Exploring the Wireless Transmitter and Receiver

Only one group at a time can test its transmitter circuit, and all of the other groups will test their receiver circuits based on the signals from this single transmitter circuit. When that group is testing its transmitter, all other groups will receive its signal.

How reliable is the wireless communication? Turn one of the LEDs on, and try to block the signal by putting objects between the transmitter and receiver. Are you able to break the link? (If the LED starts flashing, this typically means the receiver is not getting a strong signal).

How far can you separate the transmitter from the receiver before they start to lose the connection?	
Insert a wire (2" jumper or longer) into the breadboard row connected to pin 4 of the RF transmitter chip *(RF transmitter circuit hole E20)*. This will act as an **antenna**. Record the distance that you can now separate your transmitter and receiver.	
You can also try using an antenna on the receiving end by putting a wire (2" jumper or longer) into pin 8 of the RF receiver *(RF receiver circuit hole E30)*. Record the distance that you can now separate your transmitter and receiver.	

What are advantages of using an RF transmitter and receiver compared to a wired transmitter and receiver?

What might be some advantages of the wired system you built last time over the wireless system you built today?

Activity 4: Sounding the Alarm Student Handout

**Name:** _____

Date: _____

In this activity, you will have the opportunity to put all the pieces together to design and build your alarm circuit. First, you will learn how to use the sound recording modules. Second, you can use the sound recording module on either the transmitting or receiving end of the circuit.

Using the Sound Recording Module

Step 1: Open the card and you can feel the sound recording module in the right side of the card. Carefully tear open this part of the card if it has not been opened already. You will see the sound recording module.
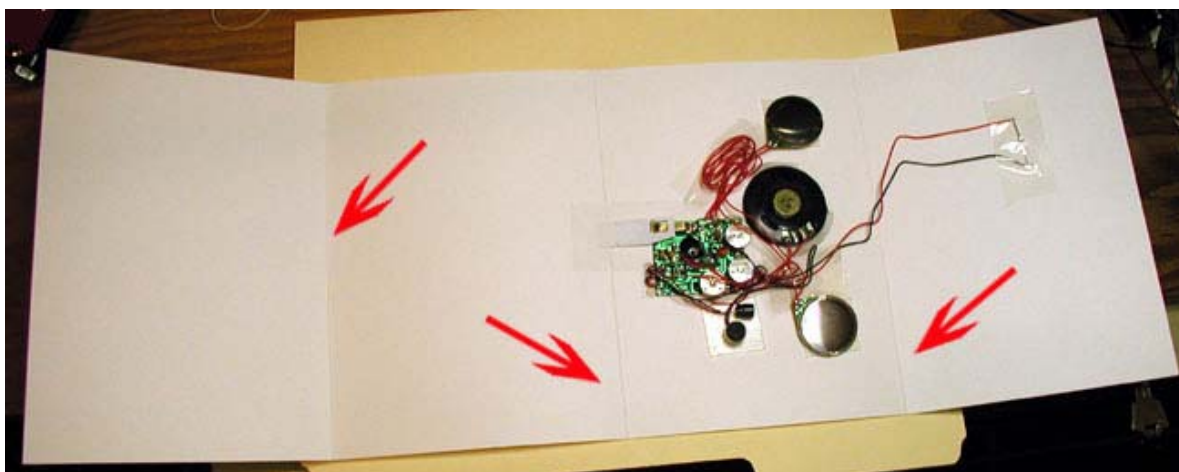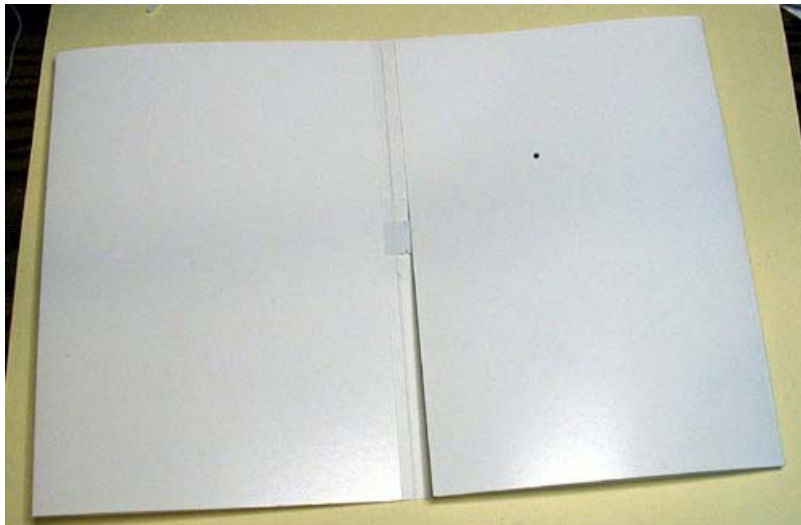
Step 2: Identify each of the parts of the sound recording module labeled A-F in the picture below. (a) record buttons; (b) microphone; (c) red LED record indicator: (d) audio filter: (e) speaker: (f) circuit board.
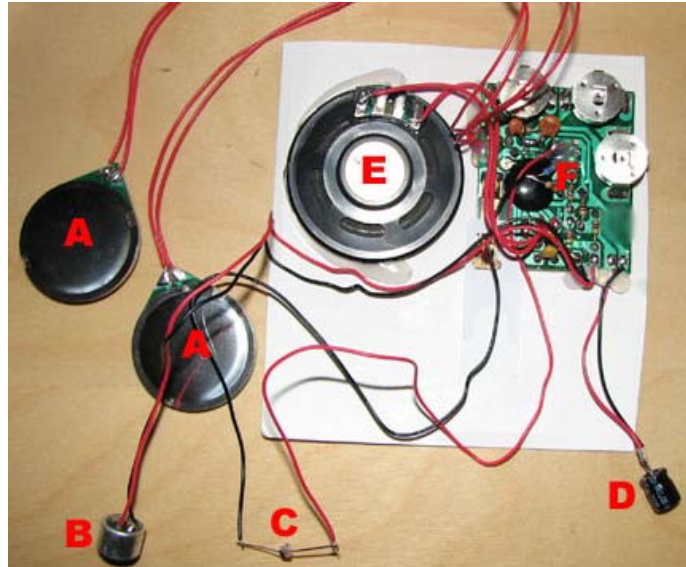

