Transmitting Karaoke with Lasers

Keelin Becker-Wheeler
Oliver Kisielius

Motivation

- Lasers are cool
- Fiber-optic cable with innovative cost-saving mechanism
- Karaoke night at the U

Objective

- Transmit an analog signal with a laser by varying the intensity of the laser

Design Specifications

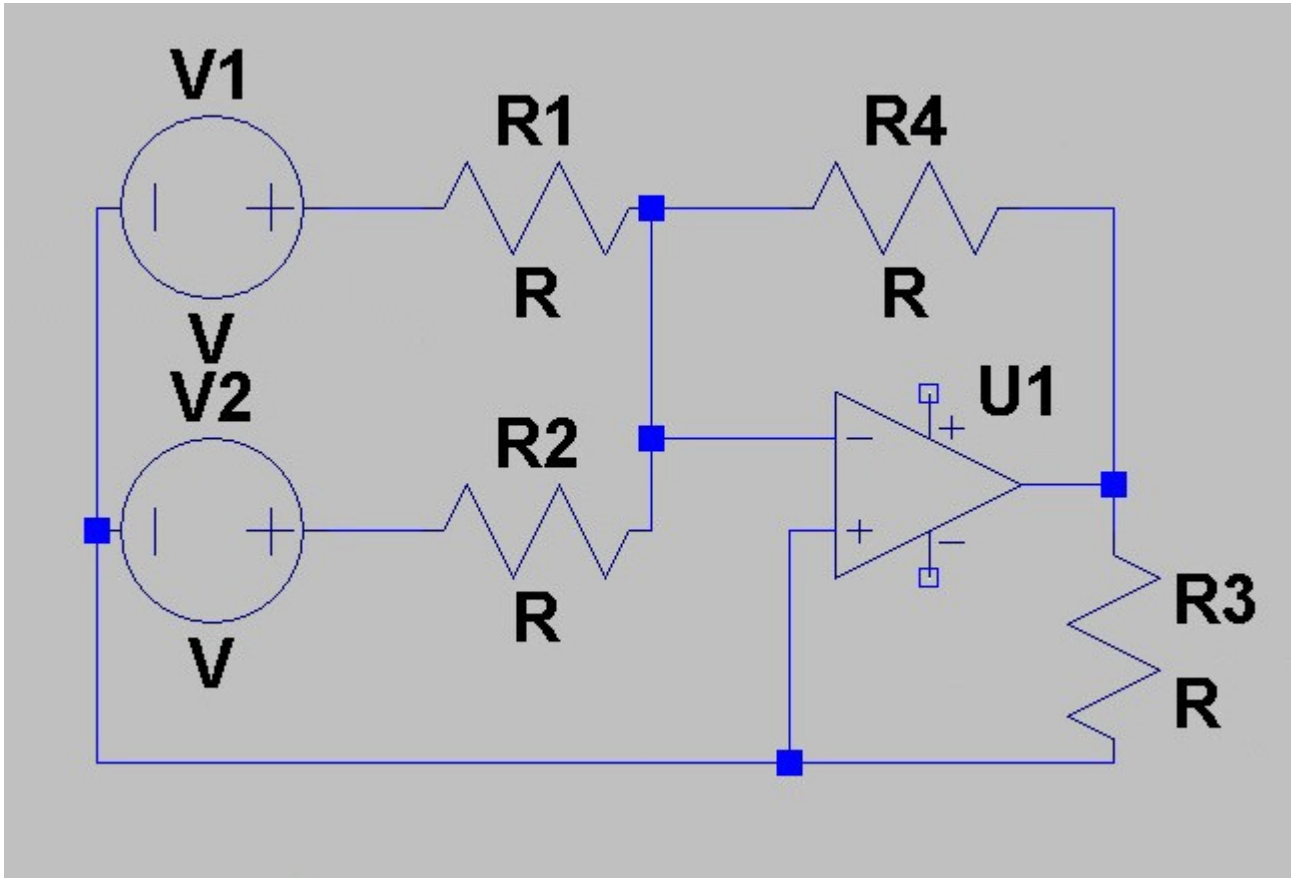
- Take input from microphone and stereo audio cable
- Mix them (with op-amp)
- Amplify to 3-5V range (with op-amp and bias-T)
- Use a laser to transmit the resulting wave (with laser)
- Restore the laser to a voltage wave (c. 1V) (with op-amps)
- Play it with a speaker (with speaker)

