Arduino for Music Making
TROLL8 µSynth / µMidiController

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Background Arduino

- Aims to provide a low cost, easy way for novices and professionals to create devices that interact with environment by sensors and actuators using micro controllers
- Examples intended for beginner hobbyists including simple robots, thermostats, motion detectors, automatization
- Thesis work of Barragán in 2004, Ivrea, Italy → Wiring environment
- 2005 Banzi et al. forked Arduino, name of Bar Arduin of Ivrea
- 2008 Arduino LLC founded
- 2016 > 1M boards in users hands

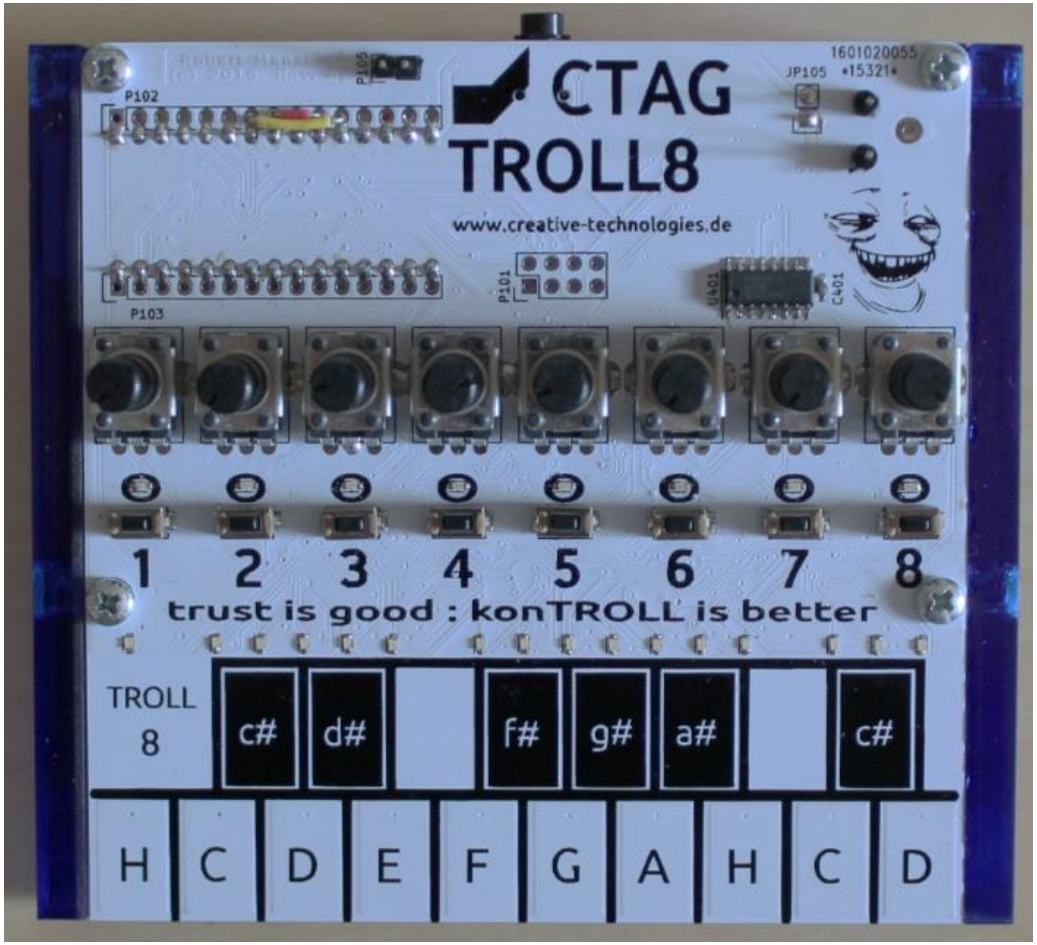
Arduino for Music Making

- Many Arduino DIY projects for music making exist
  - Minty Synth http://mintysynth.com/
  - Bleep Drum http://bleeplabs.com/
  - MicroWaveSampler http://www.dogenigt.com/2013/10/the-microwavesampler_6.html
  - …

Arduino for Music Making

- Mozzi, a library for algorithmic music, sonification of sensors, on small and super cheap Arduinos
- http://sensorium.github.io/Mozzi/
- Contains basic blocks such as filters, delays, envelops, sample grains, sensors access, audio i/o (PWM and DAC), sequencer control etc.

