

## Lab 7: Capacitance Touch Sensors and Sound

### Objectives:

1. Experiment with a capacitive touch sensor as an input device.
2. Run a calibration routine that detects minimum and maximum values.
3. Send an output signal to a piezo buzzer (or LED) that is proportional to the input from the sensor input.

### Required Equipment:

- Computer with Arduino IDE & Teensy extensions installed and working
- Capacitive sensor, such as aluminum foil, copper, etc. Note: you're to supply the aluminum foil, copper wire, etc.
- Piezo buzzer (or LED)
- Teensy board and USB cable
- A variety of resistors (one for the output device ( $\sim 220\Omega$ ), and one in series with the cap sensor ( $\sim M\Omega$ ))

### References and Resources:

- Calibration tutorial: <http://arduino.cc/en/Tutorial/Calibration>
- Several good demo videos by Internet search: teensyduino touchread

### Basic Setup

1. Install the capacitive touch sensor. Only one connection to the microcontroller is required, but only a few microcontroller pins are capable of sourcing the `touchRead()` function.
2. Run a preliminary sketch that issues the `touchRead()` function and observe the return value output on the serial monitor.
3. For this lab, we need a setup where sensing will occur when your hand is near the tin foil; it should not be necessary to actually touch the tin foil to get a reading. To get reliable results, you **will** need to perform some sort of **auto-calibration** and **scaling**. Code a calibration routine in the `setup()` function, and note the max/min points obtained so that they can be used to define output levels for the frequency argument of the `tone()` function (or PWM levels of the LED).
4. Demonstrate your working circuit.

### Demonstration

Once you know how to calibrate your circuit from the previous step (Basic Setup), your next step is to review the Lab 7 Grading Scheme posted on Brightspace. Decide your letter grade, and then build the corresponding circuit. Demo your completed circuit to the lab instructor.

### Deliverable

Uploaded your Teensyduino sketch (.INO) file to Brightspace for the due date and time.