USB-Midi-Controller Workshop

Schedule

- Presentation
  - MIDI
  - Applications
  - Signalflow
  - Electronics Basics
  - Programming
  - Mapping in Software
  - Examples: Layouts, Cases
- Hacking

MIDI

- Protocol for Musical Information
  - Note on / Note off
  - Controllchange
- Hardwarespecification
  - MIDI
  - USB-MIDI
  - USB-Serial with Converter

Applications

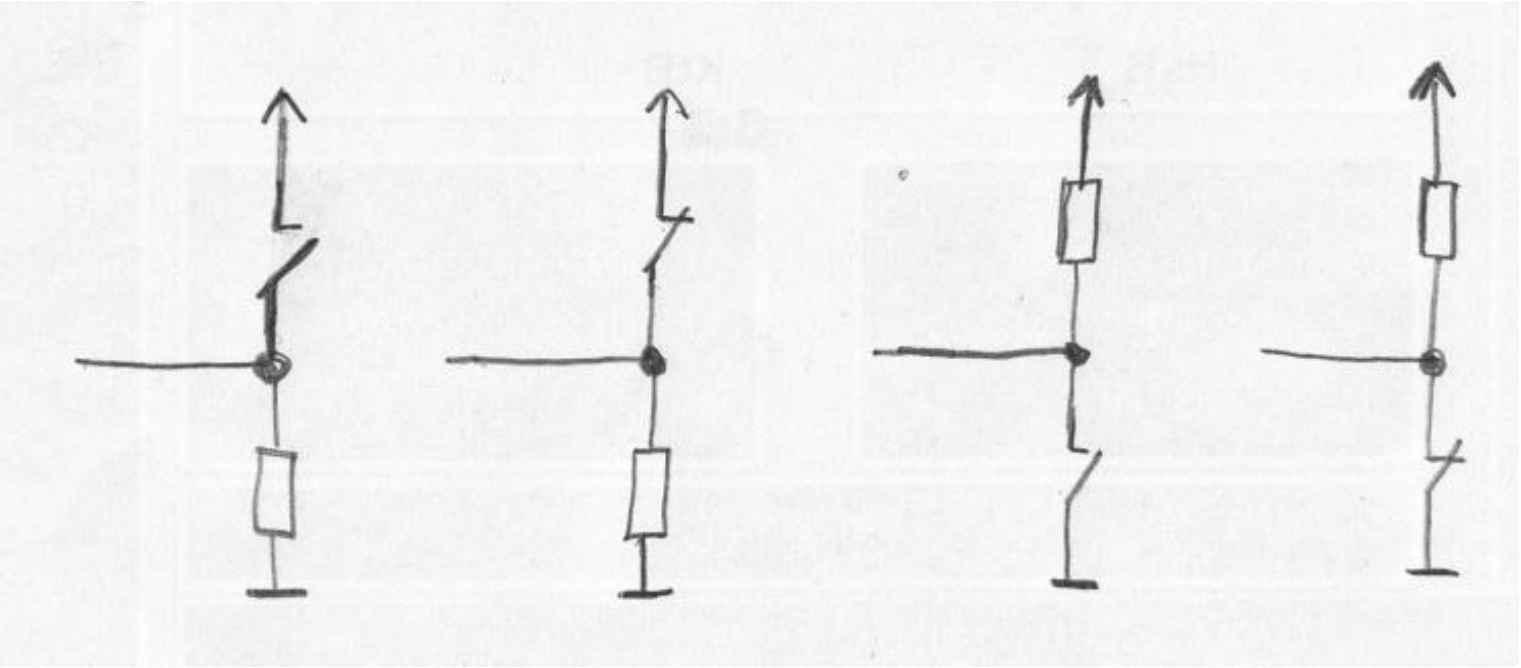
- DJ
- VJ
- Musicplayer
- ???

