Fine Bookbinding Meets Electronics

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Abstract
As technologies, finely bound books are compact, durable forms that get passed from one generation to the next. As handcrafted objects, they exemplify manual control and dexterity, patience and care, and continuity with the past. Paper-based electronic books, by contrast, are relatively new objects that enable novel interactions with material. Here we explore connections between centuries-old and contemporary building techniques by adding electronics to traditional binding. What kinds of details would be interesting to learn about the past? How could we use conductive fibers to talk to the future? What could gilded edges tell us about our interactions with books? In this studio, participants will build basic bookbinding and e-textiles skills to enable new material explorations.

Keywords
Bookbinding, e-textiles, handicraft, craft.

ACM Classification Keywords
H5.m. Information interfaces and presentation: Miscellaneous.

General Terms
Design.

Introduction

Fine bookbinding is an age-old handwork practice that requires detailed understanding of materials and techniques. Through a series of discrete, skilled activities — folding, sawing, sewing, pressing, gluing, chopping, rounding, backing, lining, pairing, staining, covering, and lettering— books develop from parts and pieces into encased archival objects. By contrast, e-textiles activities have recently developed from experiments combining fashion with electrical circuitry [1]. Novel interactive wearables, objects and surfaces push the boundaries of techniques (painting, sewing) and materials (conductive paints and fibers) by producing a variety of unusual forms, from handcrafted textile sensors [3] to computational sketchbooks [2] and painted electronic pop-up books [4]. Here we look at fine bookbinding as a site to explore the intersections of past and future handwork practices.

Studio Proposal

This studio will be structured in four parts. The first part of the studio will involve brief presentations of a personal book that participants bring to the workshop. In order to better understand how a book is structured, participants will spend the second part of the studio learning basic bookbinding techniques by creating a simple book using plain and decorative papers, boards and paste. In the third part of the studio, participants will get a feel for how to integrate a microcontroller and electronic circuitry with one of their books by testing and extending a simple prepared Arduino program. The forth part of the studio will involve material explorations using old books and materials. Techniques will be based on the first author's ongoing apprenticeship-based qualitative study of fine bookbinding in the UK and US.

Our studio is for participants with an intermediate level knowledge of electronics and programming. We expect participants to have the following skills:

• Basic hardware skills: competence with prototyping simple circuits on a breadboard, such as turning on an LED with a battery and resistor.

• Basic programming skills with Arduino and either Processing or Java.

• No prior knowledge of bookbinding is required.

Studio Topics to be covered

This studio will cover the following topics:

- Sewing to connect individual pages
- Setting and assembling a spine
- Pasting up end papers and covering boards
- Hand tooling with gold/silver foil, gold leaf
- Creating circuitry with copper tape, conductive fabric tape, conductive glue, conductive thread, velostat, conductive paint (copper and carbon), pencils (graphite),

Studio Learning Goals

We hope that participants will gain a better appreciation for fine binding practices as well as learn basic techniques for integrating electronics with paper and binding. By experimenting with materials, tooling and techniques, participants can extend their existing skills in electronics and computation into the developing paper-based domain.

Studio Supporting Web Documents

Recent painted paper circuit concepts include:

"Paper Computing" by Leah Buechley
http://www.youtube.com/watch?v=-LyKmaz_3uI

High-Low Tech Paper Circuits tutorial:
http://hlt.media.mit.edu/wiki/pmwiki.php?n=Main.PaperCircuits

"Touch to interact with brain" by Takashi Kondo
http://www.flickr.com/photos/t_kondo/4788541619/

"Rip to hear message"
http://www.flickr.com/photos/t_kondo/4788555023/in/photostream/

"Electronic Popables" by Jie Qi
http://vimeo.com/user1892233

Book of paintable electronics examples resulting from day-long workshop:
http://www.youtube.com/watch?v=n7IQhMCYru8

Arduino libraries:
http://www.arduino.cc/en/Reference/Libraries

The first workshop on paintable electronics took place at the Cambridge Science Festival. Each participant was given a pre-programmed micro-controller, a selection of components wherein the power supply travels through the pages. Participants were asked to make a page of a book.
Video:
http://www.youtube.com/watch?v=n7IQhMCYru8
Photos:
http://www.flickr.com/photos/plusea/sets/72157623998025530/

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Citations

[1] Buechley, L., Eisenberg, M. "The LilyPad Arduino: Toward Wearable Engineering for Everyone," *IEEE Pervasive Computing* 7, no. 2 (2008): 12-15.

[2] Buechley, L., Hendrix, S. and Eisenberg, M."Paints, paper, and programs: first steps toward the computational sketchbook," in *Proceedings of the 3rd International Conference on Tangible and Embedded* Interaction (Cambridge, United Kingdom: ACM, 2009), 9-12.

[3] Handcrafted textile sensors:
www.howtogetwhatyouwant.at

[4] Qi, J., Buechley, L."Electronic popables: exploring paper-based computing through an interactive pop-up book," in *Proceedings of the fourth international conference on Tangible, embedded, and embodied interaction* (Cambridge, Massachusetts, USA: ACM, 2010), 121-128.