TROLL8 –
Trust is good, konTROLL is better



TROLL8 – Hardware

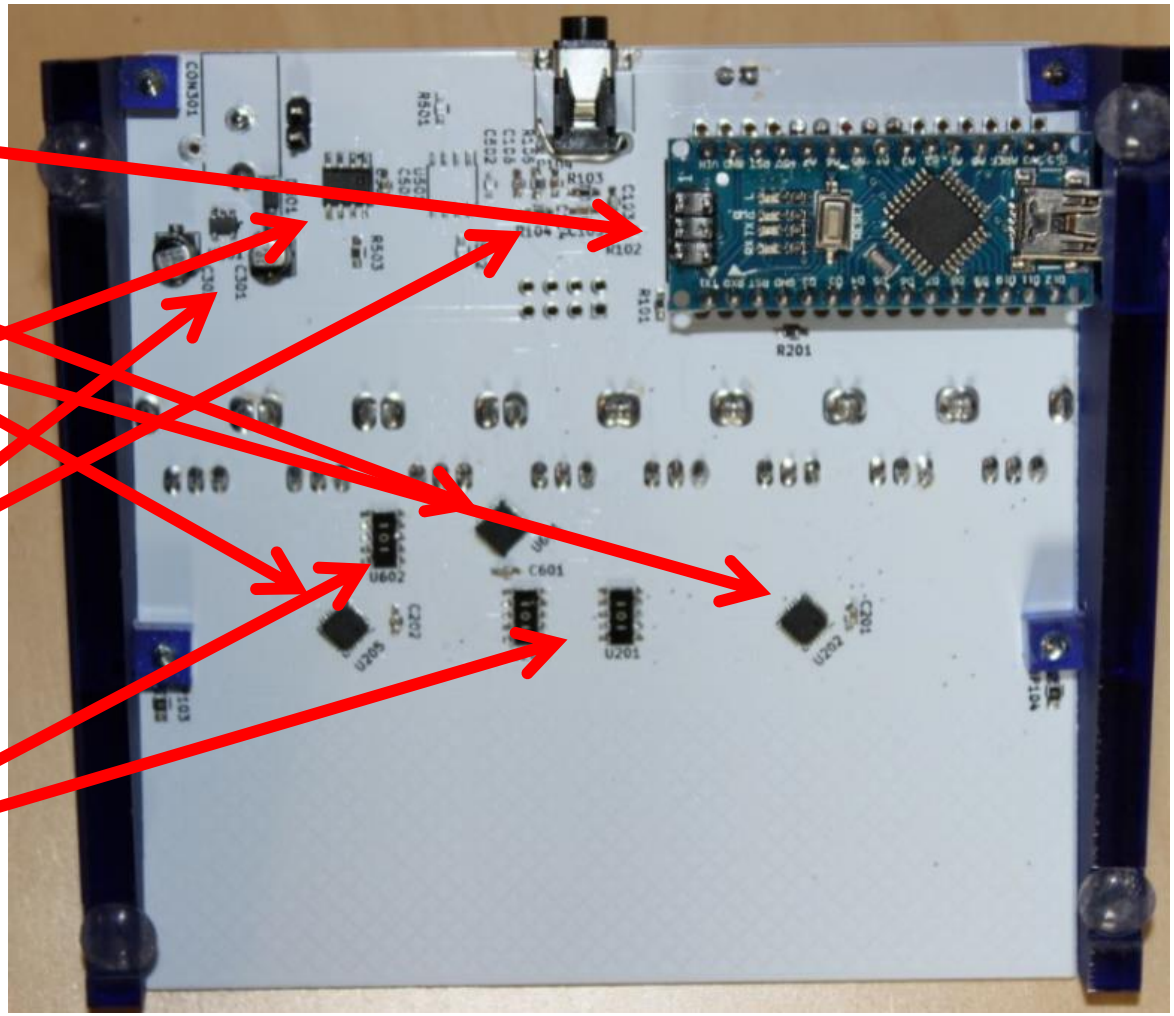
- Arduino with Mozzi for general control
- SPI bus with mux for periphery access
- 8-channel ADC to access potentiometer values
- 16-channel GPIO extension (8 buttons, 8 LEDs)
- 16-channel capacitive touch for keyboard
- Serial SRAM for longer delay efx / reverb
- Serial FLASH for larger sample rom

