70.100, 91.117: Artbotics  Spring 2008
4 credit hours (3 for lecture, 1 for lab)
Prerequisites: None

Course website
www.artbotics.org

Class meetings
Lecture  Tuesday & Thursday, 1pm – 2:15 pm
Olsen 402

Lab  Tuesday or Thursday, 2:45pm - 4:45pm
The Revolving Museum LAB, 181 Market Street, downtown Lowell

Instructors
Prof. Holly Yanco
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Diana Coluntino
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Course Administrator
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Collaborators
Prof. Fred Martin, Computer Science, UMass Lowell
Prof. Linda Silka, RESD, UMass Lowell
Jerry Beck, Artistic Director, The Revolving Museum

Important Date
The opening exhibition for the final projects will be held on Thursday, May 1st from 7-9pm at the Revolving Museum. Attendance is mandatory. Arrange your schedules now.
Course Description

Artbotics focuses on exploring the intersections between art, computer science, and robotics. The course is project-driven and includes public exhibitions and service learning. You will learn founding principles in both the fields of art and computer science, then put them into practice by creating interactive, tangible exhibits that are displayed in public settings. In the service learning component, you will have the opportunity to mentor local high school students participating in an after school program that meets concurrently with the course’s lab session. The course will also include guest lectures from practitioners in the fields.

Class will consist of two 75 minute lectures each week (Tuesdays and Thursdays 1:00-2:15) and a 2 hour lab (Tuesday or Thursday, 2:45-4:45). The lab will meet in the Revolving Museum LAB at 181 Market Street in downtown Lowell. Lab attendance is required; see the attendance policy below.

The curriculum includes the following topics:

(Hybrid Core)
- Historic and contemporary practices in the collaboration of science and technology.
- Problem-solving process of engineering and art – its commonality and difference.
- Sustainable community through art, science and technology, and education.

(CS and Robotics Core)
- Introduction to imperative programming: functions, arguments and return values.
- Introduction to real-time systems including sensors, actuators and control loops.
- Agent-based models of computing (sense-act loops).
- Elements of robotics systems and how to physically create them (e.g., wiring and construction techniques).
- Uses of computing in a variety of fields.

(Art Core)
- Introduction to New Media Art: Historic background, development and themes.
- Examination of form and content – use of visual language to support communicative issues such as concept, content and subject matter; the interplay between media and idea.
- Traditional visual language – aesthetics in color, composition, value, texture and material.
- New media language – aesthetics in time, motion, space, interactivity and hybrid media.

Objectives

By the conclusion of the semester, students will:

(CS and Robotics related)
- Have hands-on experience with embedded computing and digital technology.
- Gained the ability to formulate structured algorithms and program them.
- Understand use of sensors and interactive algorithms.
- Carry out a project from inception to public exhibition that incorporates computing.
- Understand how computing is used in a variety of fields and applications.
(Art related)
• Acquire the understanding of New Media art and be able to, historically and conceptually, contextualize your own art work in the art world.
• Have examined principles of aesthetic and conceptual elements in visual art and be able to find strategies for a successful and engaging art expression.
• Have investigated examples of art and technology collaboration especially in public domain.
• Evaluate new media art works in various contexts including gallery or public installation.

(Service Learning related)
• Deepen the knowledge in the subject matter by teaching and mentoring high school students.
• Recognize art and science education as a way of supporting sustainable community.

Materials we will provide
1. Lab kit: You will be loaned a lab kit for the semester that includes a SuperCricket, sensors and motors. You need to bring this kit to each week’s lab. On the last day of the semester, you will return the lab kit. Failure to return the kit will result in no grade being entered for the term. Each lab kit has numbered parts with the kit ID number; please do not mix kit parts with your friends.
2. Art supplies for the introductory labs
3. Any additional sensors or motors needed for your projects

Materials you need to provide
1. Portable digital storage media to save your programs in the lab
2. Sketch book for class notes, sketching ideas, and documenting your process throughout the semester
3. Art supplies needed to create your project
4. Extra AA batteries for the Cricket, as needed

Requirements & Assignments
Each student is expected to complete all of the assignments, required readings and projects on time as well as full attendance in the lectures and labs. During discussion and lectures students are expected to engage in meaningful classroom participation. No late assignments will be accepted.

Your work in class will include labs, readings, an artist paper and presentation, the final project, documentation of the final project, and class participation.

Labs: At the start of the semester, there will be weekly labs, as follows:
- Week of 1/29: 2D Art
- Week of 2/5: Crickets, light sensors and LEDs
- Week of 2/12: Cricket cars, touch sensors, DC motors, functions
- Week of 2/19: No in class lab; construct a paper machine on your own
- Week of 2/26: 3D art with motors: start of mini-project
- Week of 3/4: Continued work on mini-project
- Week of 3/11: Mini-project presentations
- Week of 3/18: Spring Break
- Week of 3/25: IR communication, variables

The remainder of the lab sessions will be devoted to work on your final projects.
Lab work will be introduced in the lab session and you will have the opportunity to work with one of the instructors present during this lab session. If you do not complete the lab assignment during the two hours, you will need to finish it on your own. Expect some of the lab assignments to take more than two hours. The weekly lab assignments will contain instructions on what to write up and submit for the week’s lab. The lab’s report will be due at the start of the next week’s lab.

You are responsible for arranging transportation to allow you to be at the lab on time. We suggest you have a car pool with other classmates or walk (20 min walking distance) to the TRM lab. Parking is available on the street (bring quarters for the meters), in the Market Street parking garage (for a fee), or for free in the National Park Service parking lot (accessible from the intersection of Dutton and Broadway; be sure to follow signs about allowable spaces – do not park in the spots marked for NPS only). We have allowed a half hour between the end of class and the start of the lab session to allow plenty of time for you to get to the lab.

**Reading and browsing assignments:** These will be given often for discussion in later classes.

**Artist paper and presentation:** In this research paper, you will investigate the ideas and practice of new media art. You will select an artist who uses technology as a vehicle of expression and creativity (a list of artists will be provided). The research paper should focus on the chosen artist’s concept, technological medium and the process of art making with a few examples of the artist’s best known works. The paper will be accompanied by a 10 minute verbal and visual presentation between March 11th to March 27th. The paper is due on March 4th.

**Final project:** The culmination of the course is the creation of an interactive work of art that incorporates robotic technology. The work will be exhibited as part of the Revolving Museum’s “Toys and Games: More than Amusement” show. Brainstorming for the project will occur in class on March 6th. Individual discussions on project plans will occur in lab during the week of March 11th and March 13th. Your project proposals are due on March 25th. Project building and programming will be done in five lab weeks, as well as outside of class. On May 1st, there will be a gallery opening from 7-9pm for your projects; attendance is mandatory. More detail on the project process will be distributed in early March.

**Attendance Policy and Class Participation:**
Attendance is mandatory. Your participation in the form of regular attendance and involvement in discussion/critiques is not only desired but also required. You will be expected to attend all class meetings on time and stay for the entire class. Students are expected to utilize lab time and will be counted as absent or tardy (unless approved by the instructor); failure to attend labs or to arrive on time will affect your class participation grade. Class lectures and demonstrations cannot be repeated.

**Grading:** Projects, lab assignments, homework, attendance and participation will all play roles in the determination of your final grade.

- Labs: 25%
- Artist paper: 15%
- Artist presentation: 5%
- Final project: 30%
- Final project report: 15%
- Class participation: 10%