Signalflow

1. Detect Input with Arduino
2. Preprocessing in Arduino (Debounce etc.)
   - SerialMIDIElements-Library
3. Send MIDI-Data via USB-Serial
   - SerialMIDIElements-Library
4. Receive MIDI-Data at PC and convert to MIDI-Message for the Music-Software
   - Linux/Mac: Hairless MIDI
   - Linux: ttymidi
   - Windows: Hairless MIDI + LoopBe Virtual Midi

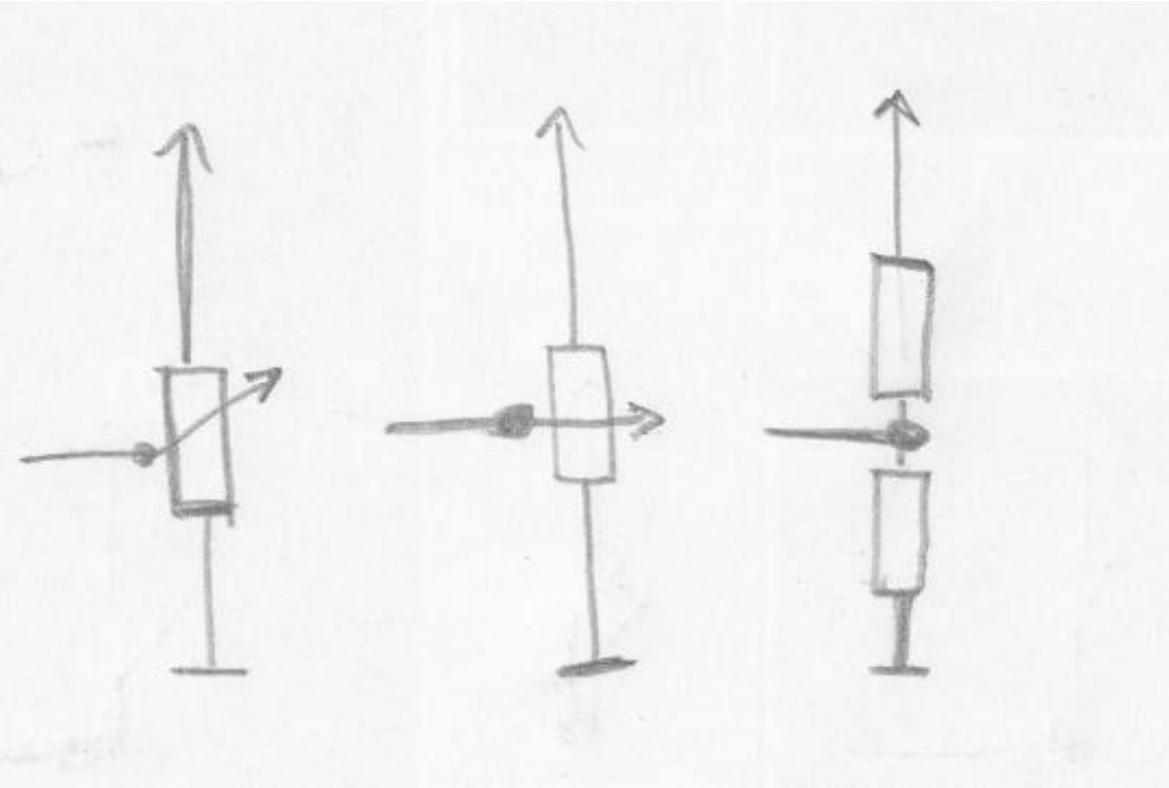
Electronics

- Buttons



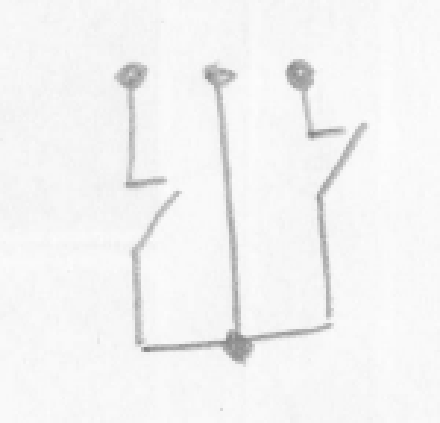
Electronics

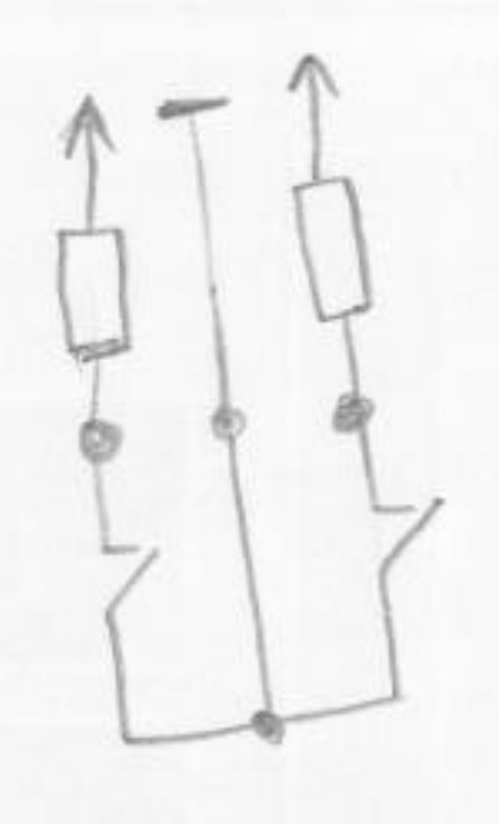
- Potentiometers



Electronics

- Encoders

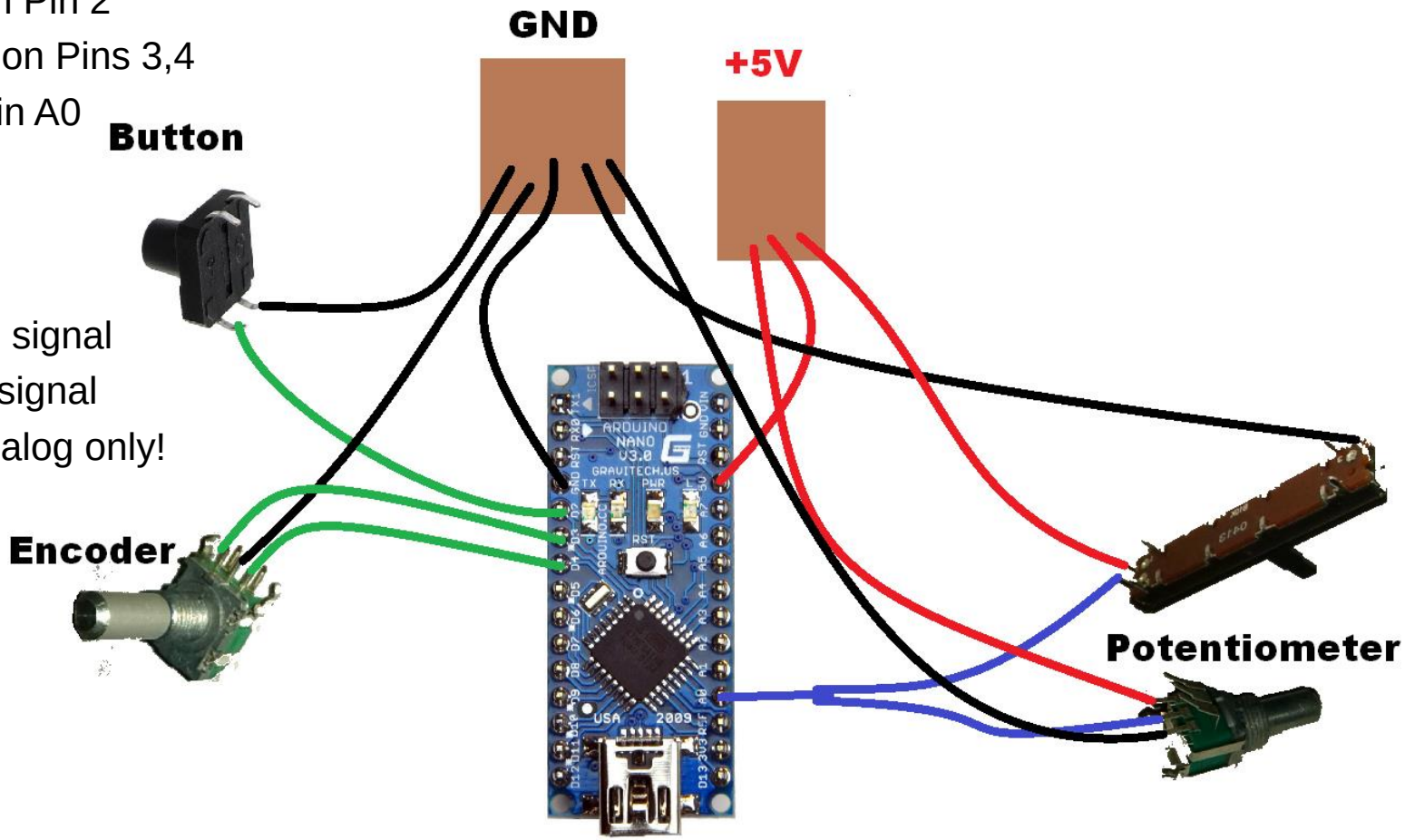




