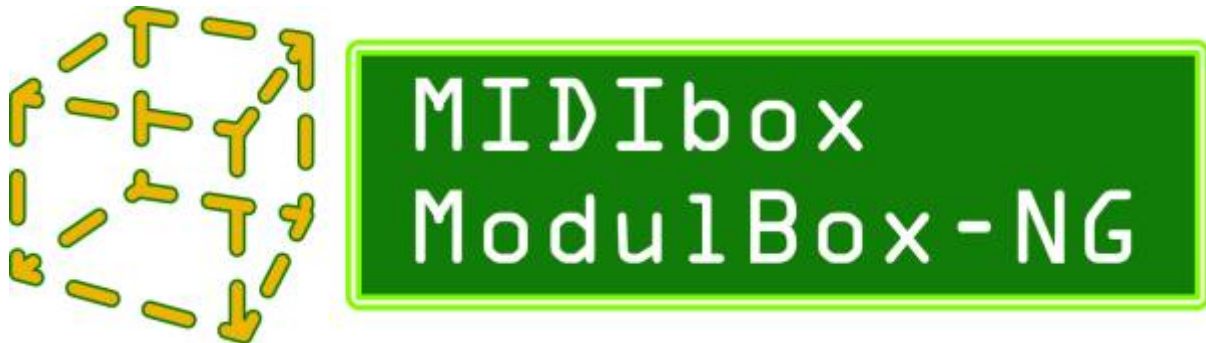


MB-ModulBox NG



Under Heavy Development @ 15/8/2016

Introduction

The MB-Modulbox-NG Project is a modern version of the **Modulbox** project .
In short words, it's a **Eurorack-size compliant Modular MIDIbox Control Surface** based upon MB-NG.

From a **Main Part**, **small modules would be chained to Build the custom-sized control surface of your dreams by choosing the MIDI controls you want.**

Main part would also allow **Access to Menus for configuring and saving things on SD Card** , and optionnal **External Analog Inputs/Outputs** to trigger from external sensors and/or drive your analog synth.

Each Small Module will have a Different type of Interaction and will include Digital Shift Registers and/or Multiplexers For Analog lines . Then modules would be chained one to another up to main part.

Modules **Chain Connectors will be 2.54mm dual row pinheader** (Molex?) and will carry Digital/Analog bus lines and Current supply. PSU Main input will be on main part PCB.

Main Part Features

1. **STM32F4 Board**
2. **Standard Control Surface** with 6 Tactile switches, Push - Encoder , **OLED** Graphical screen
3. **SD Card Slot** (+USB in?)
4. **2xMIDI IN + 2xMIDI OUT 2.5mm jack Plugs**
5. **Optionnal 16x3.5mm jacks** for external **Analog Ins/Analog Outs** with External interfaces for expanding.

Community users working on it

- [Ksir](#) - Modulbox Original Designer - PCB Design - Programming
- [Psykhaze](#) - Documentation - Frontpanel design - PCB Design - Programming
- [Latigid On](#) - PCB Design -Troubleshooting Help

Getting Involved ?

