OttO, The Generative Critter

An MFA Thesis Project by Grant Bouvier

Full documentation available at
www.grantbouvier.com/devices/otto

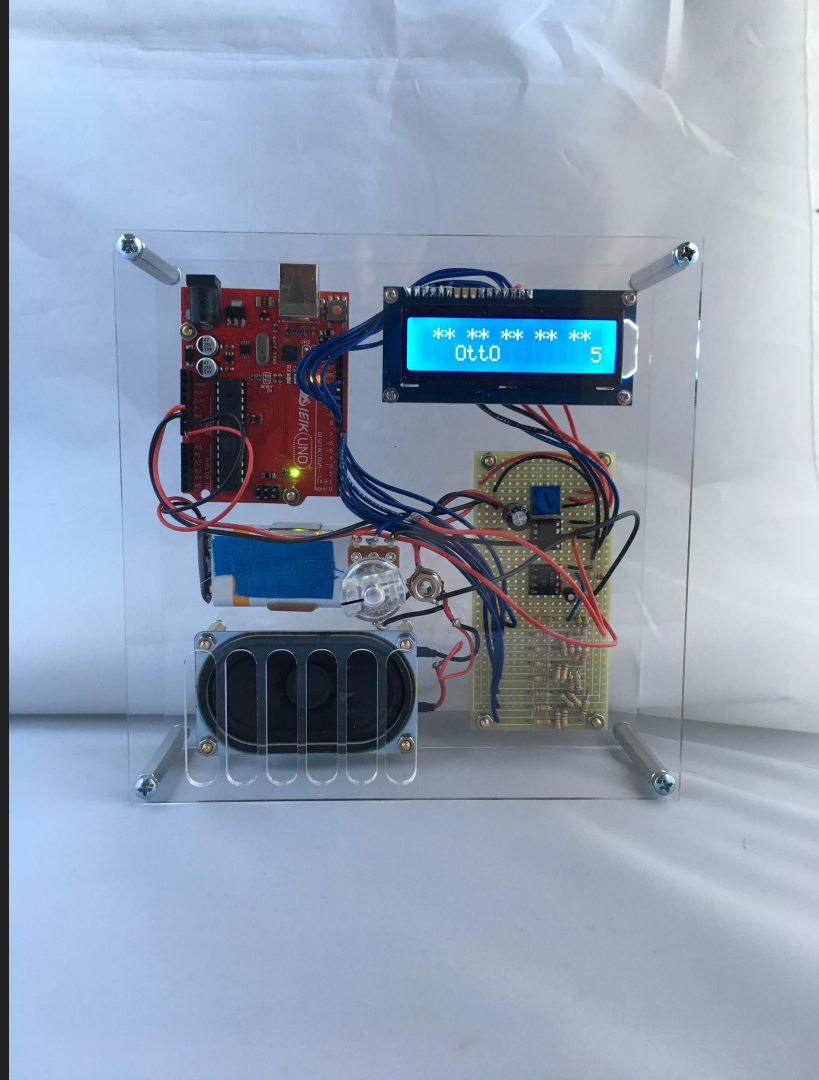
This is OttO -

For a few short demonstrations of OttO:

Demo #1 (dry)

Demo #2 (with *effects!*)

Firmware 1.2 is also available on github.



What is OttO?

- OttO is a generative music composition and open source hardware platform for generative music development all in one package.

- Designed around free software tools and affordable parts available off the shelf, the objective of OttO is to create an accessible entry point to generative music for listeners and artists alike

And what is generative music?

- Generative music is a vague term, but can be defined as music that is created through evolving processes over time. These processes can be highly chaotic or subtle, and are often governed by material or conceptual systems and laws.

- Think of a wind chime

Why does the world need OttO?

- OttO addresses two main issues facing generative music listeners and composers.

- #1 - GM typically relies on expensive software and higher end computers to be experienced or created. Cheap and free tools that exist tend to be difficult to use.
- #2 - GM is only truly generative when experienced live. Recordings of generative music cease to capture the essence of generativity.

