

## Chapter 14. Meeting 14, Practices: Analog Electronics and Circuit Bending

### 14.1. Announcements

- Controller/Interface/Instrument Design 1: comments and grades this weekend
- Due Wednesday 6 April: Controller/Interface/Instrument Design 2 Proposal
- Due Wednesday 13 April: Performance Frameworks Draft

Must email me now with special requests for groups

### 14.2. Quiz Review

- ?

### 14.3. Reading: Ghazala, The Folk Music of Chance Electronics: Circuit-Bending the Modern Coconut

- Ghazala, Q. R. 2004. "The Folk Music of Chance Electronics: Circuit-Bending the Modern Coconut." *Leonardo Music Journal* 14(1): pp. 97-104.
- How did Ghazala get started building instruments?
- What are the basic techniques of chance electronics?
- What is Ghazala's notion of the immediate canvas?
- How is the coconut a useful metaphor for building new instruments?
- For Ghazala, what are living instruments?
- Why might Ghazala's approach be seen as a democratization of music making?

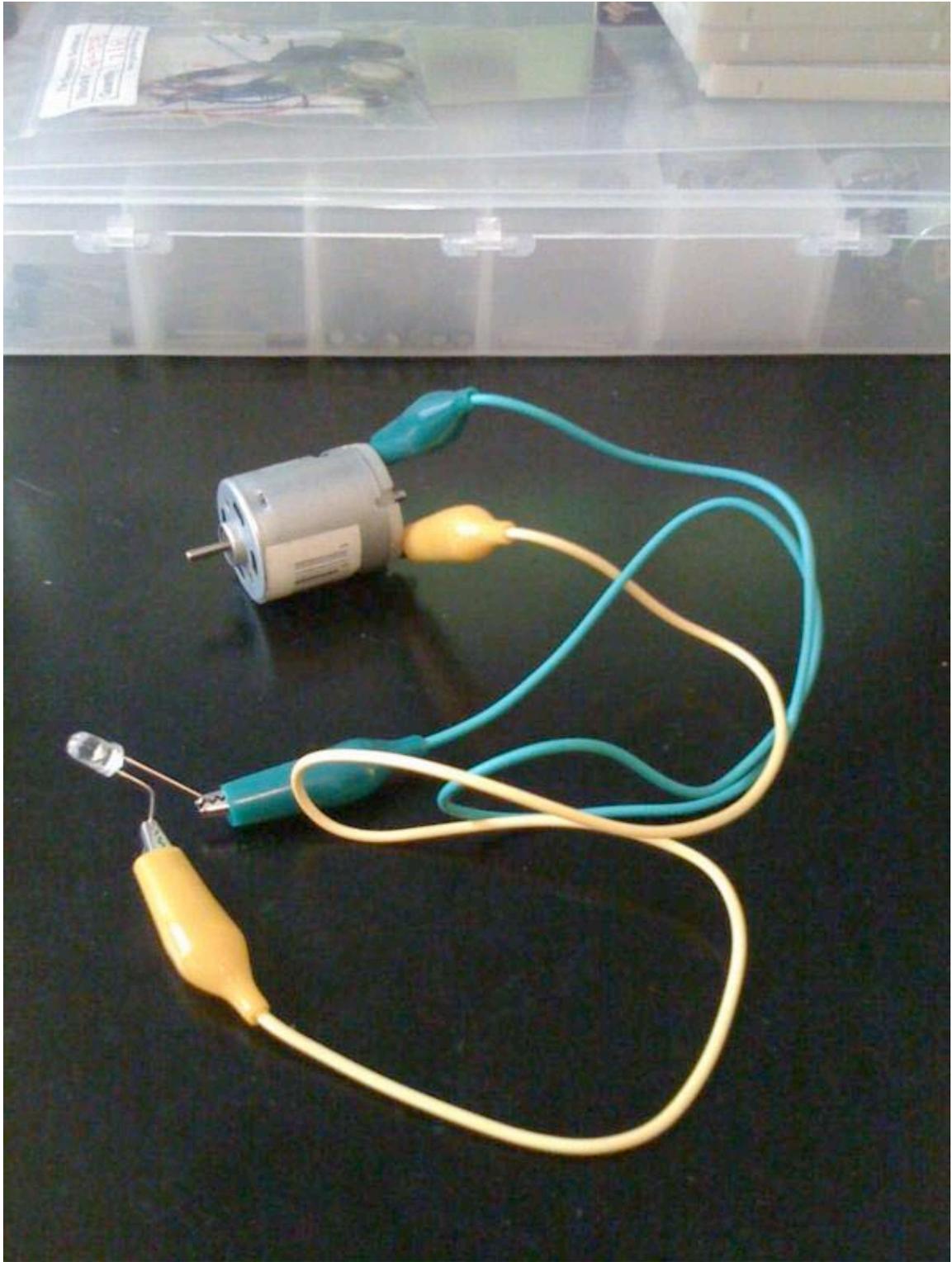
### 14.4. Reading: Collins, Handmade Electronic Music

- Collins, N. 2009. *Handmade Electronic Music: The Art of Hardware Hacking*. 2nd ed. New York: Routledge.
- Laying of hands: radios, circuit boards
- The cracklebox

- Adjusting, replacing, and manipulating clocks in toys
- Using potentiometers, photoresistors, and alternative electrodes
- Circuit bending: the difference between bent and hacked?