TROLL8 – Hardware

- Arduino Nano (or clone)
- Microchip MCP3208 SAR 12-bit ADC
- Microchip MCP23S18 16-bit IO expander with open drain outs
- Microchip CAP1188 8-channel cap sense with LED drivers
- Microchip 23A1024 1Mbit SRAM
- Microchip 5ST25VF 1Mbit FLASH

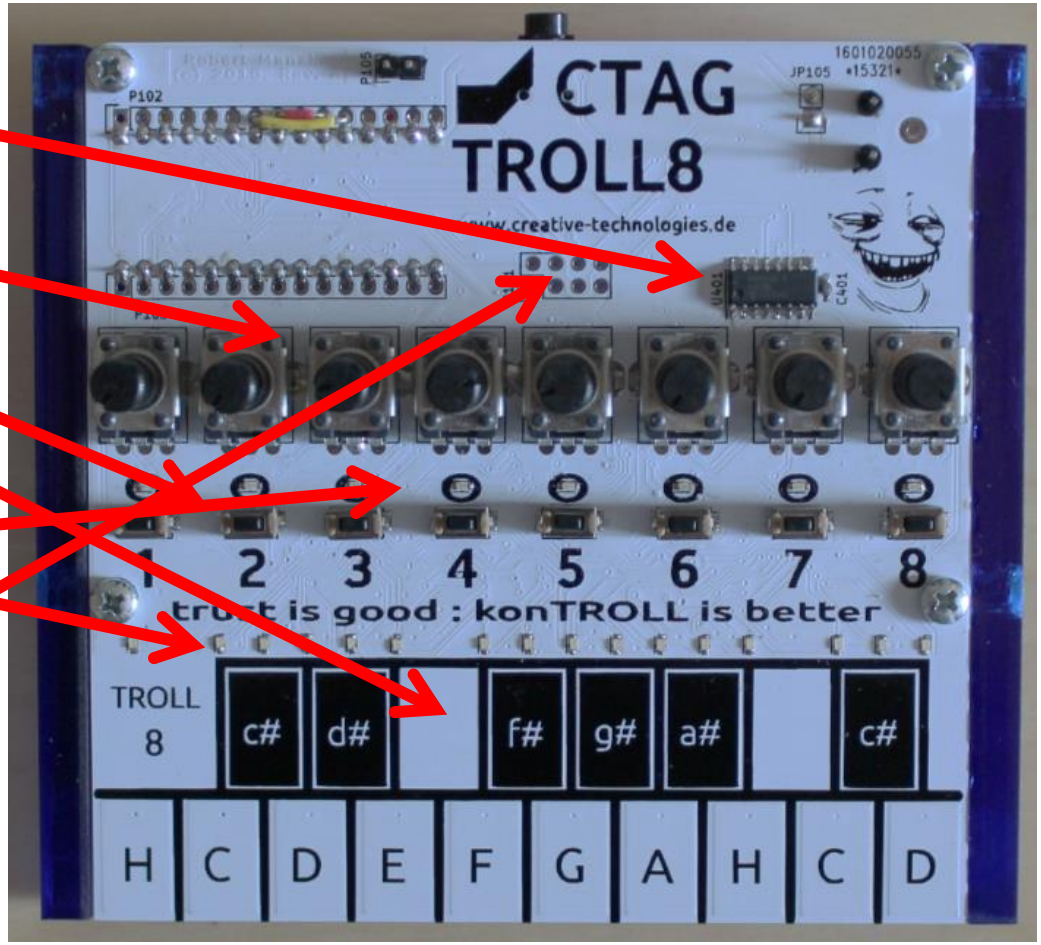
TROLL8 – Hardware

- Arduino
- GPIO
- Cap Sense
- SRAM
- PWM Filter
- Power
- Resistor Arrays (LEDs)



TROLL8 – Hardware

- ADC
- 8 Potis
- 8 Buttons
- 16 Touch Keys
- 24 LEDs
- SPI Header



TROLL8 – PCB Design

- 2-Layer PCB (low cost, standard 10x10cm²)
- Design with KiCad, Open Source EDA SW
- http://kicad-pcb.org/

TROLL8 – Software

- Example projects running with Mozzi
  - Velocity sensitive ePiano (using dC/dt)
  - Step Sequencer
  - Drum Machine
  - Midi Controller
    (with http://projectgus.github.io/hairless-midiserial/)
  - Sample Player
  - Synth
  - …

Outlook

- Open Source TROLL8
- Possibly build educational platform
- Develop Eurorack modules

- Visit project web-page at http://www.creative-technologies.de

Thanks!