OttO - Big things in a small package

- OttO is highly affordable
- OttO is DIY and open source
- OttO is genuinely generative
- OttO is fun
- Let’s democratize generative music

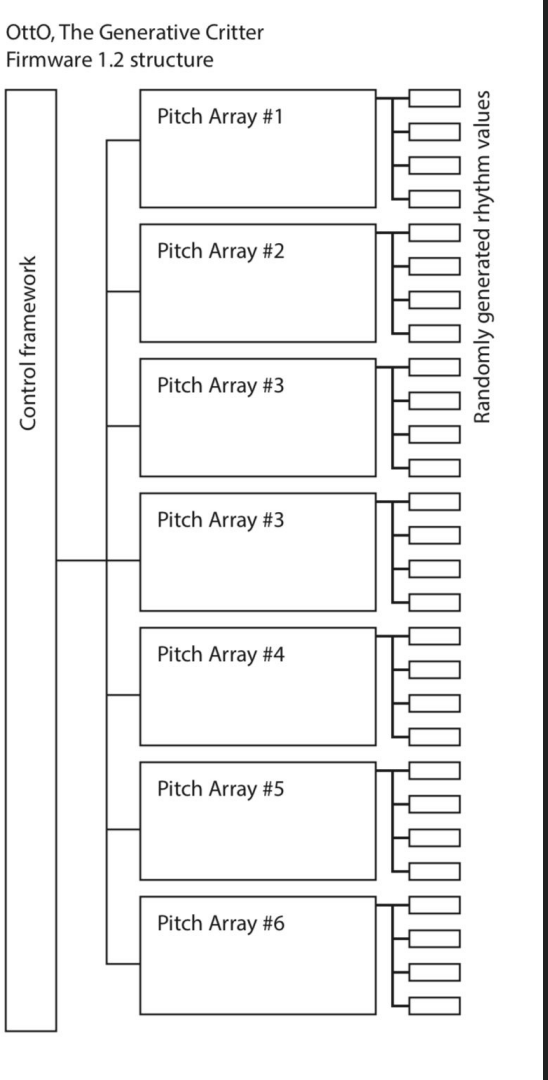
Tech Specs. - Firmware 1.2

OttO's brain is an Arduino Uno microcontroller and the Arduino IDE software is used to program it.

Firmware 1.2 uses the native Arduino random() function to determine 1 of 6 pitch arrays to access.

These arrays have set pitch values that are then also selected at random to be played.

4 rhythm values are determined randomly within each array (no array lookup used).



Firmware 1.2 continued...

This iteration of OttO firmware uses electrostatic charge on analog input pin #1 to seed the random() function, allowing for more truly random generative process to occur.

Pitch arrays serve as distribution tables and can be manipulated to encourage certain tendencies in the composition.

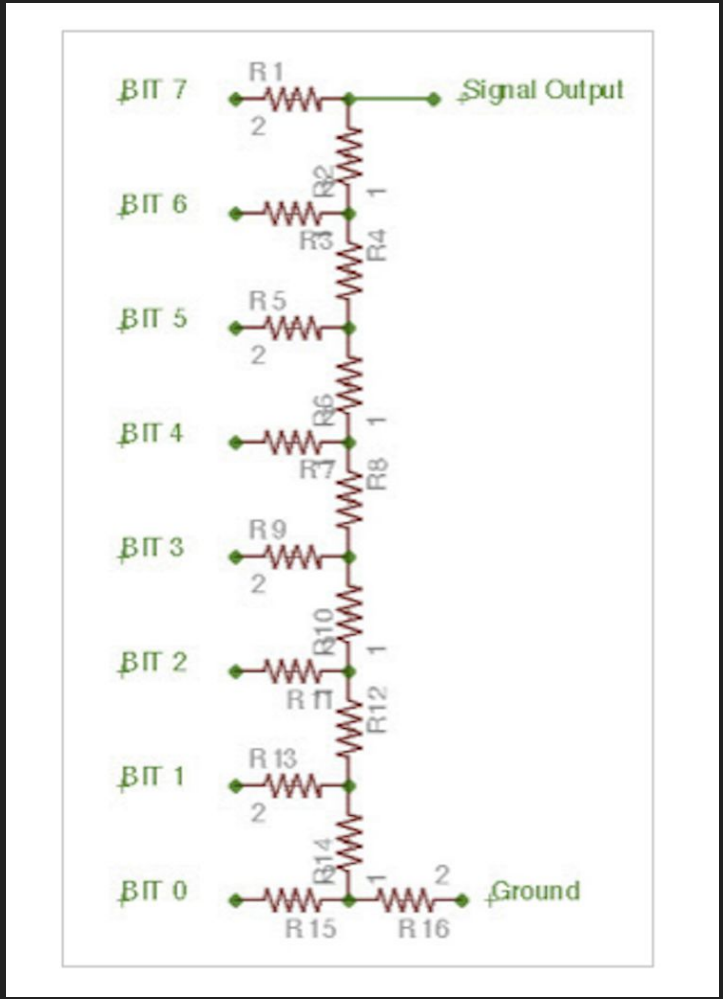
While programmed specifically for the Arduino Uno, Firmware 1.2 can be ported to other microcontroller boards.

Audio Output - R2R Ladder

Firmware 1.2 uses a simple resistor ladder 8-bit digital to analog converter to produces an sawtooth waveform output.

This DIY DAC can be built using only 1 value of resistor (10k ohm used in OttO).

Other complex wave shapes can be created.



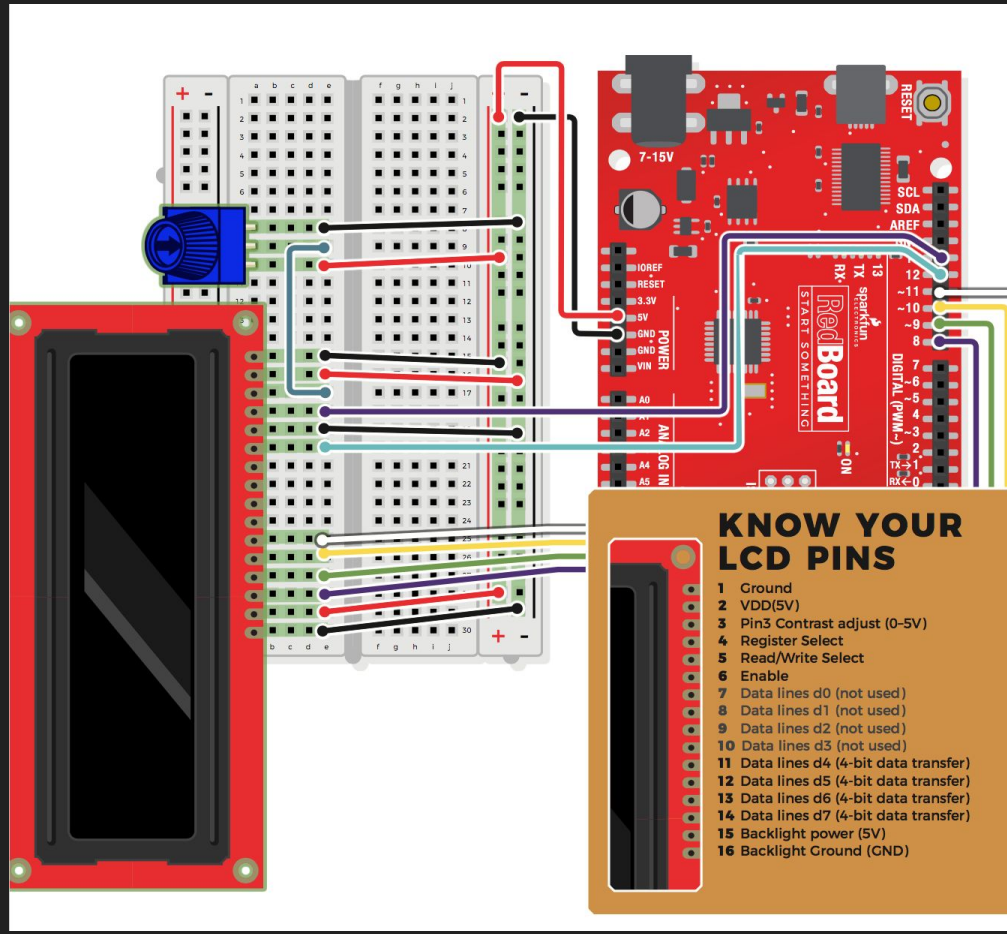
The LCD Screen

OttO has a native LCD for programming text and animations.

Extremely useful for debugging and testing firmware

Firmware 1.2 uses the SparkFun Inventor's Kit implementation of a basic LCD (chapter 4).