Just let a Private message on the forum to users already involved

Software Tools used

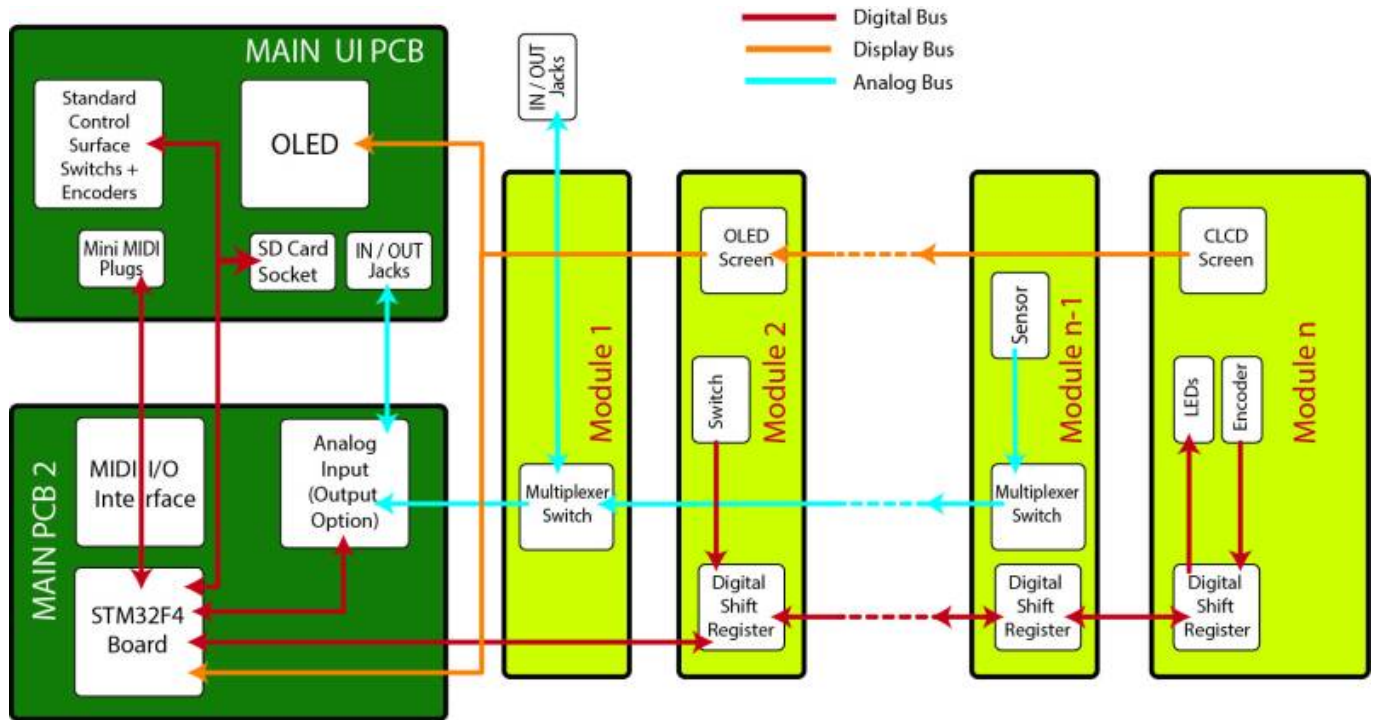
- [Inkscape Vector Drawing Software](#) - Front panel Concept Drawing
- [KiCAD PCB](#) - PCB Design | [KiCAD Libairies](#)
- [FreeCAD 3D Technical Drawing](#) - Case Design
- [Code::Blocks Integrated Development environment](#) - GUI Software - MIOS programming
- [JUCE](#) - Cross-Platform Audio/MIDI/GUI Library

PCB process

1. Parts List – Datasheets Gathering – Reference selection
2. KiCAD Library
3. Schematics
4. FootPrint Creation / Association to schematics
5. Netlist Export
6. Make Pcb routing - Put pinheader/jumper to Strategic Troubleshooting Places.

Architecture

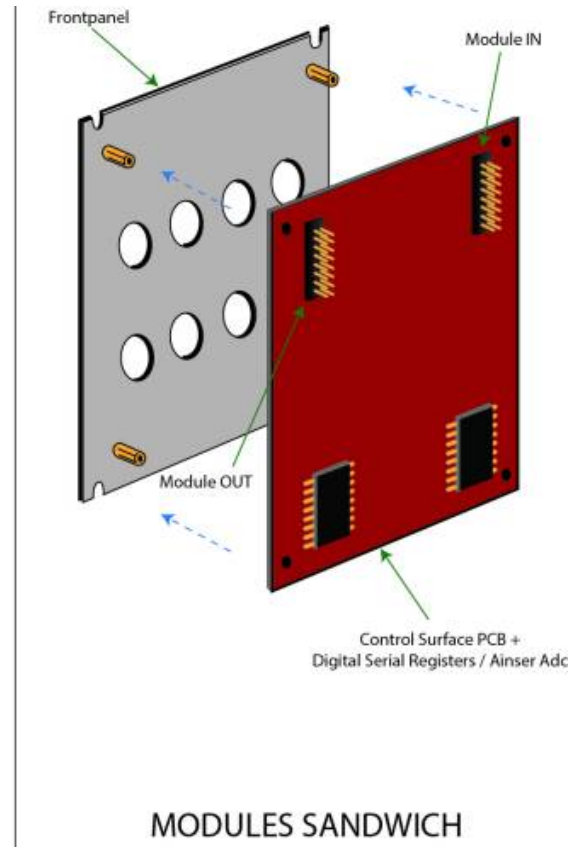
Modulbox-NG



Eurorack design

- **Eurorack Design is 3U Height** So frontpanel = $5,25'' = 133mm - rails = 128,5mm$ Height . Sandwich Design is ok here due to non heating components and allow to spare space.
- **Modules Frontpanels are 8HP-multiple wide** ($8HP = 40,3mm$) see [Eurorack Specification](#).
Frontpanel back spacers glued with JB-weld to avoid front screwing. [Eurorack Templates PDF](#)
- **PCB Size is 100mm height** To stay compliant to [Eurocard Specification](#)

