach a class a student has missed. Faculty may drop a student from a course who does not attend the first class meeting. Therefore, students risk losing their spot to another student. In the case of extended illness or other legitimate absences that may keep the student from attending class, students must contact their faculty member. Faculty members will alert their department chair.

Grading Policy: Grades consider student performance of assignments listen on each course syllabus, participation in class, magnitude of improvement, attendance, level of project difficulty, timeliness of project completion, compliance with class policies, and effort/dedication. + or - may be added to letter grades at the discretion of the faculty member. The MFA program employs a pass/fail grading system and does not use letter grades.

A = Excellent work, progress far beyond expectations of effort and outcomes, full participation

B = Good work, course requirements completed, preparedness for more advanced study

C = Average work, course requirements completed, preparedness for more advanced study

D = Passing but below average work, some promise of improvement

F = Work not acceptable, or course requirements not completed

Grading Procedure / Criteria:

10% - Attendance/Class participation  
  
20% - Introductory Workshop Projects  
  
30% - Individual Project #1  
  
40% - Individual Project #2

Incomplete Policy: To receive a grade of Incomplete for a class a student must meet with the chair of the department or program director in which the class is taught to discuss the circumstances of the request.

Grade Notification: Midterm grades will be posted on MyMCAD between weeks 7-10 of the semester. Final grades will be posted on MyMCAD the week following commencement.

Archiving Your Work: Students are required to submit documentation of their work for each class, every semester. Please follow this naming convention: LastName\_FirstName\_ ProjectTitle.ext. Ex: oneill\_co\_DrawingA1.png

The media formats should follow MCAD archiving standards, which are found at:

<http://kb.mcad.edu/index.php?category=64>

Samples should be accompanied by a Word document containing relevant information, found at:

[http://kb.mcad.edu/index.php?article=166 - Text Listing](http://kb.mcad.edu/index.php?article=166#Text%20Listing)

Academic Deficiencies: MCAD notifies students of deficiencies in academic performance through the student alert form at any time throughout the semester. Notices are placed in student mailboxes. Students are encouraged to contact the faculty member immediately and take steps to remedy the deficiency. If a student has two or more alerts the student will be contacted by the Dean of Student Affairs. A subsequent meeting will be scheduled to help the student analyze the problem and make realistic plans to remedy the situation and succeed in school.

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This information is taken from the Student Handbook. You are expected to adhere to college policy.

A. THE LEARNING CENTER: The Learning Center provides interdisciplinary support for all MCAD students, including face-to-face and online tutoring, an online writing and learning lab (OWLL), small and large group workshops and in-class presentations, as well as academic accommodation services for students with disabilities. The Learning Center works with students to make them better learners and prioritizes equal access and opportunity for all students. Tutoring areas include writing, software and technical skills, time management, and study skills. For more information on the Learning Center’s Hours, instructions for how to make an appointment, and access to the MCAD OWLL, visit [learningcenter.mcad.edu](http://learningcenter.mcad.edu/) or call (612) 874-3671.

B. TITLE IX MANDATORY REPORTING: By Federal law, faculty are mandatory reporters of sexual harassment or sexual violence. Faculty are not confidential resources for students and must report any knowledge of sexual violence to the Title IX coordinator.

C. NONBINARY PRONOUNS: It is MCAD policy to recognize self-identification within our population and it strives to accommodate.

D. LYNDA.COM: Students can access a wide variety of online tutorials at Lynda.com using their MCAD login information: <https://intranet.mcad.edu/modules/lynda/>

E. COURSE EVALUATIONS: Course evaluations are an integral part of MCAD curriculum development. Student feedback on courses are instrumental in creating a vibrant, informed, and robust learning community at MCAD. For these, and many other reasons, students are encouraged at the end of the semester to provide extensive feedback on course evaluations.

F. CELL PHONE POLICY (optional): Cell phones should be put on mute or vibrate during class. Calls can be made during breaks, as well as before or after class.