Transmitter

Transmitter

Summing circuit

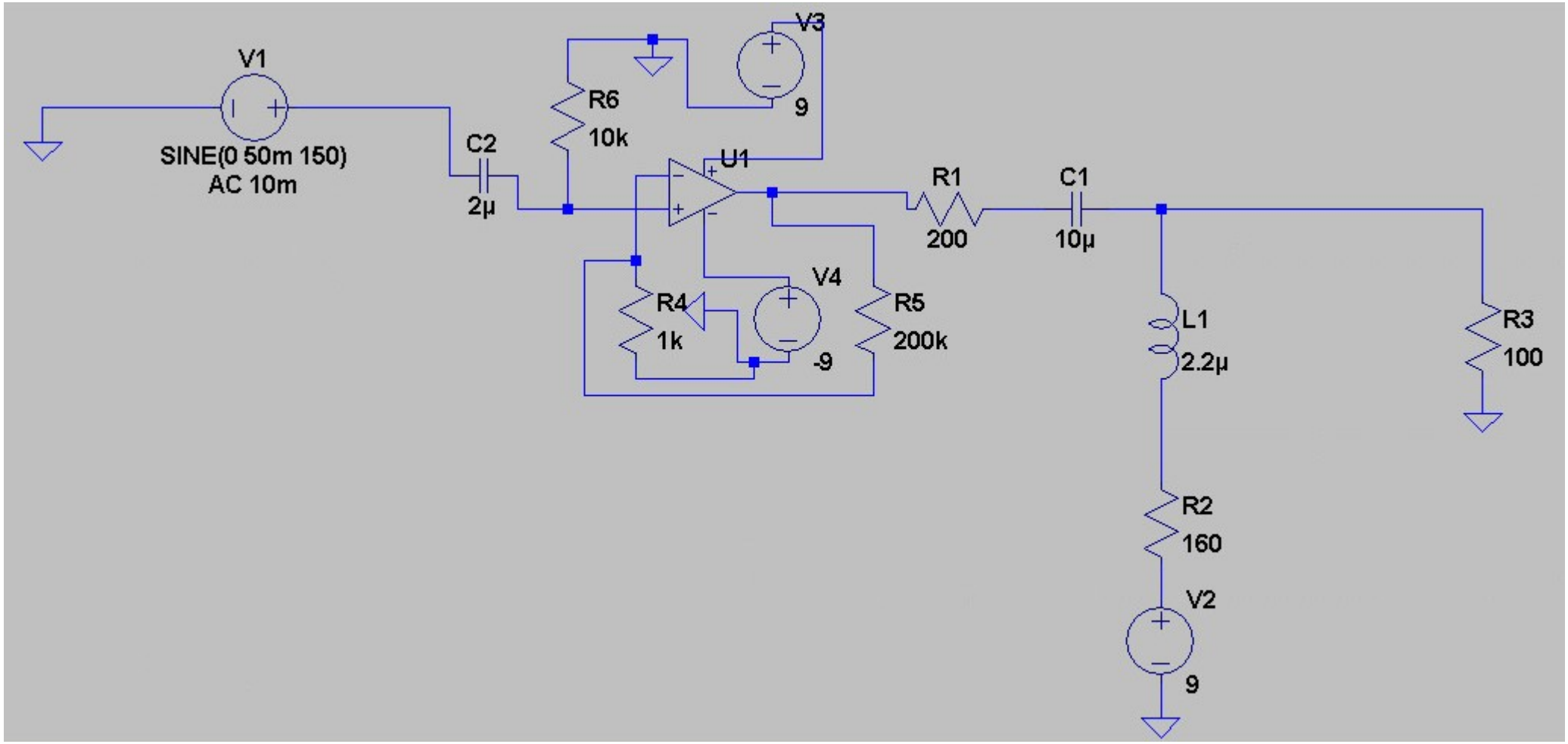
Vout = -R4(V1/R1 + V2/R2)



R3 is the load
V1 is the microphone (after capacitor)
V2 is from the audio cable

Transmitter

V1 is the output of the summing circuit
R3 is to be in series with the laser

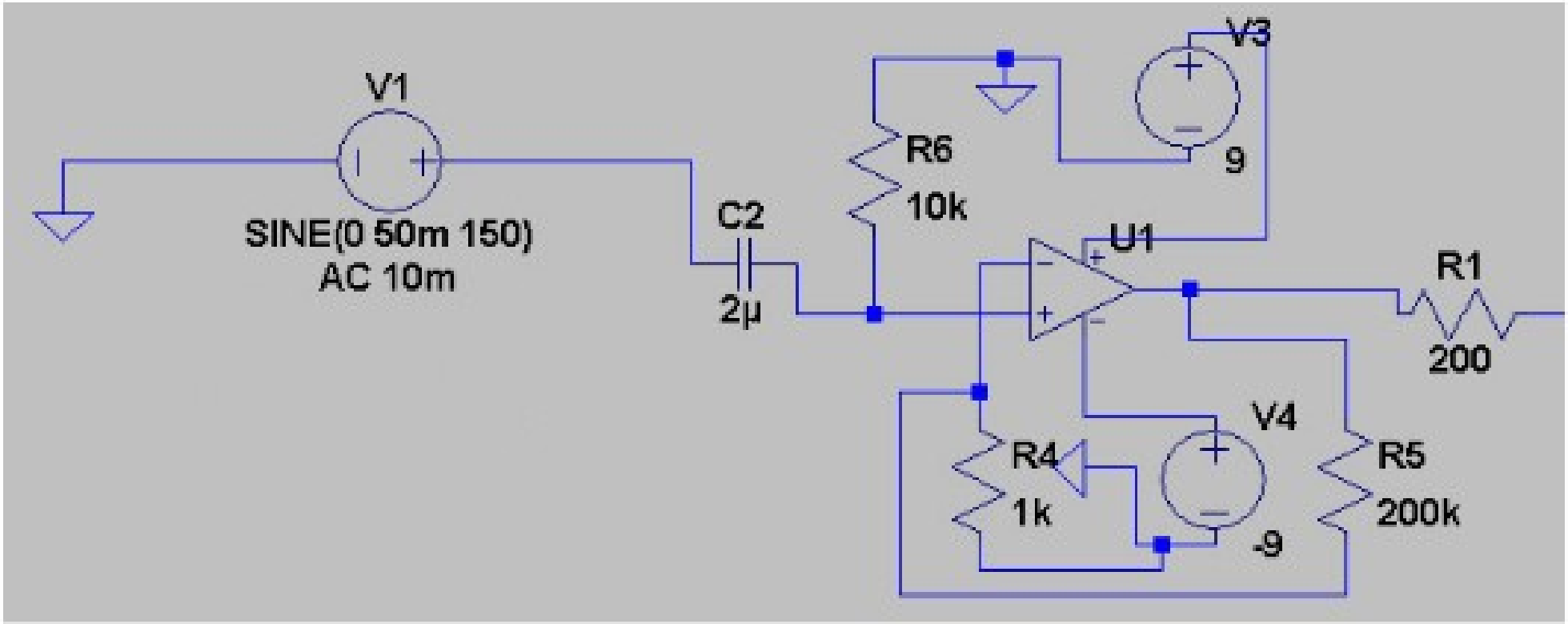


Receiver

Receiver

V1 is the photodiode
R1 should be 8ohm (the speaker)

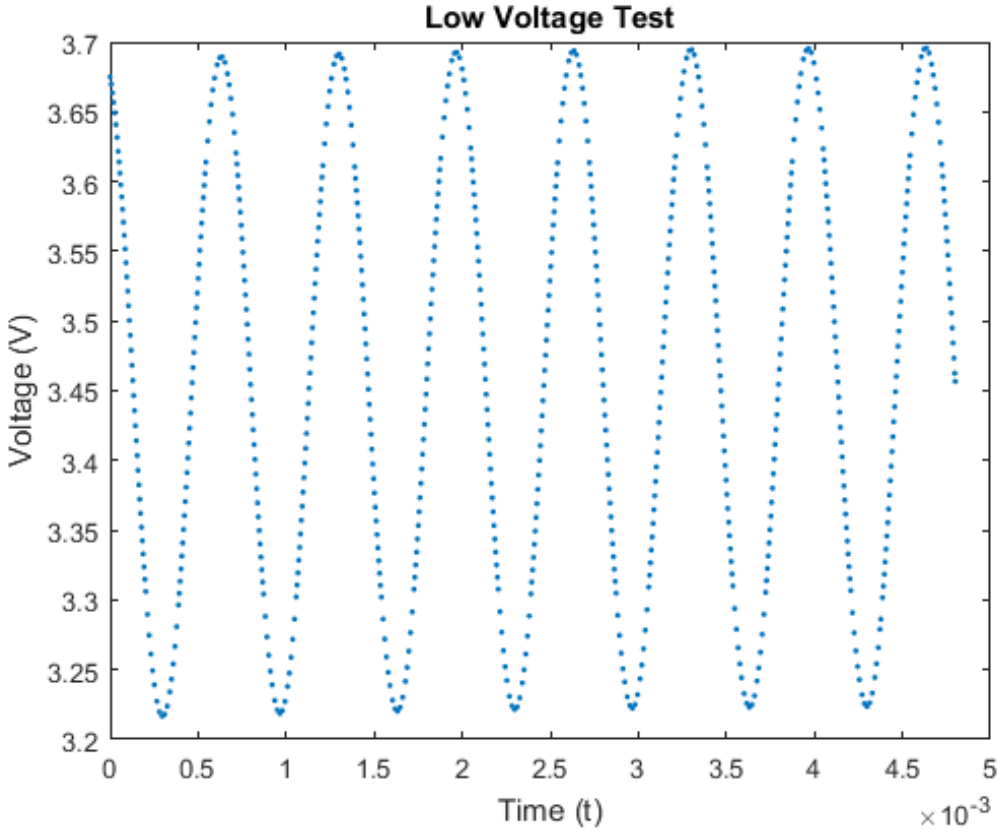
(This is exactly the amplifier from the transmitter)

