ChickTech Soft Circuits Workshop Outline

Corvallis, November 14-15, 2015

Goal: By the end of the workshop the students will have learned:
- What an electronic circuit is and how to design, construct, and troubleshoot one.
- The basics of a computer system (input, output, memory, program).
- How to write and debug a computer program including loops and branching.
- Have the confidence to take an example project and modify it.

Product: By the end of the workshop the students will have created and programmed a soft circuit project using either a provided object (handbag) or item from home (hat, vest, or stuffed animal). They will take the project home as well as the required items and software to reprogram or repurpose it.

Budget: ~ $40 / participant

Volunteers / roles (target 5, one per three participants)**:**

Materials Needed:
- Hardware:
  - LilyPad USB (https://www.sparkfun.com/products/11190)
  - LiPo Battery (https://www.sparkfun.com/products/10718)
  - Sew-on breakout boards (OSH Park, Ken)
  - USB-micro cable
- Software:
  - Arduino Software http://arduino.cc/en/Main/Software
  - Example sketches in google docs
- Crafts:
  - Felt, thread, scissors, needles, scissors
  - Embroidery floss
  - Base textile (tote bag? see resources & notes)
- Equipment:
  - Soldering irons, safety glasses, hair-ties
  - Hot glue guns
  - needle-nose pliers & side-cuts
  - laptops
- Handouts in google docs
  - Arduino cheat sheet
  - Soft circuit notes

- ○ Soldering 101
- ○ Example Circuit

Workshop Outline:
- ○ Session 1 (Saturday a.m.)
  - ■ Introduction to workshop.
    - ● Introductions
    - ● Goals (soft circuit with input and output)
    - ● Checkpoints
    - ● Example projects
  - ■ LilyPad Basics
    - ● Software installation
    - ● Configure IDE, upload Blink
    - ● Modify blink
  - ■ Idea phase
    - ● Show basic soft-circuit
    - ● Discuss inputs and outputs
    - ● Discuss design-build-test cycle
  - ■ Design phase
    - ● Circuit diagram
    - ● Component placement
    - ● Gather parts

- ○ Session 2 (Saturday pm)
  - ■ Have participants present their plans, get feedback, check for questions.
  - ■ Soldering video (http://youtu.be/QKbJxytERvg (Collin) or http://youtu.be/P5L4Gl6Q4Xo (Geek Girl))
  - ■ Short programming demonstration:
    - ● If / then statements
    - ● for loops
  - ■ Build phase
    - ● Finish design
    - ● gather / solder components needed
    - ● Test component components / code with alligator clips
    - ● Sew in board and output component and test with code
    - ● Sew in input component and test with code

- ○ Session 3 (Sunday am)
  - ■ Progress check, check for questions
  - ■ Grace Hopper video (http://youtu.be/JEpsKnWZrJ8)
  - ■ Short programming demonstration:
    - ● Integrating inputs & outputs
    - ● Serial output for debugging

- ■ Continue building
  - ● Add additional inputs / output
  - ● Integrate code for desired behaviors

- ○ Session 4 (Sunday pm)
  - ■ Progress check, check for questions
  - ■ Add flourishes and details
  - ■ Discuss future modifications or new projects ideas (get them thinking about what they want to do at home).
  - ■ Prepare for Tech Show

- ○ Present projects (Tech Show, Sunday closing)

Resources and notes:
- ● OSU Highschool 2013 Soft-Circuit Notes: https://docs.google.com/document/d/14dqMjYi9-5w4NNwl8_IqIyMwQ-ibG0T9ikteo5YUN98/edit?usp=sharing
- ● Ken's sew-on break-out board documentation: https://docs.google.com/document/d/10bkYXEu4GjkP0Fdy2mqsNdYcEcfP2hLYTwVIshxOR2Y/edit?usp=sharing
- ● Example of using Hall-effect sensor and magnet for closure?: http://vimeo.com/4061697
- ● Tote bag sources:
  - ○ http://www.theexecutiveadvertising.com/messengerbagwithmatchingstripedhandle-screenprinted.aspx#.Uvun2_ldXh4
  - ○ http://www.theexecutiveadvertising.com/soho-messenger-bag.aspx#.UvunVvldXh4
  - ○ http://www.discountmugs.com/product/mb016-custom-messenger-bags/
- ● 2014 event blog post http://makersbox.blogspot.com/2014/08/chicktech-highschool-osu-2014.html

Thoughts for the future: If we were to do this workshop again I would make the following changes:

1. Inventory on hand for next workshop:
    5 Lily Pads
    9 LiPo Batteries
    8 USB micro cables
    2 USB / LiPo chargers (not really needed with LilyPad USB)

2. Need simple working programming examples for:

Touch circuit with on/off toggle
Light sensor
(introduce at start of second day)

3.

Example Projects: