



Singing plant. Make your plant sing with Arduino, touche and a gameduino

by [madshobye](#) on September 20, 2012

Table of Contents

Singing plant. Make your plant sing with Arduino, touche and a gameduino	1
Intro: Singing plant. Make your plant sing with Arduino, touche and a gameduino	2
Step 1: Components and tools	2
Step 2: Touche shield	4
Step 3: Making the TouchÃ© shield and the GameDuino play nice together.	4
Step 4: Connect the two shields and upload the code	5
Step 5: Visualizing the code and calibrating it with guino	6
Step 6: Creating an enclosure	6
Step 7: Drill a square hole for the Arduino usb cable	7
Step 8: Lasercut the acrylic plate	8
Step 9: Mount two buttons for max and min and mount the connectors.	8
Step 10: Connect the audio jack	9
Related Instructables	9
Advertisements	9

Intro: Singing plant. Make your plant sing with Arduino, touche and a gameduino

Making a plant sing has been a trick since the Theremin was invented. Here I am going to teach you how to do this with an Arduino board, a **gameduino** shield and a **the touch shield from my previous instructable**.

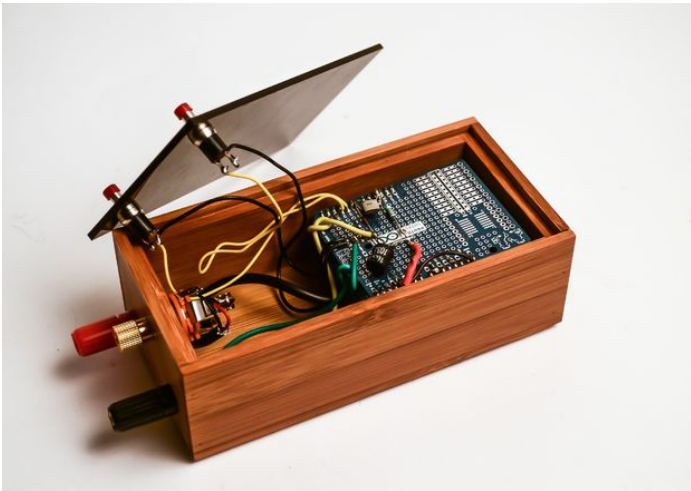
A short introduction to capacitance

If two objects are conductive you can measure the capacitance between them (e.g. objects like: metal, water, human bodies and plants). By connecting a capacitance sensor to a plant we can detect if people are touching it and convert the touch into sound. Normally you would do this with a theremin like interface.

With the introduction of the touché frequency principle by Disney Research lab we can now make a really stable solution that can run entirely on the Arduino platform. The Touché works on a similar principle as a normal theremin, but does a frequency sweep instead. By hooking the touché up to the plant we can measure the capacitive interaction and convert it into sound.

Credits:

The singing plant as an artistic project has been done with multiple people as a member of illutron. I will just credit a few key people who I have worked with: Åsmund Boye Kverneland, Nicolas Padfield, Thomas Jørgensen, Schack Lindemann, Thor Lentz, DZL, Vanessa Carpenter



Step 1: Components and tools

Components needed:

- Arduino
- Homemade touche shield (Instructable can be found [here](#))
- Gameduino (We are going to use it for sound).
- Two buttons.
- A couple of Alligator clips.
- Two banana connectors.
- Enclosure (I used a wooden box from <http://www.containerstore.com/welcome.htm>)

Components needed for the touche shield:

- Prototyping shield

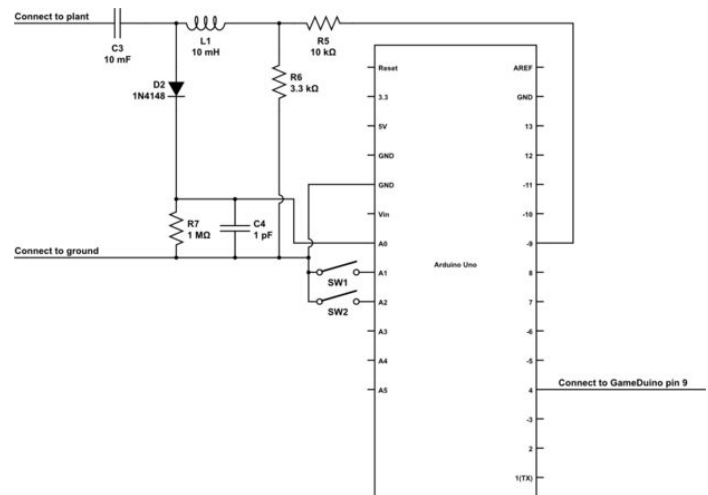
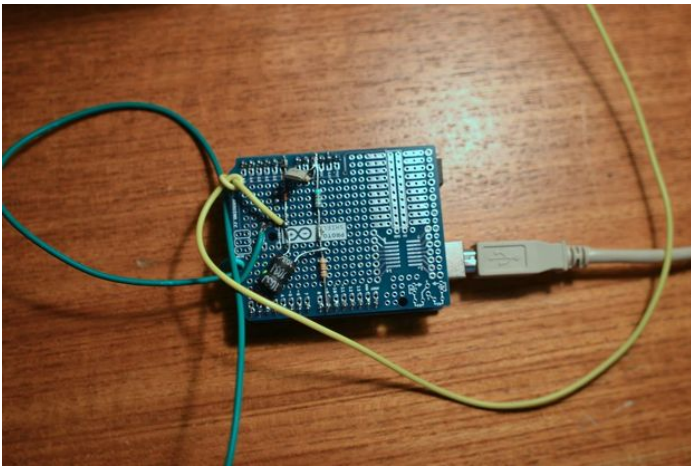
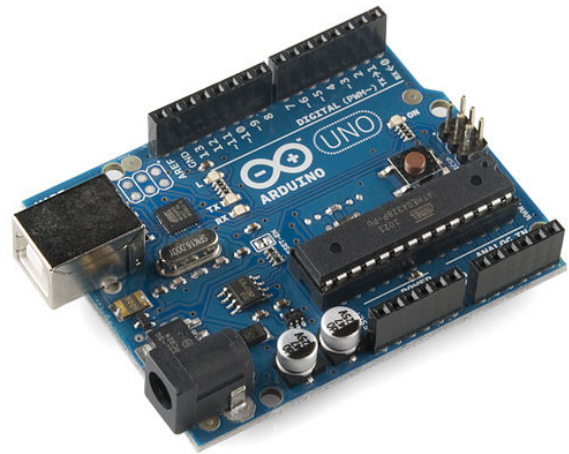
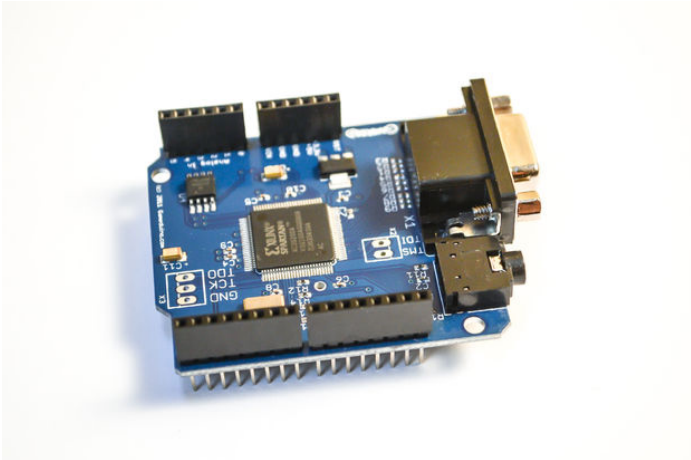
<http://www.instructables.com/id/Singing-plant-Make-your-plant-sing-with-Arduino/>

- Pin stripes
- Resister: 10k, 1MOhm, 3,3k
- Capacitor: 100pf, 10nf
- Diode: 1N4148 diode
- Coil / inductor: 10mH (cypax.dk part no: 07.055.0510)

Tools:

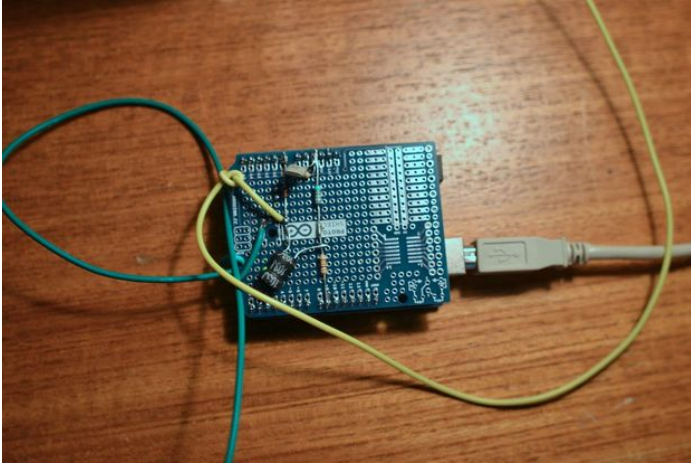
- Basic soldering tools.
- Wood working tools.

For the enclosure I lasercut an acrylic plate, but you could just as well use a piece of wood and cut it manually.



Step 2: Touche shield

We are going to use the same shield that we used for this instructable. For the touche shield and the gameduino to work together we need to do a little hack. Since the touche shield is using pin 9 for frequency generation and the gameduino uses pin 9 for the chip select. For now all you need to know is that you should not connect the wire to the pwm pin nine but let it hang loosely (at least you should be able to disconnect it again when you are done testing).



Step 3: Making the TouchÃ© shield and the GameDuino play nice together.

Since the touche shield and the Gameduino are both using pin 9, we need to make the GameDuino use pin 4 on the Arduino board and we need to connect the touche shield directly to pin 9 on the Arduino board.

Here are the steps:

- Bend pin nine on the gameduino out. Be aware that it will break if you bend it back and forth.
- Connect a wire from the bend out pin on the gameduino board to pin four on the Arduino board.
- Connect another wire from pin nine on the arduino to the pwm pin on the touch shield.

This is not an elegant solution, but it will work :)

For it to work we need to make sure the Gameduino library communicates properly on pin 4 instead of pin nine. I have included a customized library for that.

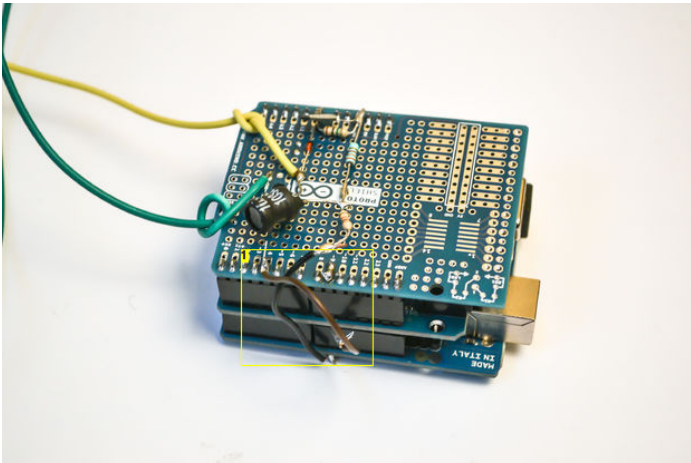


Image Notes

1. We need to route the gameduino pin 9 to pin 4 and need to connect the touch shield to pin 9 on the Arduino board



Image Notes

1. Bend pin nine on the gameduino out and attach at wire to it.

