

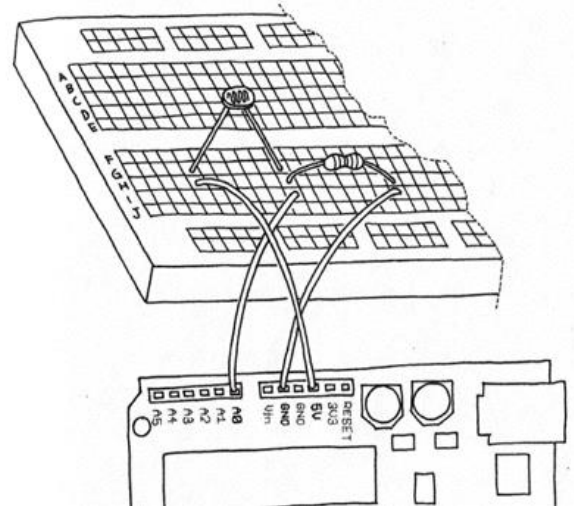
day92 Arduino theremin
Wednesday 5/8/24

Today we're going to make noises with the Arduino by creating a simple Theremin circuit. A Theremin is a device that makes strange sounds electronically. Ours will use the LDR to make different tones.

Part 1: Together

With your partner build two circuits on your breadboard:

1) On the breadboard, connect an LDR in series with a 10K resistor. Wire the free end of the LDR to 5V on the Arduino board, and wire the free end of the resistor to GND. Then wire the A0 pin on the Arduino board to the junction between the resistor and the LDR. See diagram to the right.



Next:

2) Connect a 270-ohm resistor in series with a speaker on the breadboard. Then wire the free end of the resistor to Arduino pin 9 with a long wire. Then wire the free end of the speaker to GND.

The program: open "theremin_starter.txt" from the Google Classroom, create a new Sketch, save it as day92. Put your name in a comment at the top.

This program uses one new command we haven't used before: `tone()`. Open the Arduino Reference page from the Help menu and look up `tone` to get a feel for what it will do.

Load your program, and you should immediately get a tone coming out of the speaker when the Arduino is connected to your computer. The tone should change when you change the light hitting the LDR. If this isn't happening, open the serial monitor to make sure that the LDR values are being read from pin A0 properly (they should go up and down as you uncover and cover your LDR...)

Have fun with the sounds, see how it works. This is called a Theremin, basically an obnoxious sound generator!

When you have this working, get me to check you and your partner off. This gives you 4 of today's 10 possible points.

Part 2 involves each person writing their own program that takes the process further. That's on the next page.

Part 2:

For part 2 each person must write their own program that goes further. You will share the one circuit, and trade it back and forth by plugging the Arduino into the correct computer when you want to test your own program.

For part 2, you choose what you are going to do per the notes below. You must do something substantially different from your partner or whoever you are sitting next to on both sides.

Ways to go further include, but are not limited to:

- Add code that changes the tone playing from the speakers even when you are not covering the LDR (you could use a for loop for example); make the LDR still have an effect, perhaps on the speed or timing between notes.
- Make your program play a short snippet of a recognizable song. Use [this web page](#) to get the frequencies for various notes.
- Use a series of for loops to make a siren or alarm sound sequence.
- If you have another great idea, run it by me.

Do not download someone else's program and try to convince me that you wrote it. I want YOU to write a program, not see if you can copy someone else's song off the Internet, as much fun as it would be to have your Arduino play the theme from Star Wars. (Please, program it to play that song if you want, but do it yourself, don't cheat by using someone else's work.)

Get me to check you off when you are done. Obviously you and your partner will need to share the circuit to test and debug your programs. Just switch the USB cable back and forth as necessary. When you plug the Arduino into your computer it will start running the last program that was uploaded to it; so after plugging it in don't forget to upload your program so that you are listening to YOUR creation instead of your partner's.

If you need to make the Arduino quiet to concentrate, just unplug the wire from pin 9 on the Arduino, or unplug the USB cable. It's best to leave the speaker plugged in to the breadboard because the speaker's leads are fragile. Please be careful with the speakers, they are easy to break, thanks.

If you finish with more than 30 minutes to go, you have a choice: either work on homework for another class or add more to your Arduino project.