Workshop: "Shrinking the Arduino: Introduction to ATtiny" Brendan Matkin

This workshop will focus on the design, construction, and applications of miniature, deployable, interactive systems based on the Atmel ATtiny85 microcontroller. It will be divided into two main components: project construction/tutorial, and discussion. We will build a smart LED throwie with 3 addressable RGB LEDs, extended battery life, and vibration trigger. The workshop will be divided into 2 sessions with a mix of tutorial and discussion in each session. It would be ideal to repeat each session in order to expand experimentation and audience. For example, week 1: discuss, plan, & code, week 2: build, test, and discuss, week 3: repeat code and combine discussion, week 4: repeat build, test, and discuss.

Project/Tutorial

Installing and preparing arduino-tiny core (compare to high-low tech); how to program (Uno as ISP); overview of ATtiny capabilities/specifications; write code (step by step); breadboard project; program chip, build.

Smart LED throwie; key points: addressable RGB LEDs, ultra-low-power sleep mode, interrupt-based wakeup, magnetic, vibration-sensitive, extremely small (approx. 1"x1"x1"), re-programmable, modifiable. This is an overly complex version to demonstrate capabilities and incite critical thinking.

Discussion

Topics: Fundamentals of interaction; how can interaction affect/be used in art; Arduino review; applications of programmable microcontrollers (MCU); implications of tiny, long-life, embedded systems; contextual modification via packaging (ex. put it in a balloon, now it flies; put it in plastic, now it's waterproof); price vs. quantity (i.e. you can afford to make 500 of something – how does this change the work?).

Modifications: use a different trigger input such as reed switch, button, proximity, IR remote, photocell (light sensor), microphone, water sensor, pressure sensor, alcohol or other gas sensor, temperature/humidity, motion (PIR), conductive materials, piezo, soil hydrometer, tilt, etc. Other modifications could include waterproof, floating (air or water), USB power, wearable, 3D printed diffusion, solar power, wireless communication (ex. Bluetooth, wifi, 433MHz), etc. Or any others that come up in discussions. How can any of these small modifications change the meaning or application of the work?

Testing: Ideally, part of this discussion will happen in the first of two workshops so supplies could be gathered before the second. During the second workshop, we could build using some of the modifications and then test, compare, and analyze them. Testing will depend on the results of our conversations but could be as simple as going out into the street or filling a bucket with water.

Worksheet(s) Contents

Useful Links:
- Make Magazine attiny intro http://youtu.be/30rPt802n1k
- Arduino-tiny cores https://code.google.com/p/arduino-tiny/
- High-low tech MIT tutorial http://highlowtech.org/?p=1695
- Detail on AVR interrupts & sleep: http://www.gamon.com.au/forum/interrupts
- Project on Github (sample code, etc): coming soon

Arduino-tiny core installation steps; notes section; wiring diagram of Uno as ISP & basic project; relevant specifications; suppliers & prices