Step 3 – Recording: Press the two record buttons labeled "A" together until they click and the LED labeled "C" lights up. This indicates the module is recording. Speak into the microphone labeled "B". You will have 13 seconds of record time.

Step 4 – Playing: If it has not already been opened, pull the tab up that completes the circuit when the card opens. This is the switch on the card. Pressing this tab down will play the current sound on the card. See below.
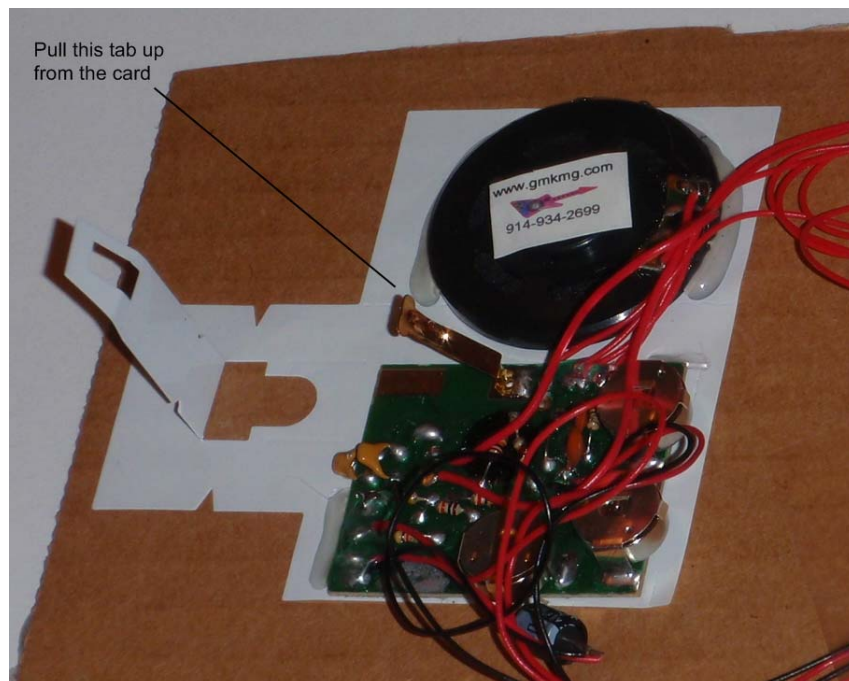
Step 5: Connect one wire with an alligator clip to the lower metal contact that is on the top of the circuit board. See alligator clip below.
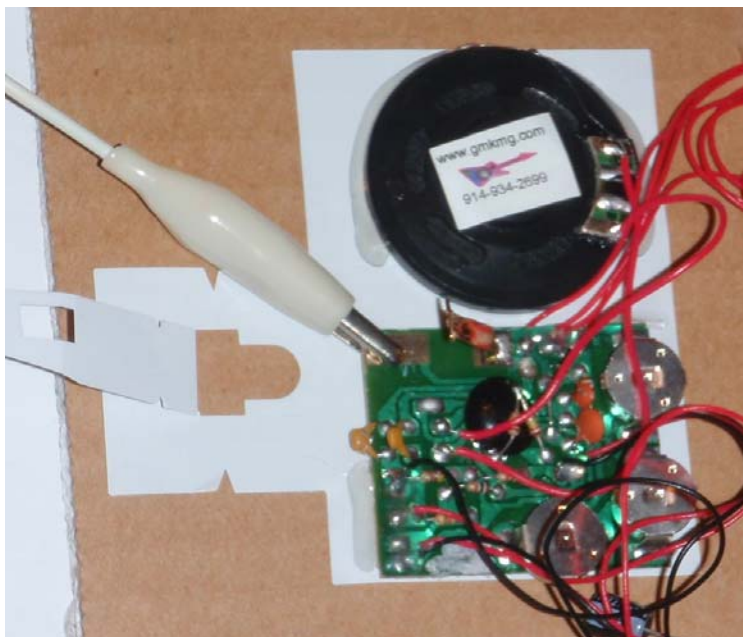
Step 6: Connect another wire with an alligator clip to the metal tab you pulled up from the board in step 4.
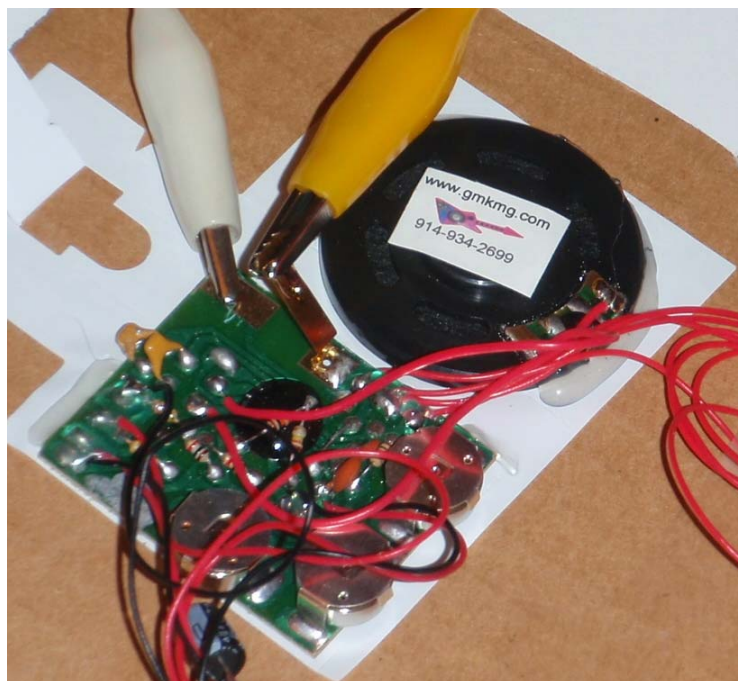
Step 7: Touch the ends of these two alligator clip wires together and the card will play because the circuit is completed.