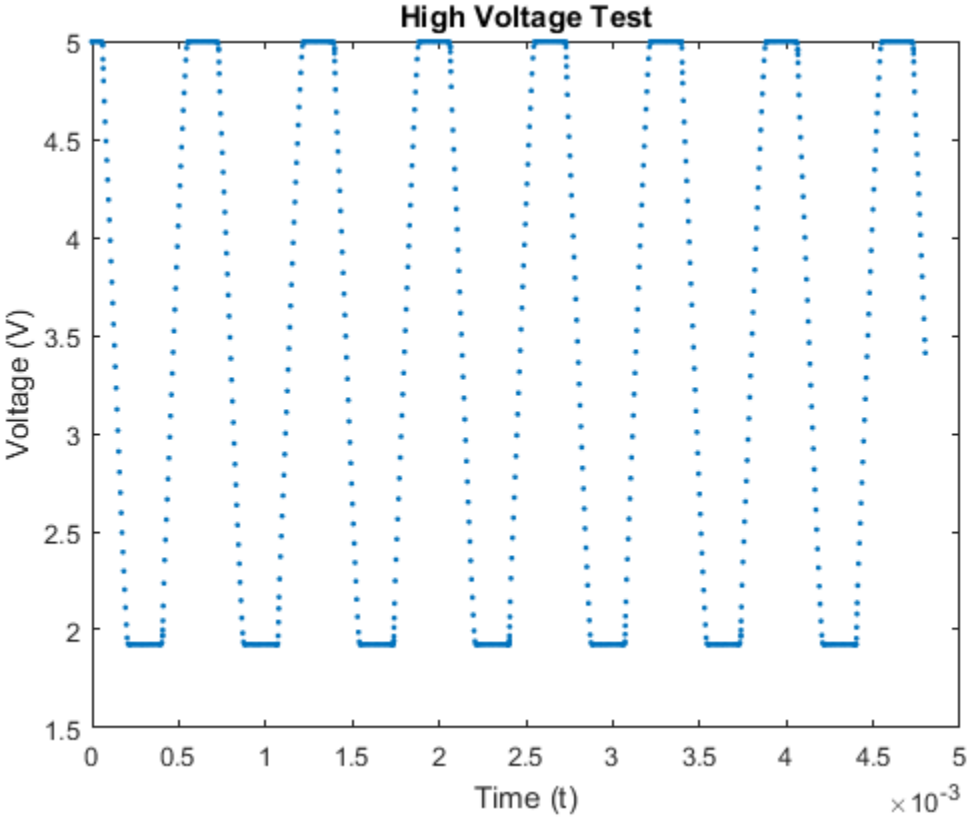


Simulation of transmitter

5mV (low) and 50mV (high)

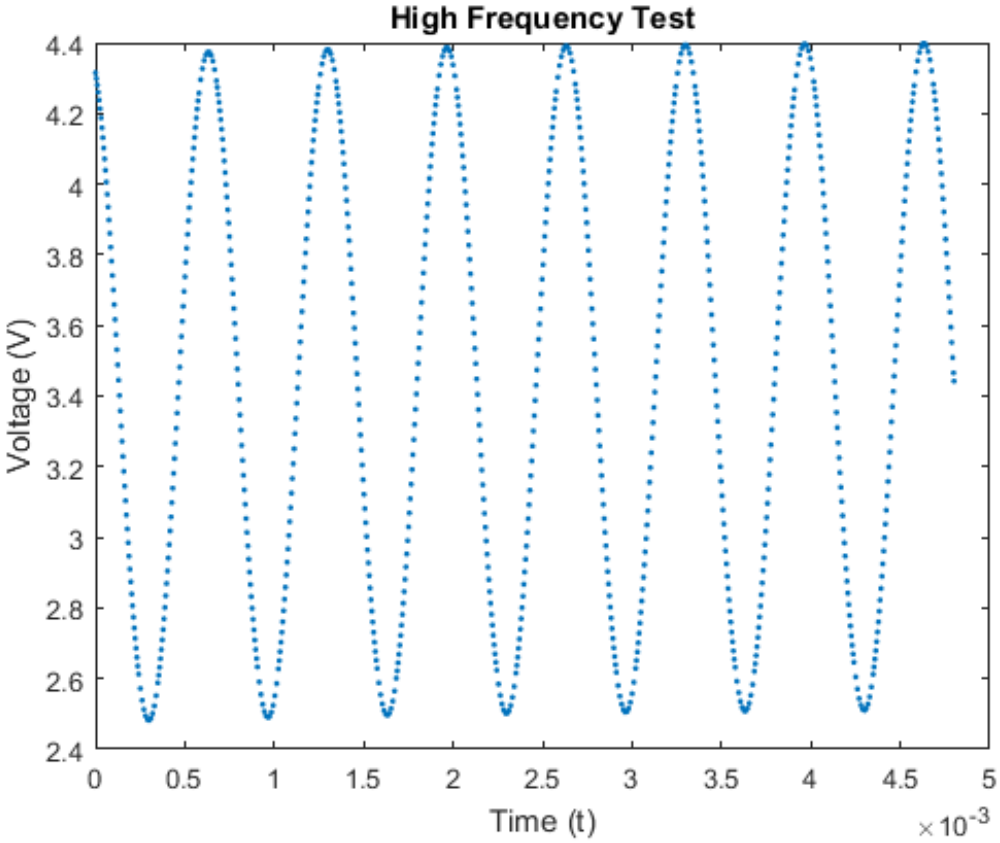
Clipping is intentional

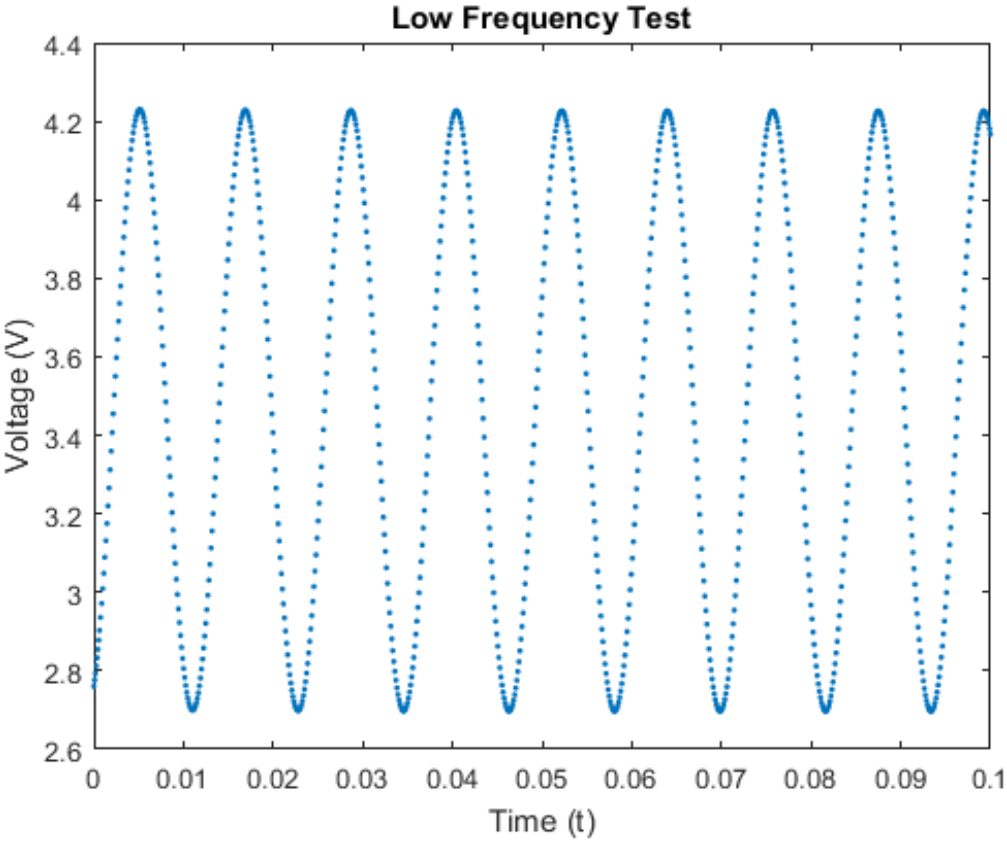