Electronics

- Basic-Circuit:
  - Button on Pin 2
  - Encoder on Pins 3,4
  - Pot on Pin A0

Green digital signal
Blue analog signal
(A6 & A7) analog only!



Programming

- SerialMIDIElements-Library
  - Classes which handle everything
  - Buttons, Potentiometers, Encoders
- Just three steps needed:
  1. Include MIDIElementsFSA header
  2. Setup a Button/Pot/Encoder
  3. Read specific Button/Pot/Encoder in Loop

Programming

```
#include <SerialMIDIElements.h>

boolean debug       = false;     // print to serial instead of midi
boolean secondary   = false;     // disabled secondary midi messages
int     midiChannel = 1;         // midi channel number

// setup a button on Arduino-pin 2 on for ControlChange 1
Button        but1(2,    midiChannel,1,secondary,debug);
// setup a Encoder on Arduino-pin 6 and 7 for ControlChange 11
MIDIEncoder   enc1(3,4,  midiChannel,11,secondary, debug);
// setup a Potentiometer on Arduino-pin analog0 on for ControlChange 21
Potentiometer pot1(A0,   midiChannel,21,secondary,debug);

void setup(){
  Serial.begin(115200);
}

void loop(){
  // add here all the input component reads
  but1.read();
  enc1.read();
  pot1.read(); // read knob and send midi messages

}
```