LiquidCrystal.h library used in 1.2



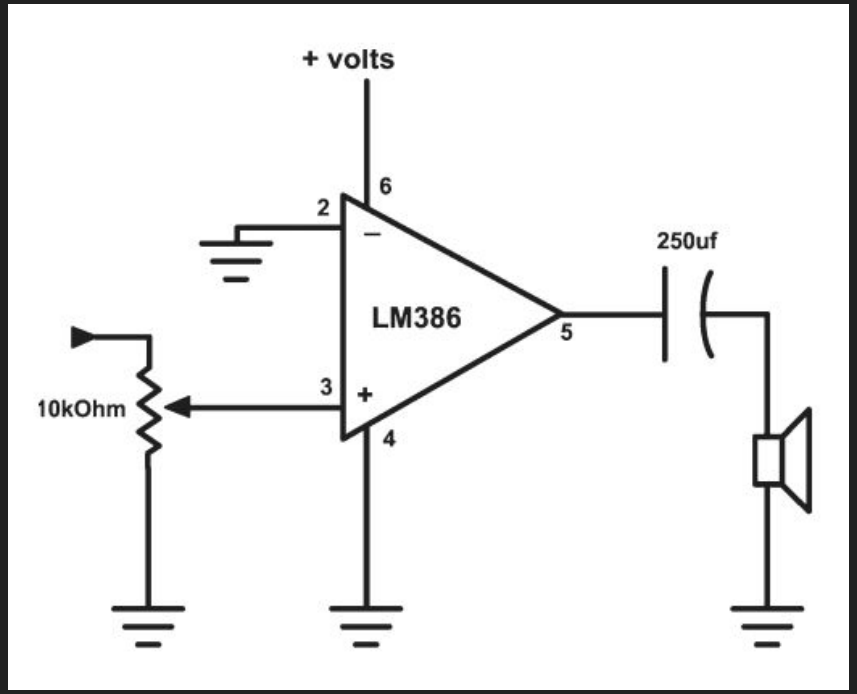
The Amplifier

The cheap and robust LM386 amp IC is used to power OttO's built in speaker.

The design is taken from Nicolas Collins' *Handmade Electronic Music* (2009). Chapter 27 (pg. 247)

Can be used with a variety of speakers (impedances between 2 - 8 ohms, less than 10 watts ideal)

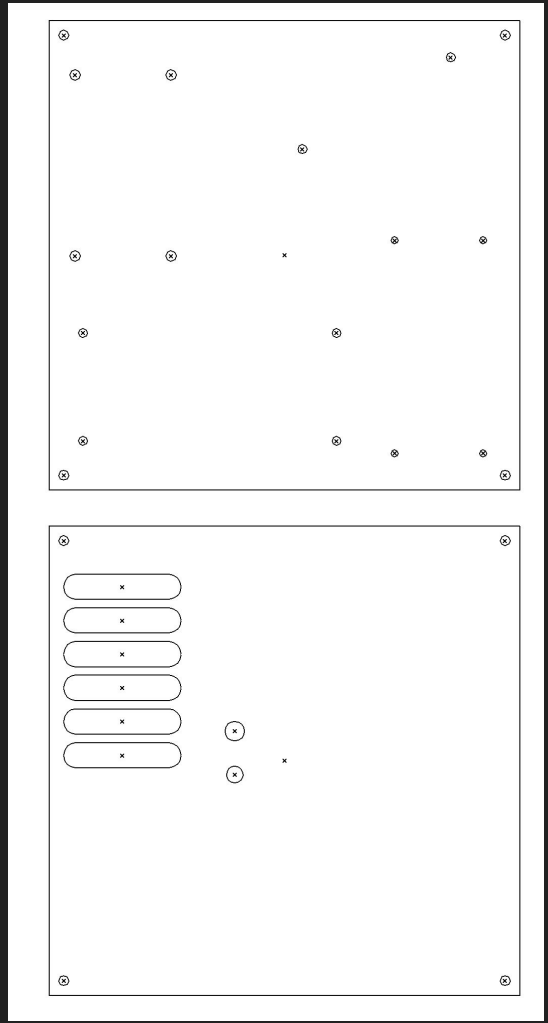
Also provides a 3.5mm mono output.



The Enclosure

Made from laser cut acrylic, the enclosure is a ‘sandwich’ style case measuring approximately 6.5 inches x 6.5 inches with 2 inch standoffs holding it together

All parts are mounted to the back panel for ease of assembly.



Conclusion -

OttO with firmware 1.2 is a prototype. Efforts are being made to create a second prototype that include a PCB, smaller footprint, improved enclosure, better amplifier, and expanded generative capabilities.

All documentation is available at www.grantbouvier.com/devices/otto

Further questions may be directed at grantbouvier@gmail.com

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