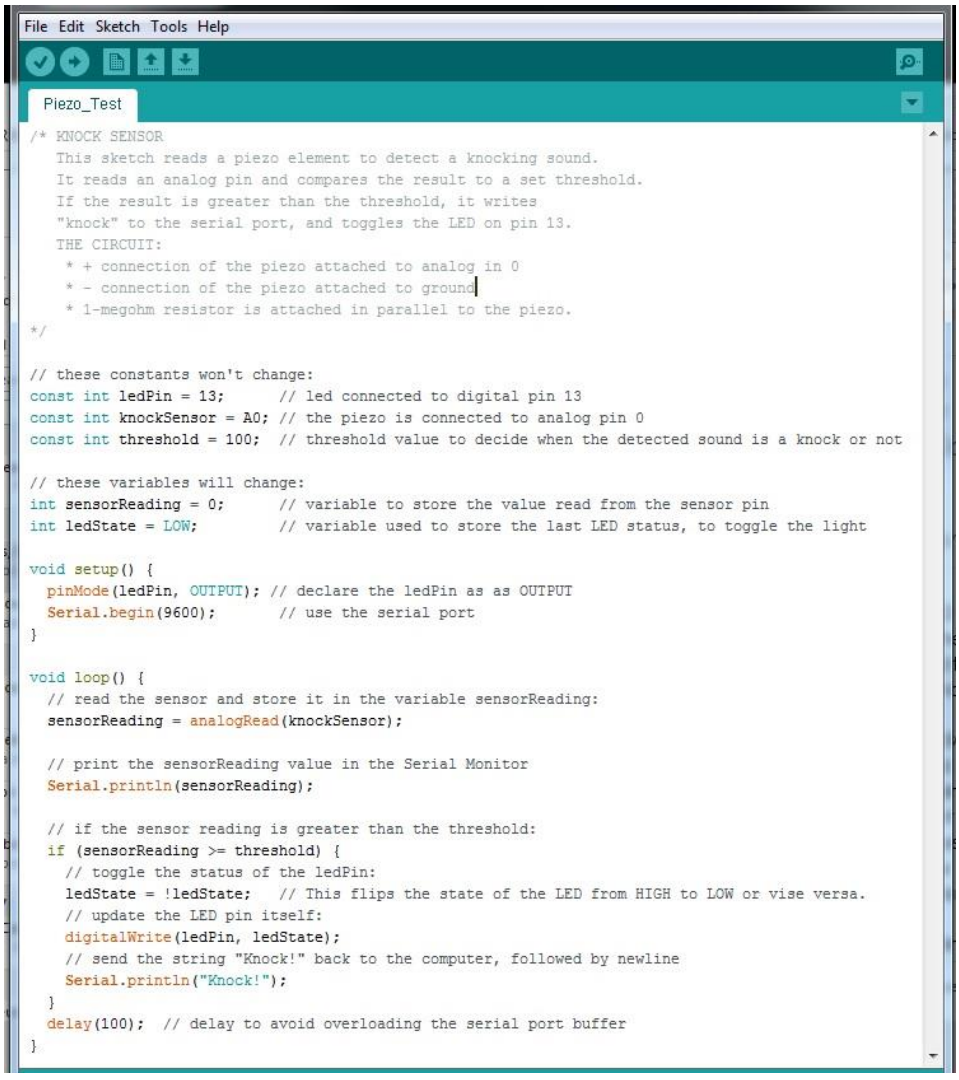
Piezo Elements and Your Rube Goldberg Machine
Making Your RGB Do Something

Your objective is simple. Your Rube Goldberg Machine (RGM) must activate a piezo element that is controlled by an Arduino controller that you have programmed. The analog input of the piezo element is to be used to cause something to occur that the Arduino controls.

The following materials provide you with some guidance, hints, and instructions for making a successful Arduino program. READ EVERYTHING CAREFULLY . . . if you expect this to help you.

Piezo elements are sometimes known as knock sensors. Please go to this link https://www.arduino.cc/en/Tutorial/KnockSensor and read the first four paragraphs, and look over the first sketch, to begin to understand how piezo elements work, and how to incorporate them in the Arduino universe.

In the example program to the right, which is the sketch you just looked at with some modifications, two things occur when the piezo element senses a knock. First, when the piezo measures a knock that is higher than the threshold value (100 in this example), the Arduino will toggle the LED on DigitalPin 13 on/off, and it prints the value being registered on AnalogPin 0, the pin that the piezo is connected to, to the serial monitor. Also note that every 100 milliseconds, the value of the piezo sensor is recorded on the serial monitor. Printing to the serial monitor is a part of this program because it provided a quick means of checking the effectiveness of the threshold value, and allowed additional troubleshooting for the sketch. It allows this because you can continually see what the sensor is measuring, and what reading is on the AnalogPin. Therefore, you know when the LED should come on, for instance. You can also relate the size of the impact on the piezo element to the value that is sensed.



What You Need To Do:

So now . . . you have a task. As all good programmers do, you are going to start with a program that has been created by someone else (the above sketch). You are to change it so that it does the following:

1. Responds to an impact to a piezo element. This might require adjusting the threshold value. It might also require you to use alligator clips and jumper wires so that the piezo can be located at the point of your RGB where it is to be struck.
2. The impact must be gentle enough to avoid damage to the piezo. Your instructors MUST approve your method for striking the piezo.
3. You must have your Arduino do something other than merely toggling on and off an LED – WE HAVE ALREADY SHOWN YOU HOW TO DO THIS ABOVE! We are leaving this up to you, but you must run your ideas by your instructors to receive approval first. We may or may not have materials to support what you want to do.

Other Criteria:

- When you are using your Arduino with your RGM, you will need to be powering your Arduino with a 110V power adaptor. We only have a limited number of these so you will have to share. In this mode, the Arduino receives power so that it can function from the power adaptor – it will NOT be hooked to a computer. Of course, you will have needed to load your program onto your Arduino prior to taking it to your RGM.
- Your RGM must have a place to hold your Arduino and breadboard SO THEY WILL NOT GET DAMAGED.
- Your piezo element must be hooked up in parallel with a 1.0 MΩ resistor. It will be difficult to get good readings if you don't do this.