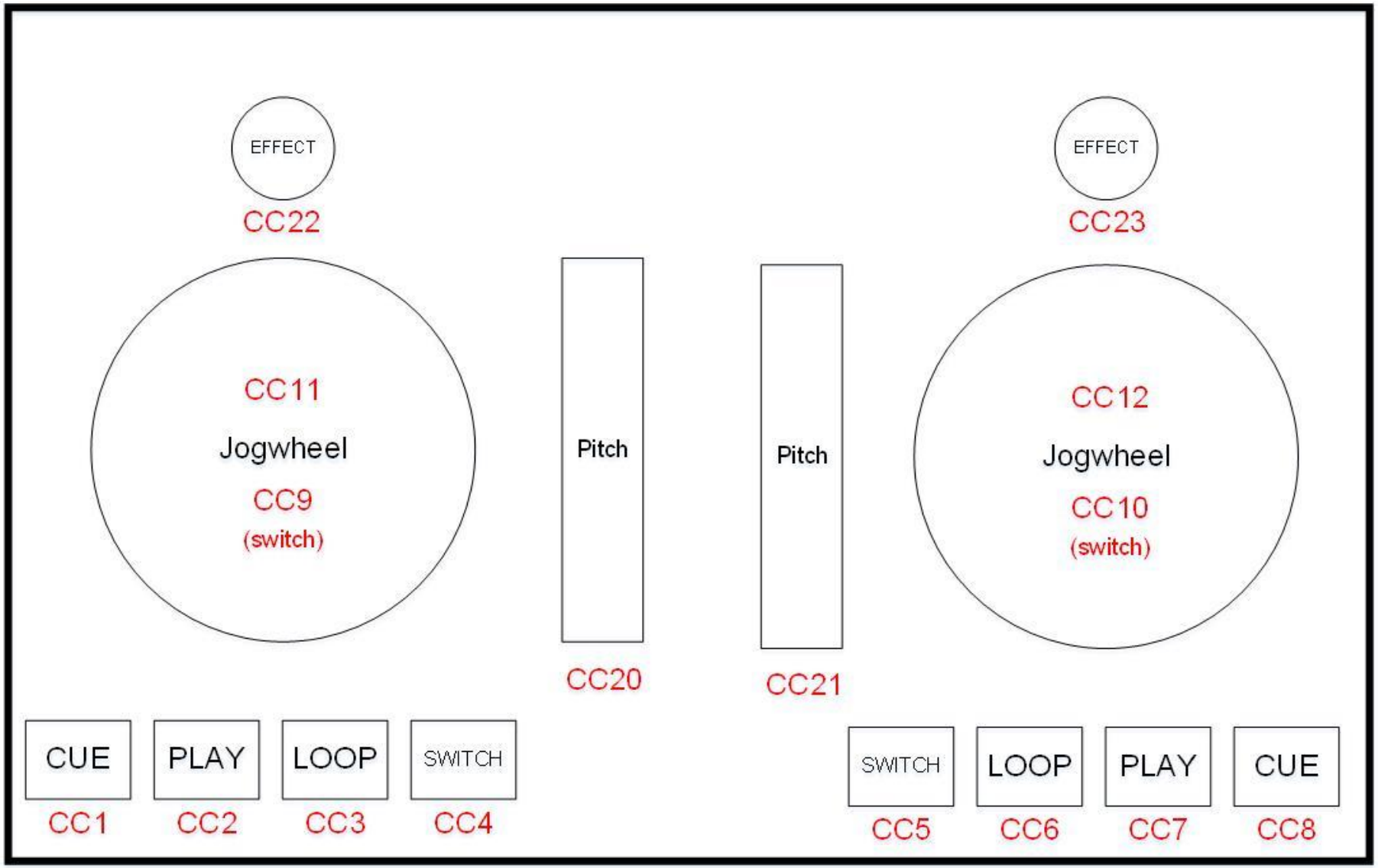
Mapping

- Ableton
  - Use Midi-Map Button

- Traktor
  - Mapping in „Controller Manager“

- Mixxx
  - Learning-Assistant in Controller-Options