Simulation of transmitter

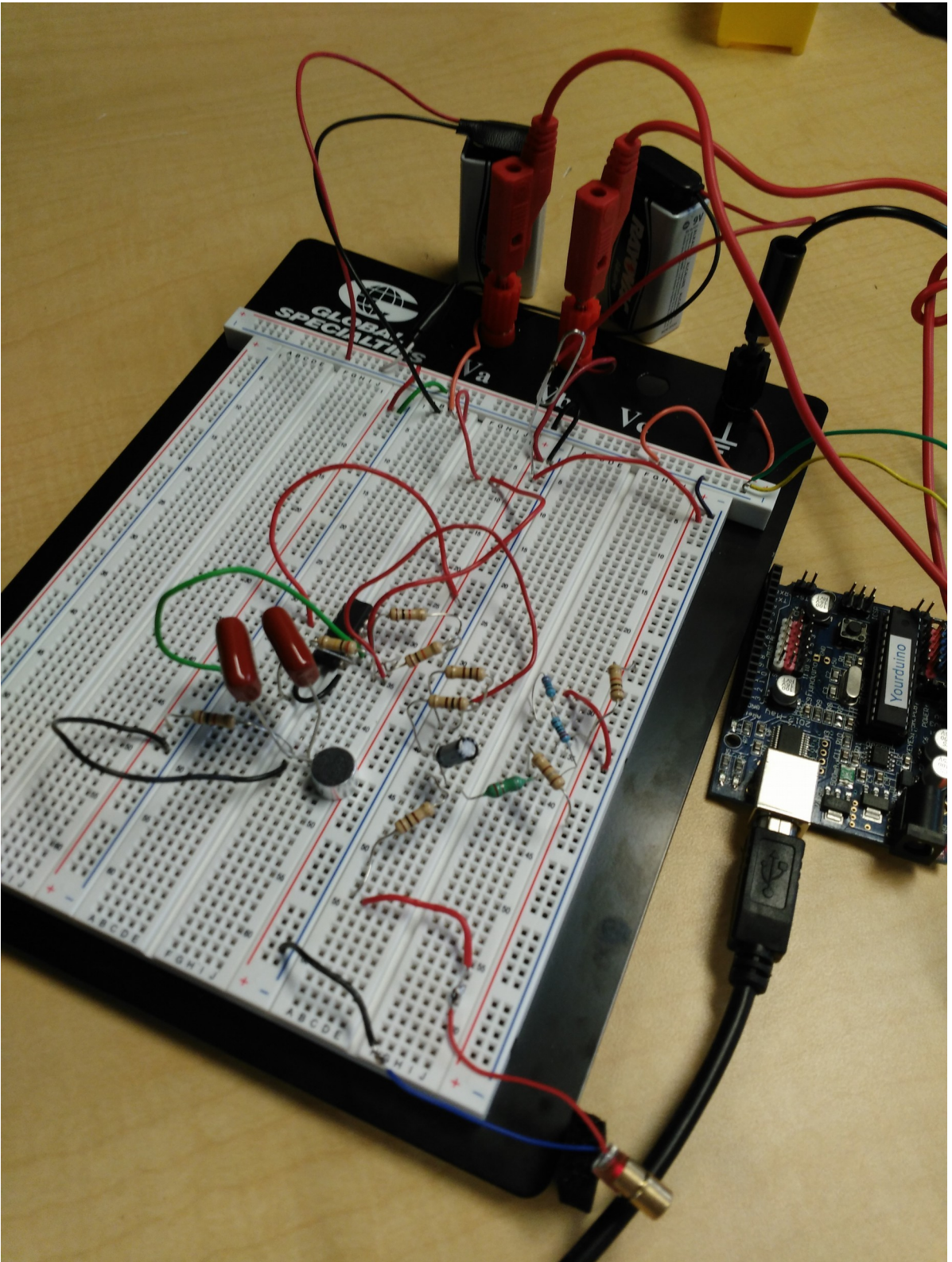
85Hz (Low) and 1500Hz (High)



