Arduino MIDI, Drum Machine Costume

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Idea: Create a functioning drum machine costume. Plan is to have 4 piezo sensors and a potentiometer to change the sounds on the “drum pads”.

Part List

* Arduino Uno
* iPhone 4S
* MIDI to iPhone (30-pin) cable
* 4 Piezo sensors
* 4 1 Mohm resistors
* 4 10 Kohm resistors
* 1 220 ohm resistor
* 1 female MIDI jack
* 1 portable Bluetooth speaker
* 1 Breadboard
* ½” thick foam padding
* 1 10Kohm linear potentiometer
* 1 portable battery to power the Arduino
* Cat5 or Cat6 cable
* Stranded and solid core wire

Tools

* Soldering iron and solder
* Glue gun
* Shrink tubing
* Tape

Notes

* Able to transmit over either the Tx pin with the Serial.Write() command, or other digital pins using the SoftwareSerial module. Observed the bits on the oscilloscope, need to make sure you’re triggering properly to catch and view the bits as they go by.
  + Also, the Tx LED does not light up when the Arduino is not connected over serial USB
* It appears that the serial Tx lines sit at 5V when not transmitting.
  + What’s the term for this? 1 = 0V, 0 = 5V?
* Bluetooth audio output from Garageband on iPhone is possible, but must set Bluetooth as an audio output inside the Garageband app
* I was fairly cautious and moved slowly throughout the whole process. Did lots of thorough testing of each stage along the way, but I could have moved more quickly had I been a little less careful/cautious/deliberate.
* Important to take photos and notes as you go!
* iOS is impressively friendly with MIDI. All I had to do was plug the MIDI to 30-pin connector into the phone and it read the MIDI signals from Arduino perfectly.
* Make sure you have time to test out your Arduino code before wearing the costume out! Once you unplug from the computer you can’t reprogram.

Hardware Issues

* 9V battery did not power on the Arduino
* Arduino appears to be running old version of code when ran off power, but runs the correct code when powered off of USB and connected to computer
  + Issue seems to be related to power. Different, more powerful going straight into the Vin pin at about 8v works perfectly. Hoping I can find a battery solution.
    - 4 AA’s in series works to power on Arduino and run the code with no lag (like I was seeing before w/ the faulty wall wart. Great!)

Software Issues

* Must be very careful with arrays in Arduino code. Make sure you’re pre-allocating everything very specifically.
* Ohmergerd, remember to change the baudrate from 9600 to 31250 when going from printing to Serial to MIDI communication

Costume Issues

* Hot glue works very well for gluing the foam to the t-shirt, but it bleeds through and sticks on the other side. Should have put cardboard inside to prevent that
* Initial placement of the foam pads was too high up on the chest. Produced a look I did not intend…

Thoughts from first demo

* In a loud setting, just make all note velocities 127, don’t bother with intensity control
* It would be great to be able to unplug the shirt from the Arduino box
* Shirt was probably too tight. Would have been better to get a larger shirt to accommodate the foam pads
* Bluetooth is cool, but the lag is kind of annoying, especially if playing along to music
* The bass kick sound just doesn’t come through well enough from the little Bluetooth speaker
* Most important: Make sure the notes are triggered reliably and with little latency. There must always be an obvious connection between each hit and a sound generated. Costume is less impressive if there is not an obvious response for each hit