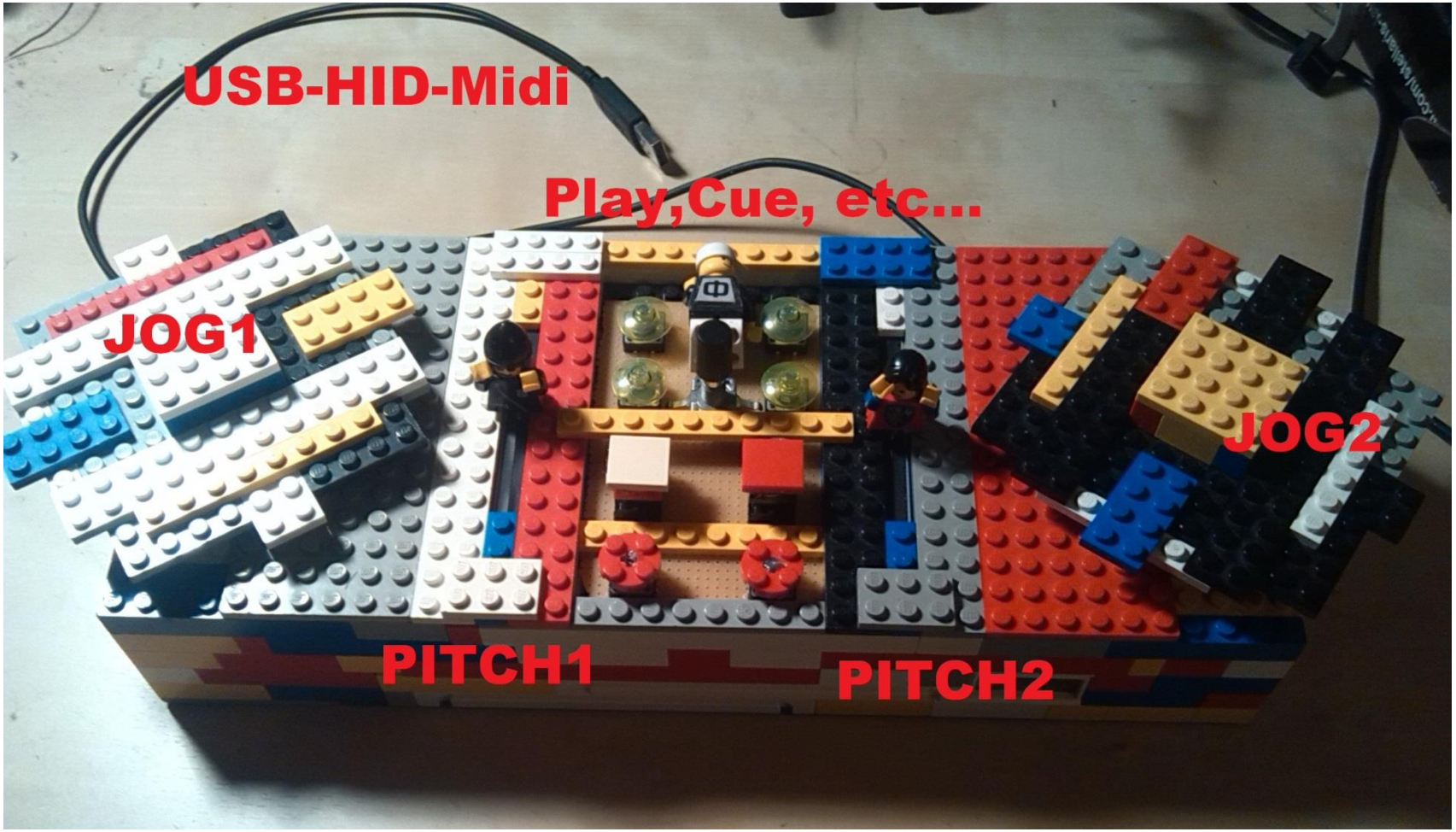
What could i build with the kit?



Examples


Effektregler
Jogwheel1
Jogwheel2
Pitchfader
Traktorsteuertaster
2 Kanäle
(Play,Cue,Loop etc.)