## **14.5. Hardware Hacking: Mini Telharmonium**

- Materials: DC Motor, amplifier, alligator clips
- Motor creates pulses that, when fast enough, produce a tone





- Variation: jumping speaker; using a speaker as a microphone

## 14.6. Hardware Hacking: Electromagnetic Transduction

- Materials: Tape head, phonograph cartridge, guitar pickup, amplifier, alligator clips
- Can read magnetic variations and transduce vibrations
- Guitar pickup and iPhone

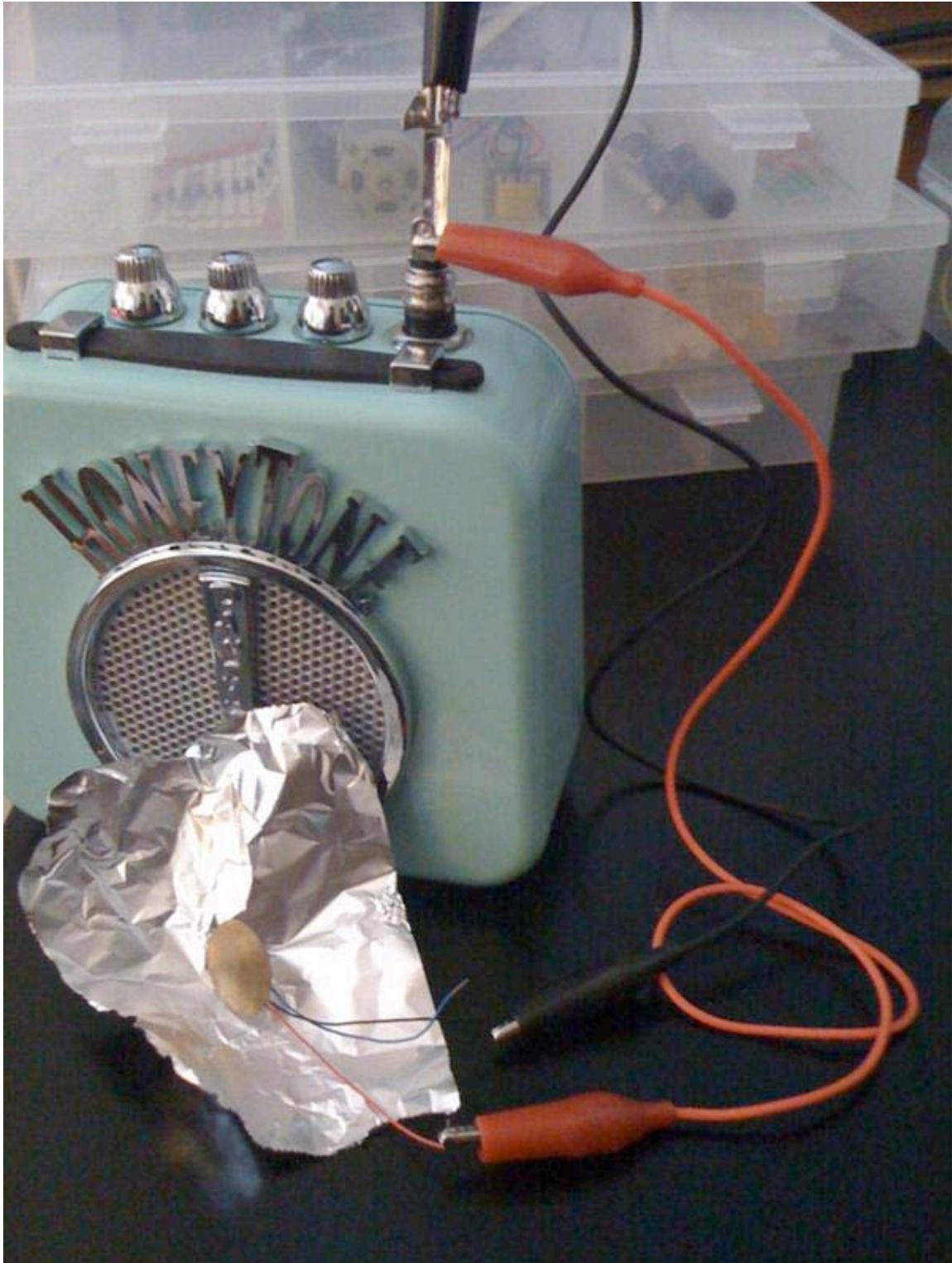


- Tape heads and ID cards



## 14.7. Hardware Hacking: Piezo-electric Transduction

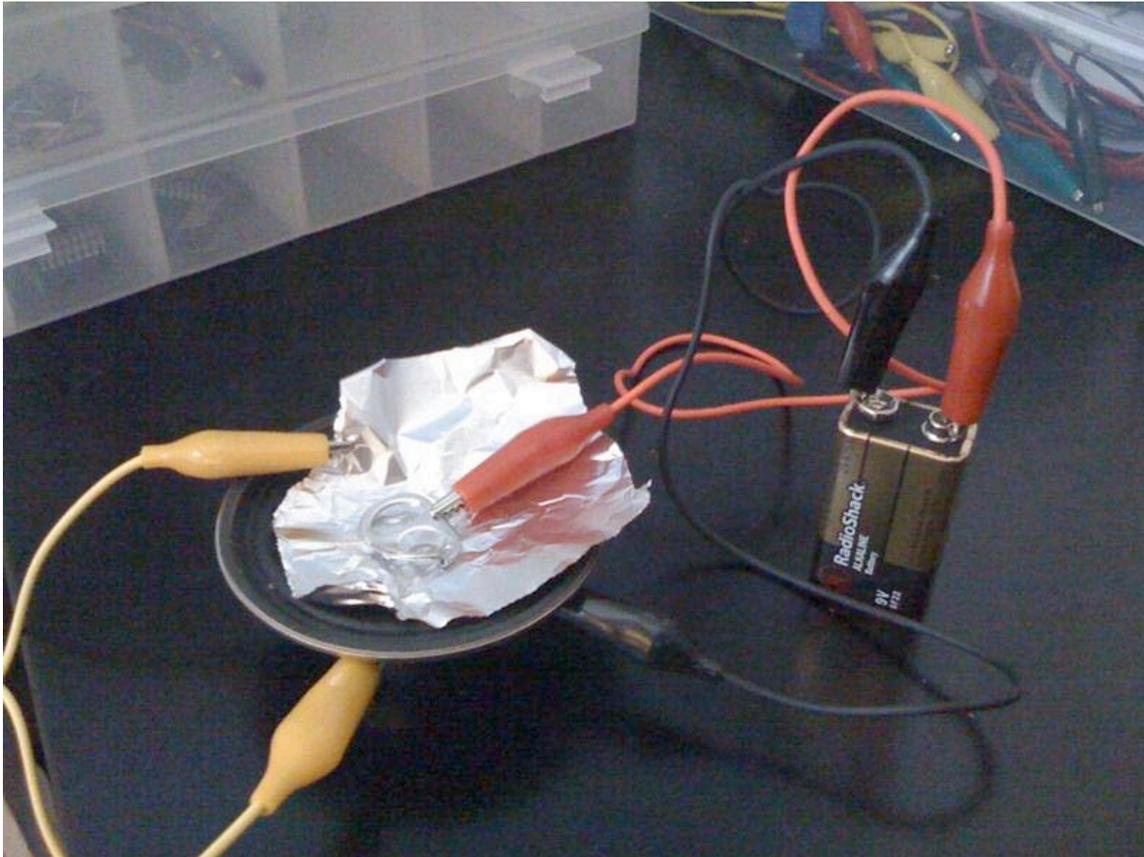
- Materials: piezo microphone, slinky, amplifier, alligator clips



- Can pick up surface vibrations for direct transduction
- Can pick up vibrations travelling through a slinky

## 14.8. Hardware Hacking: Victorian Oscillator

- Materials: 9v battery, speaker, three alligator clips, metal materials
- Connection to speaker from battery is created and broken through mechanical feedback



## 14.9. Hardware Hacking: Video Excerpts

- Project tutorials / Laying of Hands, Chapter 11
- Project tutorials / Hack the Clock, Chapter 12-15 (1:07, 1:13, 1:14)
- Circuit bent examples:
  - Emir Bijukic: Solar Cell Calculator
  - Michael T. Bullock: Open-backed radio
  - Chapman & Collinson: The Bent Radio Orchestra
  - Seth Cluett: Open-backed Cassette

- Stewart Collinson: Hacked Cyberhead
- David First: The Radiotron
- Steve Marsh: Bent Stix Drum Machine
- Dan Wilson: Work Cracklebox
- Project tutorials / Drivers Chapter 8

### **14.10. Listening: Collins, Behrman, Yasunao Tone**

- Listening: Nicolas Collins, “El Loop,” *Handmade Electronic Music*
- Listening: David Behrman, Players With Circuits
- Listening: Yasunao Tone, Imperfection Theorem of Silence

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