iDesign Studio ~ Lab 5: Input via microphone

written by Shani Mensing ‘15

Materials

- Arduino
- breadboard
- jumper wires
- electret microphone amplifier (mic amp)
  https://www.adafruit.com/products/1063
- LEDs x 5
- resistor (200 ohm, included with LEDs)

In this lab, you will use the mic amp in order to pick up sound and cause LEDs to react. The mic amp takes in sound waves and converts them to electronic signals. The signals are analog (like the photoresistors), taking on a range of values. The Arduino reads in analog values with a min of 0 and a max of 1024.

Step 1
The mic amp has three pins that need to be soldered on: OUT, GND and VCC. As you may have picked up from past projects, VCC represents the pin that will connect to positive power, GND stands for ground and the OUT pin is where the sound wave form will come out of.

With Nikki’s help, solder 3 pins onto the mic amp.
Step 2
Use the Arduino and breadboard to test out the mic.

- place the mic amp on the breadboard so that the pins land in 3 different rows
- use a jumper wire to connect the row for VCC to the 3.3V pin on the Arduino
  - Our mic amp can run on a voltage between 2.4-5V; lower voltage is preferred, so we use the 3.3V pin.
- use a jumper wire to connect the row for GND to GND on the Arduino
- use a jumper wire to connect the row for OUT to analog input A0 on the Arduino

Now download the code from moodle called SoundInBasic and open it in the Arduino application.

The code samples the analog reading and converts it into voltage so that it is easier for us to use. To see your code in action, open the serial monitor.

Make sounds next to the mic to see if the serial monitor is picking up the change.
Almost your turn!

For the rest of the lab, you must complete the setup with the Arduino (code) and breadboard to create 5 LEDs that light up according to how much sound is detected by the mic. This should achieve the same behavior as shown in the demo.

Before you start, though, Audrey attempts Ohm’s law…again… since we must keep in mind:

- Digital out pins from the Arduino give out 5V when set to HIGH.
  - Our LEDs drop about 2V and require ~15mA of current
  - What sort of resistor do we need then to complete the circuit?
- A little lesson on serial/parallel circuits

And, Audrey tries to get some pseudocode for how to light the LEDs. Look on moodle for sample code for a switch construct `serialSwitch`.

Now it’s actually your turn!

Step 3

- Disconnect your Arduino from power
- Add jumper wires and resistor(s) to connect 5 LEDs on your breadboard to digital pins D2-D6 on the Arduino
- Once you think your circuit is connected correctly, ask Audrey or Nikki to check it BEFORE plugging your Arduino in again (otherwise, you will burn out your LEDs!)
- Modify the sample `BLINK` code from the Arduino examples to blink all 5 LEDs simultaneously

Step 4

- Modify and add code to make the 5 LEDs light depending on how much sound is detected

*Steps 3 and 4 are due by Monday’s class.*