Examples

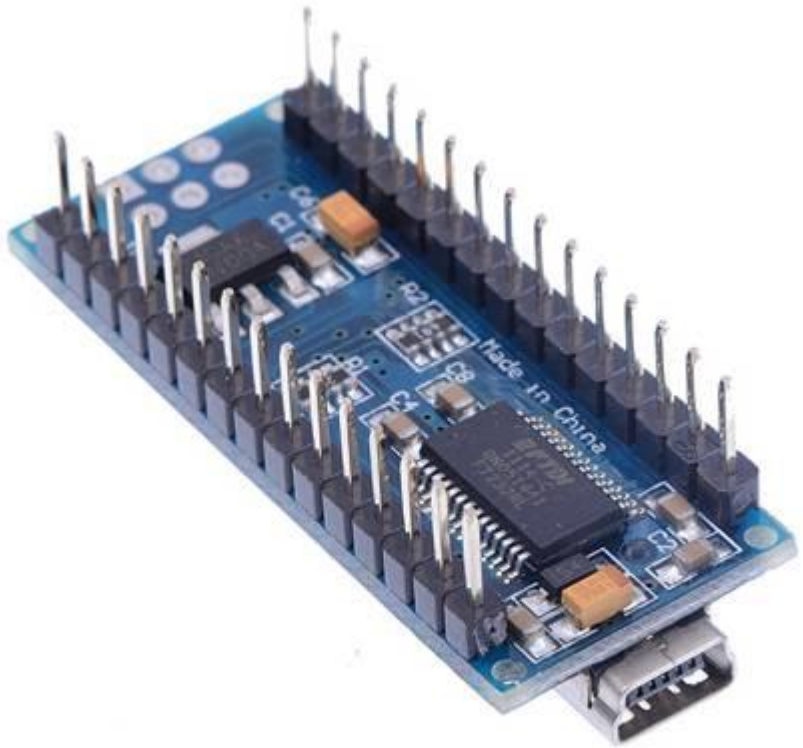


Hacking

- Procedure:
  1. Solder Pinheaders to the Arduino Nano
  2. Wire one button/pot/encoder to the Arduino (see schematics)
  3. Fix the +5V and GND plate with some tape at a piece of cardboard (prevent superevil short circuits…)
  4. Install USB-Serial Chip-Driver CH340 (only Windows & MAC)
  5. Get the SerialMIDIElements-Library from my Github and load it into the Arduino-SW
  6. Load the basic-example: SerialmidiElements_basic_example_31C3.ino
  7. Install and start ttymidi / hairless-midiserial and debug input from button/pot/encoder
  8. Create a virtual midi-port and use it in ttymidi / hairless-midiserial to publish midi-messages
  9. Map the inputdevice to a controlelement in e.g. MIXXX DJ-Software