Engineering Design Challenge
Option A: Silent Alarm

Engineering Design Problem:
Design an alarm system in which the burglar will not hear the alarm when the door opens, triggering your aluminum foil switch, but you will be notified wherever you are at the time.

Engineering Design Constraints and Specifications:
    a. Decide what your alarm is being used for.
    b. Record an appropriate warning for your alarm on the card module.

Describe what your alarm is protecting.

Follow these steps to build your alarm:

Step 1: Remove LED L1 from the receiver circuit.

Step 2: Insert one end of a 2" jumper wire where LED L1 was just removed. *(Hole J10)*

Step 3: Insert one end of another 2" jumper wire into the blue negative power rail *(Right blue rail).* There should now be two jumper wires sticking up out of the board.

Step 4: Connect the two alligator clip wires from the sound recording module to the receiver.

Step 5: When switch S1 on the transmitter circuit is closed, the sound recording module will play. Your next task is to figure out how to close that switch using the door trigger you created earlier.

**Engineering Design Challenge
Option B: Sounding the Alarm**

Engineering Design Problem:
Design an alarm system to warn a burglar that he/she has tripped the alarm and to tell them they should leave.

Engineering Design Constraints and Specifications:
   a. Decide what your alarm is being used for.
   b. Record an appropriate warning for your alarm on the card module.

Describe what your alarm is protecting.

Follow these steps to build your alarm:

Step 1: On the transmitter circuit, insert one end of a 2" jumper wire into the row containing pin 5 of the encoder chip on the transmitter circuit *(Hole G10)*

Step 2: Insert one end of another 2" jumper wire into the red positive power rail *(Left red rail).* There should now be two jumper wires sticking up out of the board.

Step 3: Connect the two alligator clip wires from the sound recording module to the receiver.

Step 4: Use the alligator clips to connect the two wires from the door trigger circuit to the two jumper wires that are sticking up.

Step 5: Remove switch S1 *(Pins in A3, A4, and A5).* The door trigger switch is replacing this.

At this point, when the door opens, the alarm will sound and the RF transmitter will turn on LED L1 warning you that someone has opened the door.

Explain how your RF wireless burglar alarm system works to warn you that somebody has opened the door. What are the major parts of your system?