Tech Crafts
Schedule: Fall 2012 - Fridays 12:30 to 3:00
Instructor: Catarina Mota (catarina@openmaterials.org)

Course Description
Combining high and low tech, this course explores the combination of smart materials and circuitry with traditional materials and crafts. We will cover embedding electronics in paper projects like books, pop-ups, and sculptures. We'll explore several soft circuits techniques for integrating electronics in textile creations. And we'll play with our food, giving it unusual properties such as touch sensing and illumination. All the while approaching circuitry as a craft in itself and using smart materials, electronics and conductive traces as aesthetic components.

Topics and techniques covered in this course include: laying out circuits on paper or fabric, handling folds and bends, making connections between hardware and other softer components, painting circuits with conductive ink, using mundane materials as tech components, adding illumination to delicate constructions, and using fruits, vegetables and drinks as sensors. We'll work with a vast assortment of materials such as electrotexiles, different conductive tapes, EL wire/tape/panels, UV and heat reactive materials, conductive acetate, heating elements, luminescent materials, and conductive paints and glues.

Grading
Grading is based on successful completion of all assignments, midterm and final projects, posts on the class blog, class participation and attendance. Since the program is Pass/Fail, 80% and above will be considered Pass.

Attendance 30%
Missing more than 2 classes or being late to more than 5 classes is an automatic failure. If you’re going to be late or absent, please email me in advance. If you have an emergency, please let me know as soon as you can.

Participation & Assignments: 30%
Assignments are due the week after (unless otherwise notified). Every assignment should be accompanied by a tutorial/description posted on the class blog. This a new class, and will be changing and evolving weekly. Please ask questions if anything isn’t clear. I will keep you posted of any changes, but check the class blog frequently.

Projects (midterm and final): 40%

Office Hours
Office hours are by appointment. Email me anytime: catarina@openmaterials.org. Skype also has a screen share feature that’s great for remote help. My Skype name is catarina1807.

Laptops & Phones
Please keep your phone on silent/vibrate or off. If you have an emergency that may require you to answer your phone during class, please tell me ahead of time. Laptops can be used during work sessions. Otherwise, lids down. The quality of the class depends in large part on the quality of your attention and active participation.

Recommended Resources
Open Materials: openmaterials.org
Kit of No Parts: web.media.mit.edu/~plusea/
How to Get What You Want: http://www.kobakant.at/DIY/
High-Low Tech Group: http://hlt.media.mit.edu/?cat=20
ITP Physical Computing: http://itp.nyu.edu/physcomp/
**Week 1: September 7**
Class Introductions.
Overview of the course.
Examples of tech crafts projects and applications.
Overview of the materials we'll be working with.
Assignment: find an ubiquitous material/object and imagine an alternative use for it.

**Week 2: September 14**
Review and critique assignments.
Traces and folds: copper tape, conductive ink, conductive fabric, conductive thread, gilding foil, conductive acetate, snaps, binding pins, push pins, zippers.
Connectors: conductive tape, soldering, conductive thread, snaps, binding pins, push pins.
In class activity: make an analog circuit on paper.
Assignment: make a touch switch on paper or fabric.

**Week 3: September 21**
Review and critique assignments.
Switches: magnets, flaps, rotary, push buttons, sliders.
Guest Lecturer: Marianne Petit will show how to make paper pop-ups that can be turned into switches.
Assignment: make a paper or fabric switch.

**Week 4: September 28**
Review and critique assignments.
Guest Lecturer: Hannah Perner-Wilson will present some of her work and talk about *Kit of No Parts and How to Get What You Want*.
Assignment: proposals for midterm projects.

**Week 5: October 5**
Review and critique assignments.
Demonstration: DIY magnetic ink
Sensors: squeeze, pressure, bend, stretch, touch, variable resistance.
In class activity: make a paper or fabric sensor.
Assignment: midterm projects.

**Week 6: October 12**
Presentation of midterm projects.

**Week 7: October 19**
Microcontrollers: arduino, lilypad, teensy.
CapSense library.
Making capacitive sensors: aluminum foil, mylar, gilding foil, copper clad, conductive ink, conductive acetate.
Assignment: make a capacitive sensor.

**Week 8: October 26**
Review and critique assignments.
Outputs: motors, EL materials, amplifiers + speakers, endlighten, buzzers.
Assignment: create motion, light or sound with one of the techniques shown in class.

**Week 9: November 2**
Review and critique assignments.
Shape memory alloys.
Demonstration: muscle wire.
Assignment: create motion using muscle wire.

**Week 10: November 9**
Review and critique assignments.
Edible and squishy circuits.
Assignment: make a circuit with an edible component.

**Week 11: November 16**
Review and critique assignments.
Assignment: proposals for final projects.

**Week 12: November 22**
Thanksgiving recess.

**Week 13: November 30**
Review and discussion of final project ideas and sketches.

**Week 14: December 7**
Cover new material and review previously covered material in support of final projects.

**Week 15: December 14**
Presentation of final projects.
Materials & Suppliers

**Required Materials**
- ¼ inch copper tape with conductive adhesive – Amazon
- flexinol wire 0.006 – Robot Shop
- crimp beads - Amazon
- aluminum foil
- cardstock

**Required Electronics**
- breadboard
- jumper wires
- 2 x AA or AAA battery holders (3V)
- SMD battery holder - Mouser
- 3V lithium batteries (CR2025 or CR2032)
- AA or AAA batteries
- alligator clips + wires
- LEDs
- mosfets – Mouser

**Optional Materials**
- gilding foil – Mona Lisa (also available in art stores and Amazon)
- conductive ink – Bare / Inventables / LessEMF
- conductive thread - Sparkfun
- conductive fabrics – Less EMF
- conductive acetate – Less EMF
- endlighten – Evonik
- thermochromic pigments – Paint w/ Pearl
- magnetite – Chemical Store
- acrylic medium – Utrecht (also available in most art stores)
- kapton tape

**Optional Electronic Components**
- pager motors
- arduino
- lilypad
- teensy
- phototransistors
- small speakers
- low impedance mini amplifier – Radio Shack