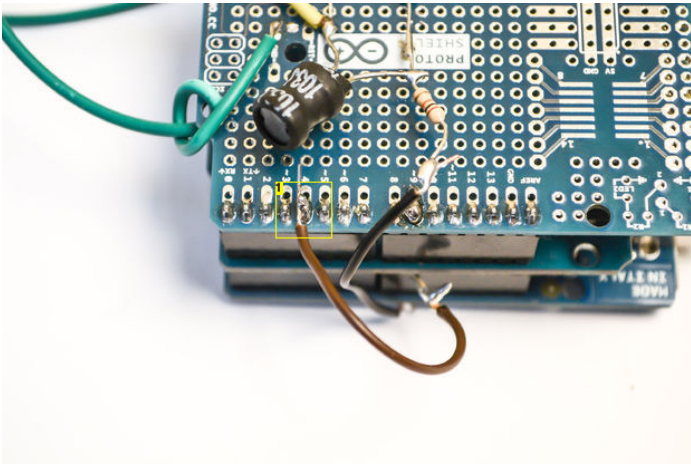


Image Notes

1. Connect the wire to pin 4

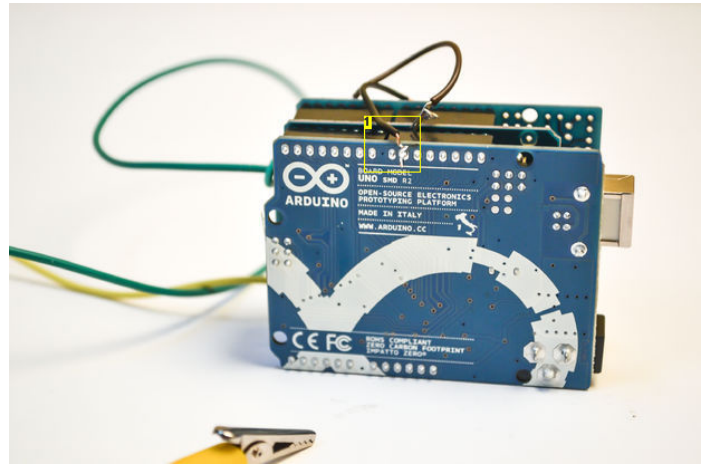


Image Notes

1. Connect at wire to pin nine on the Arduino.

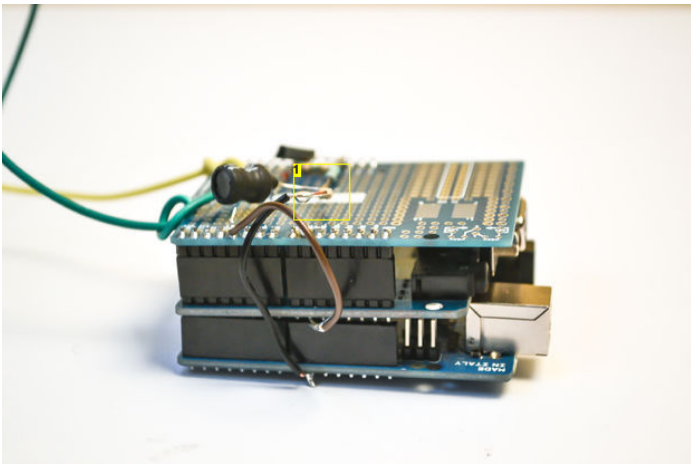


Image Notes

1. Connect it directly to the touch wire that would normally be connected to pin nine.

Step 4: Connect the two shields and upload the code

There are lots of tutorials which already explains how to program an Arduino and they do a much better job than I could. So I will just give you a couple of links:

- <http://arduino.cc/en/Guide/HomePage>
- http://www.youtube.com/watch?v=4HqXAmV_Ock
- <http://www.ladyada.net/learn/arduino/lesson1.html>

The 3 things that usually cause trouble:

- On windows you have to install the proper drivers (sometimes also on mac).
- Remember to select the right serial port in the gui.
- Remember to select the right board in the gui.

Below are the simplified steps to uploading the code to your Arduino board:

- Download Arduino: www.arduino.cc
- Connect the Arduino board to the computer via usb.
- Download the code from here.
- Move the libraries in the libraries folder into your Arduino libraries folder. If you do not know how to this please refer to this tutorial.
- Upload the code to the Arduino board.



Step 5: Visualizing the code and calibrating it with guino

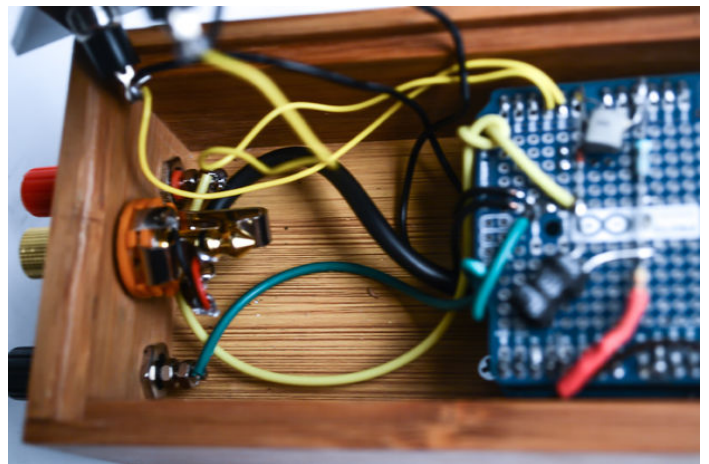
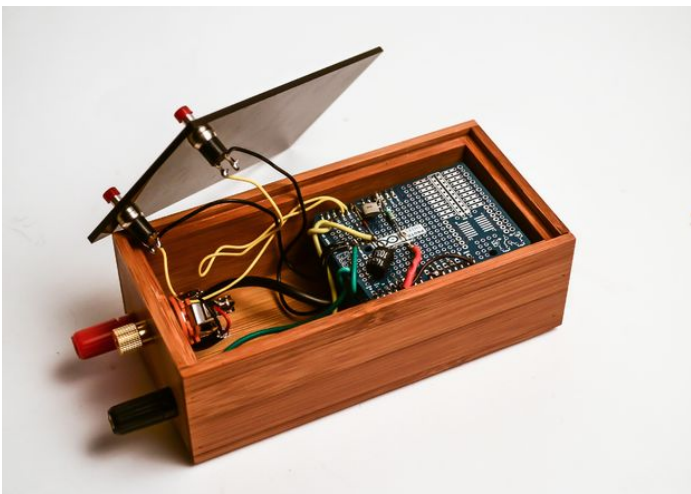
We are using Guino to visualize the code. Guino is a new program to visualize data coming from the Arduino board and it enables you to calibrate it on the fly.