Hacking – Tips n Tricks

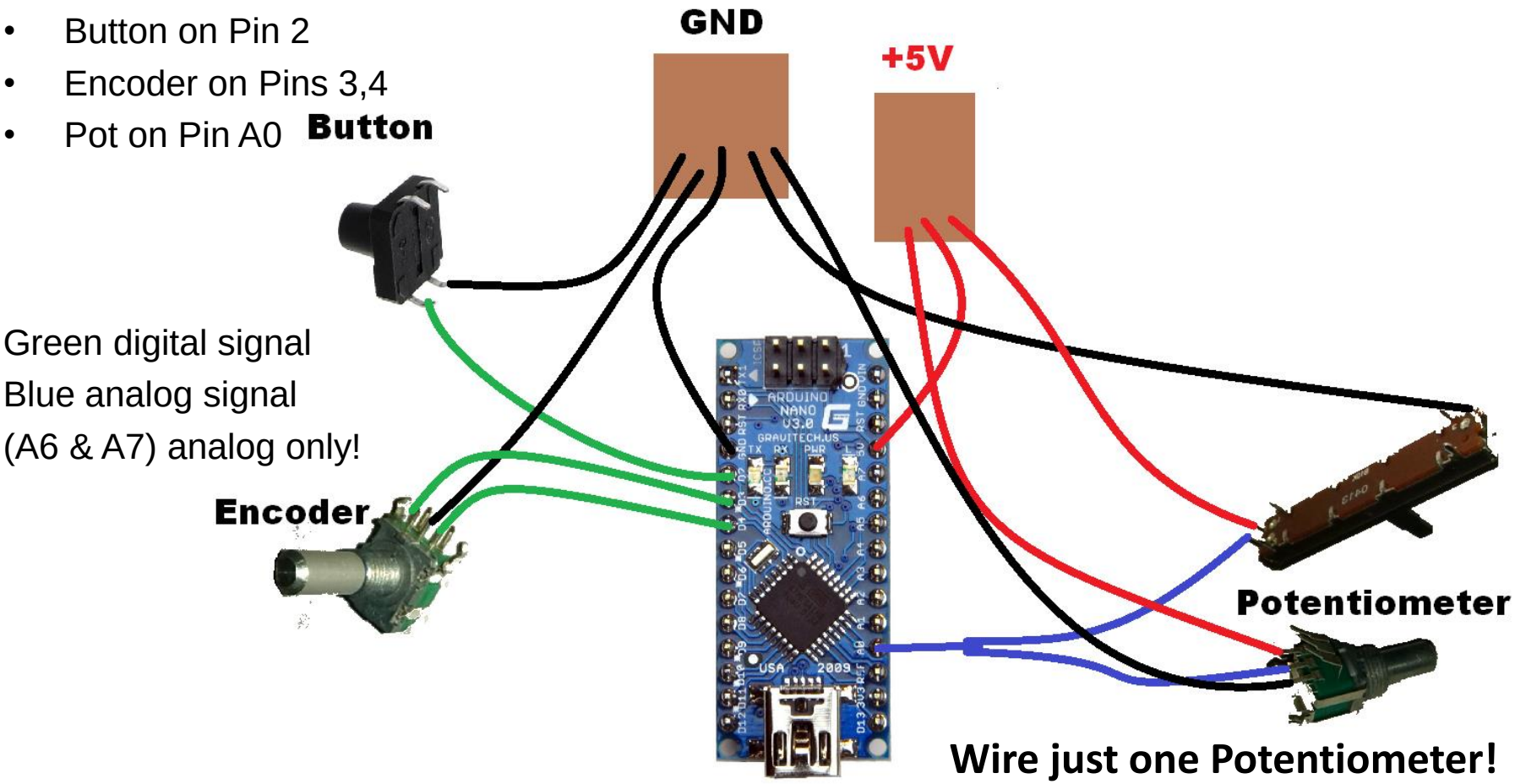
1. Solder the Pinheaders:
   – It should look like this



Hacking – Tips n Tricks

2. Wire the Basic-Circuit:

- Basic-Circuit:
- Button on Pin 2
- Encoder on Pins 3,4
- Pot on Pin A0



Hacking – Tips n Tricks

4. Install USB-Serial Chip-Driver CH340:

- MAC OSX
  - http://www.wch.cn/downloads.php?name=pro&proid=178
  - On MAC OSX 10.9 & 10.10: sudo nvram boot-args="kext-dev-mode=1"
  - RESTART!!!
- Windows:
  - http://www.wch.cn/downloads.php?name=pro&proid=5
  - RESTART!!!
- Linux.
  - Normally no driver needed
  - Otherwise: http://www.wch.cn/downloads.php?name=pro&proid=177

Hacking – Tips n Tricks

5. Get the SerialMIDIElements-Library:

- https://github.com/julled/SerialMIDIElements

- https://github.com/julled/SerialMIDIElements/blob/master/zipped-Library/SerialMIDIElements.zip

- Import it into Arduino: Arduino -> Sketch -> Import Library -> Add Library … choose the SerialMIDIElements.zip

Hacking – Tips n Tricks

6. Load Basic-Example:

- Open SerialmidiElements_basic_example_31C3.ino @ Github
- Upload Sketch to Arduino

Hacking – Tips n Tricks

7. Install Serial-to-MIDI-Converter:

- HairlessMidi:
  - https://projectgus.github.io/hairless-midiserial/

OR

- ttymidi:
  - sudo apt-get install ttymidi

Hacking – Tips n Tricks

8. Virtual MIDI Port:
   - MAC: http://www.johanlooijenga.com/tools/12-virtual-ports.html
   - Windows: http://www.midiox.com/myoke.htm
   - Linux: no additional SW needed

Hacking – Tips n Tricks

9. Mapping in MIXXX
   - Download MIXXX: mixxx.org
   - Learning-Assistant in Controller-Options