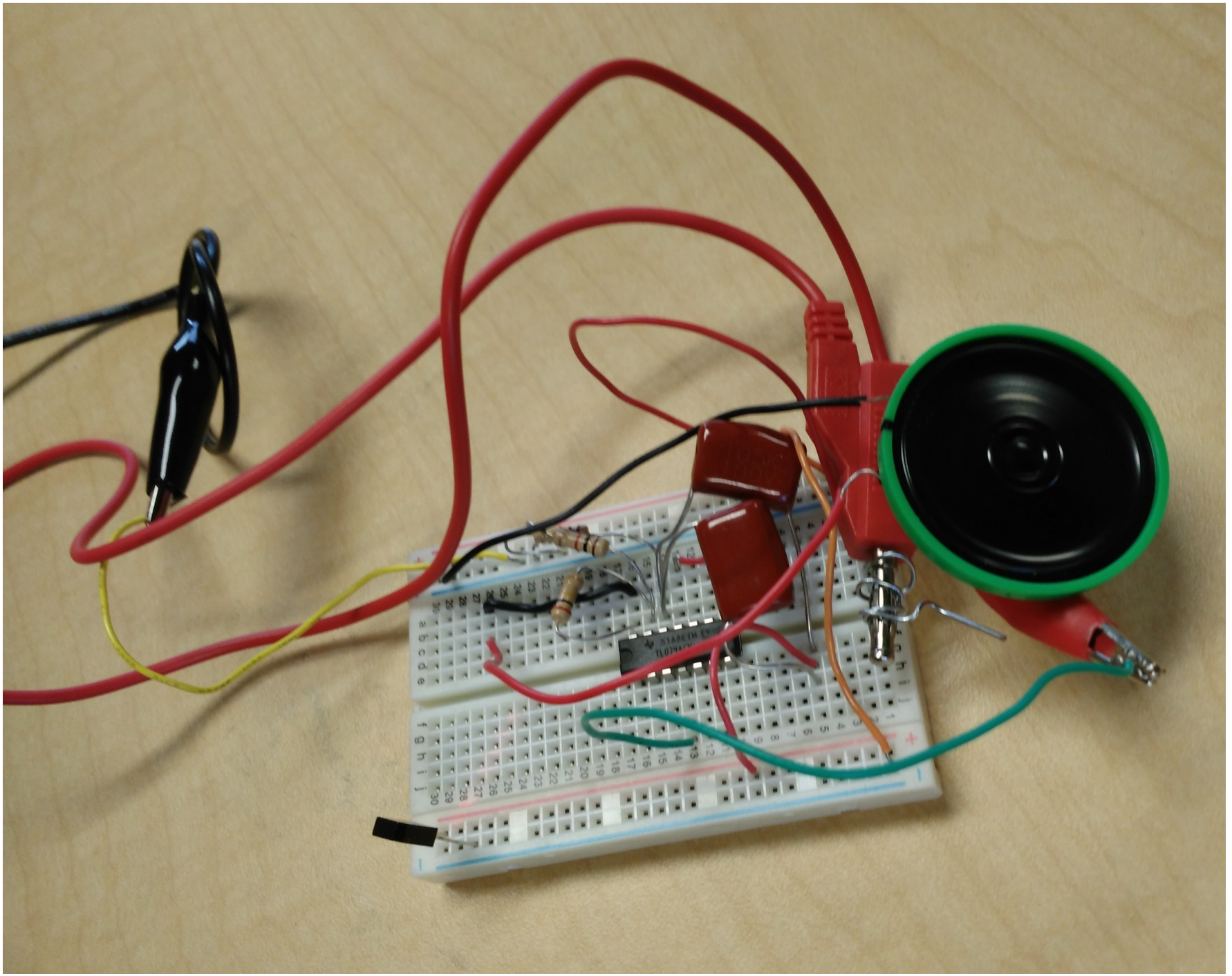


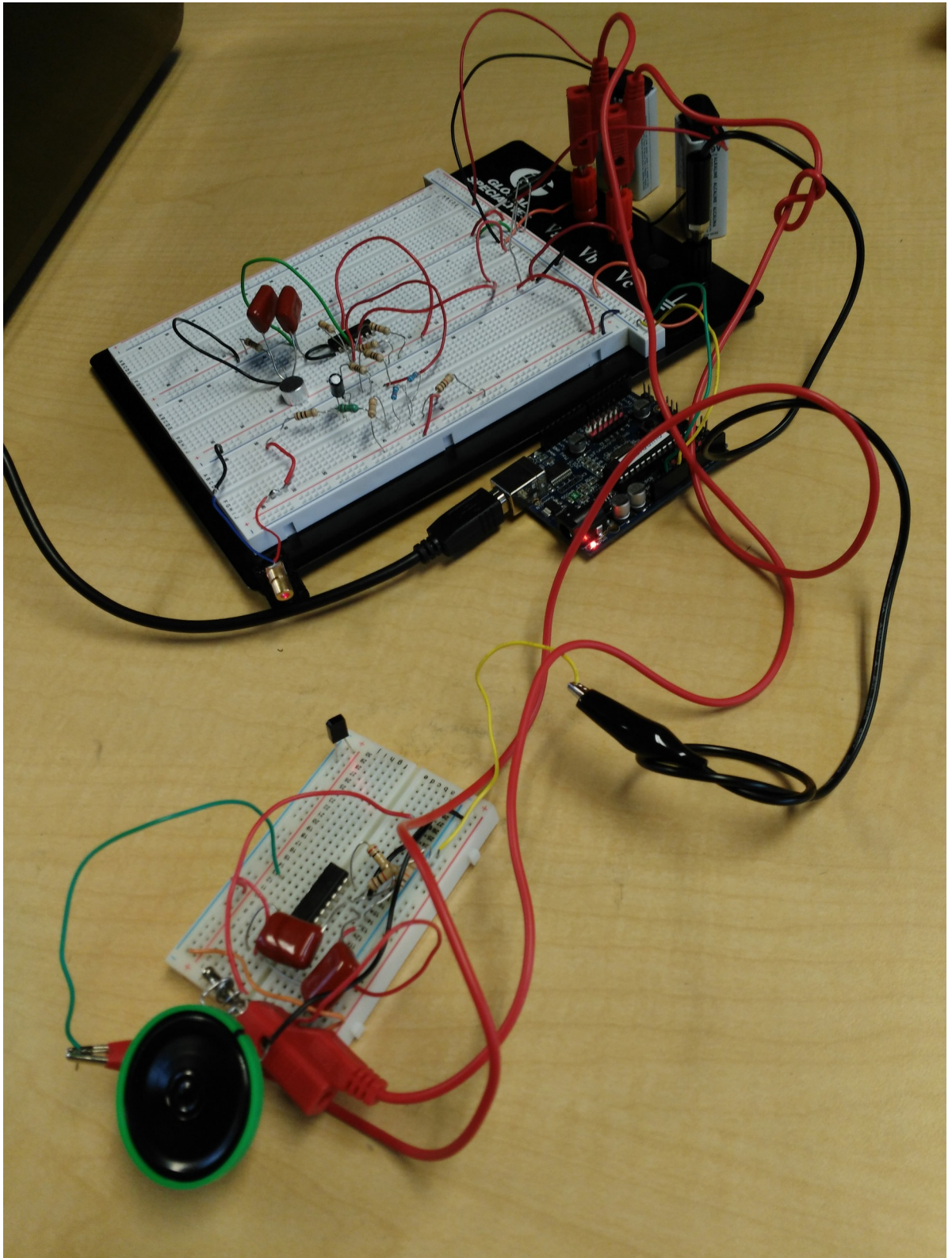
Materials

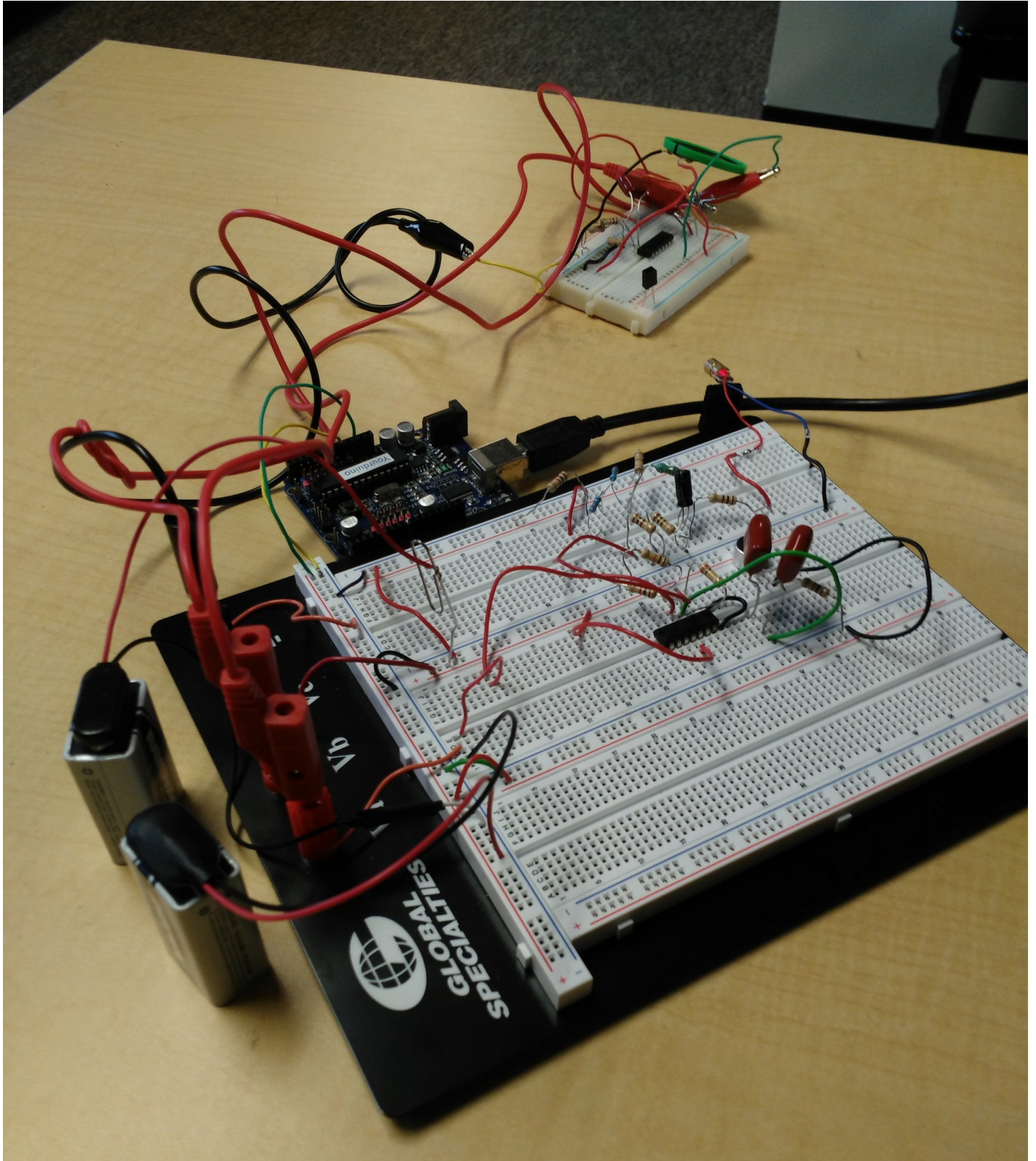
- Resistors, capacitors and inductor from the kits
- Keelin's Arduino (to supply 5V)
- Speaker, laser, op-amps, and photodiode provided
- Breadboards
- Paper clips
- Wires
- 9V batteries
- Headphones (used with utmost care)



Photos




Vb
Vc


Youduino
9V
GLOBAL SPECIALTIES