You can find the the Instructable here on how to use it. It is really simple to get up and running and it enables you to control some of the internal values. Download the program from here and run the program (you have already installed the libraries in the previous steps).



Step 6: Creating an enclosure

The following steps are optional. It will work just fine without. I choose to use a wooden box from the container store and modify it for my needs. Further I lasercut and acrylic plate to put on top of it.





Step 7: Drill a square hole for the Arduino usb cable

Drilling a square hole in a wooden box has proven to be a tricky task. I have yet to find the perfect solution for it. My solution in this case was to use a drill press, a tiny drill bit and a larger drill bit.

Start out by marking with a pen the approximate area where the hole should be. Then drill many, many tiny holes inside this area. Since it can be tricky to get the precise placement of the square hole I usually compare it to the Arduino board to see what areas I am missing. When you have drilled enough holes for the wood to be porous then use the larger drill bit to remove all the loose bits.

I would love to hear if anybody has a better way to do this?



Step 8: Lasercut the acrylic plate

I used a laser cutter to cut the acrylic plate to put on top. You can download the diagram [here](#) .



Step 9: Mount two buttons for max and min and mount the connectors.

The buttons for max and min should be connected to analog 1 and analog 2. Since we are using an internal pull-up resistor the other end of the buttons should go to ground. You can leave out this step and use the Guino interface instead for calibrating the plant.



Step 10: Connect the audio jack

I used an stereo audio cable to wire the jack connector to the Gameduino. You can of course use the jack connector directly mounted on the Gameduino shield.

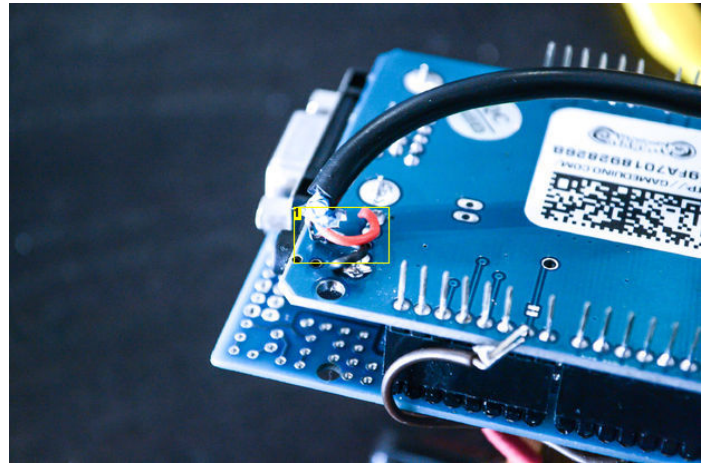
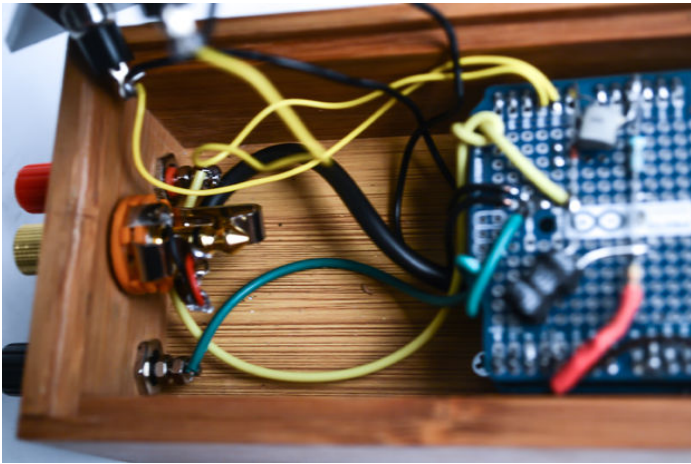


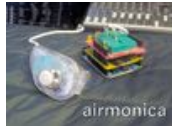
Image Notes

1. I soldered an audio cable directly to the Gameduino. You can of course just use the audio connector on the Gameduino

Related Instructables



Matrix sound machine: Generative music with a particle system
by madshobye



airmonica - a free-air musical instrument by flashular



Fairly Simple Simon - the evolution of an Arduino game
by thedod



Recycle christmas card as digital recorder module by gtoal



How To Sing in Rock Band/Guitar Hero by The Landon



Intro to Arduino
by randofa