G. CREDIT HOUR DEFINITION: In lecture/discussion courses requiring outside preparation, 1 hour of credit represents 50 minutes contact time each week in class, and 2 hours of work outside of class. Therefore, a 3-credit lecture course requires 2.5 hours in class per week and approximately 6 hours outside of class.

In studio/laboratory courses, 1 hour of credit requires a minimum of 1.5 hours contact hours each week in class and approximately 1.5 hours of work outside of class. Therefore, a 3-credit studio course represents a minimum of 4.5 contact hours in class and approximately 4.5 hours of work outside of class per week.

In online courses, 1 hour of credit requires approximately 3 hours of work per week for all activities (i.e., reading, viewing, making, scanning, responding to discussion threads, collaborating, etc.). Therefore, a 3-credit online course requires approximately 9 hours per week to complete the necessary activities.

H. ATTENDANCE (ONLINE COURSES): Registration for an online course presupposes that the student will attend/fully participate in all online activities. Each student is responsible for meeting all course requirements.

I. CLASSROOM DEVICE USAGE POLICY: Participation in a classroom community has many benefits, but students will also find that along with those benefits come responsibilities:

+ Students are responsible for bringing laptops to class when scheduled to do so.

+ Student laptops should be in good working condition. If a student is experiencing problems with a laptop, it is the student’s responsibility to go to Computer Support for help: <https://intranet.mcad.edu/modules/css/?css=1>. Technical difficulties such a problems printing, uploading, saving, or retrieving files do not excuse late or missing work.

+ During classroom discussion, demonstration, or lecture, students should not be connected to network resources unless students are specifically instructed to do so.

+ Chatting, using social media, or emailing is no more acceptable than talking on a cell phone during class time. Non-class related use of a laptop during class time, including working on homework for other courses, may result in restriction of laptop use or a grade penalty.

+ Unless otherwise indicated, students should never use headphones during class time.

+ Students should always store copies of files in two backup locations. Students should never store the only copy of a paper/project on the student server space in case the server is down, and students are unable to access the paper/project.

+ Recording by instructor permission only. See the MCAD Student Handbook for the full policy.

J. ACADEMIC INTEGRITY / SCHOLASTIC DISHONESTY: Academic integrity is essential to a positive teaching and learning environment. All students enrolled in MCAD courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else’s work as your own can result in disciplinary action.

The MCAD Student Handbook defines academic dishonesty as follows: Submission of false records of academic achievement; cheating on assignments or examinations; altering, forging or misusing a College academic record, document or funds; taking, acquiring or using test materials without faculty permission; acting alone or in cooperation with another to falsify records to obtain grades, honors, awards or professional endorsement in a dishonest manner; plagiarizing.

+ Plagiarizing: Quoting uncited materials, visual or written; presenting the work of others as your own; using work of other MCAD students without their express permission.

+ Using the Same Work in Different Courses: Students may not submit the same work for more than one class without the knowledge and consent of all faculty.

+ Consequences for plagiarizing and double submissions may include failing the assignment or the course, or academic probation.

Within this course, a student who is responsible for scholastic dishonesty can be assigned a penalty up to an including an “F” for the course. If students have any questions regarding the expectations for a specific assignment or exam, they should consult with their professor.

Using the Same Assignment in Different Courses: Studio projects are assigned and assessed according to the specific learning objectives for each course. Occasionally students may be assigned a project in one course that shares many of the learning objectives of an assignment given in a different course. While turning in the same assignment for two courses is not encouraged, students who wish to do so are required to first notify the faculty member of each course and get permission. Faculty may assign additional requirements. Failure to notify faculty can result in failure of the assignments in both courses.

K. ACCESSIBILITY AND EQUAL ACCESS: Persons with disabilities have a right to equal opportunity as prescribed by law. MCAD is responsible for creating a barrier-free environment while empowering students to grow toward independence and self-assertion. It is the individual student’s responsibility to make their needs known and request accommodation. First-time disclosures must be made via appointment with the Learning Center or via our Disability Disclosure Form. For more information, visit [learningcenter.mcad.edu](http://learningcenter.mcad.edu/) or call (612) 874-3671.