Splitted View



Tech Demos Videos



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|  Video |
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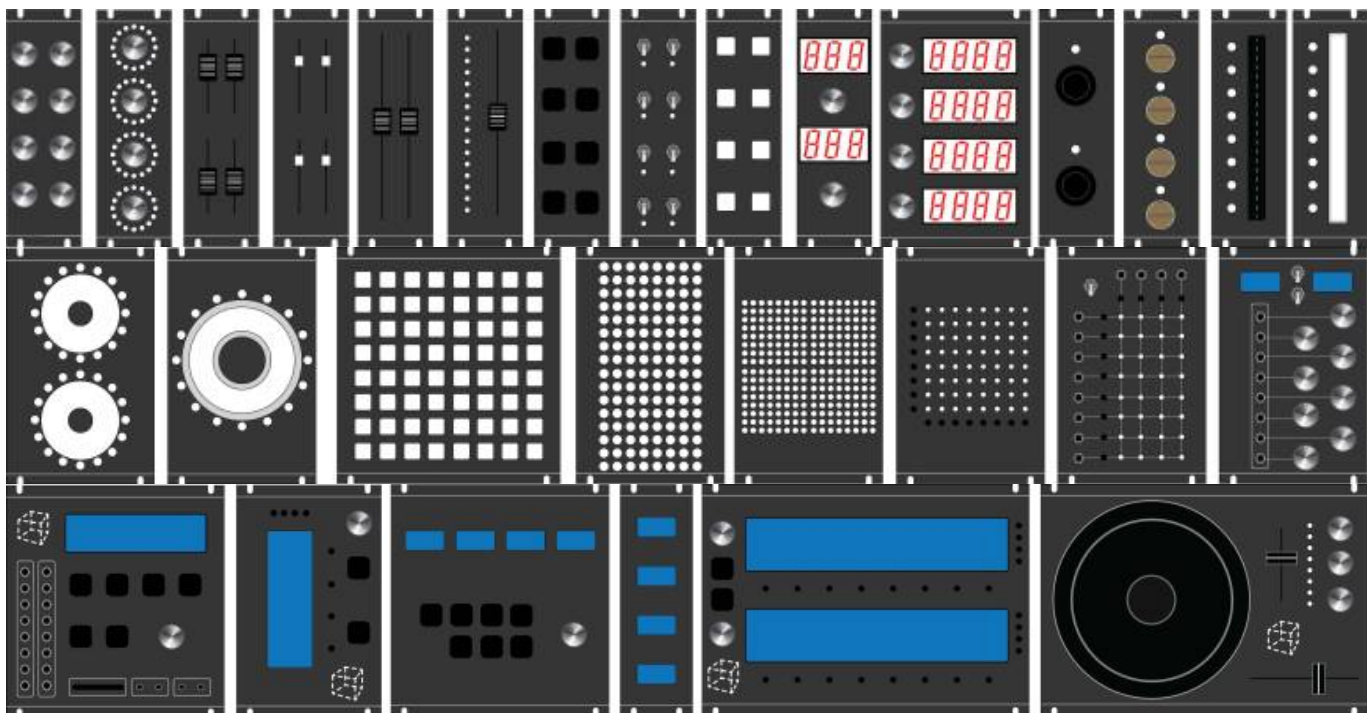


Modules List + UI Parts

| Module | N° | Analog | LED | Encoders | Switches | HP | User | Display |
|-----------------------------|----|----------------|-------------|---------------|------------------|----|------------------|----------------|
| Main UI+Main PCB | 1 | Jacksx16 | | x1 PushRotary | Tactilex6 | 24 | Psykhaze/Latigid | Graphic-OLEDx1 |
| OLED-SCS | 2 | | | x1 PushRotary | Tactilex6 | 24 | Latigid | Small-OLEDx1→8 |
| Vertical 4xOLEDS | 3 | | | | | 16 | Latigid | Small-OLED x4 |
| LCD Vertical SCS | 4 | | | x1 PushRotary | Tactilex(4+4+2) | 16 | | CLCD 20×4 |
| LCD Horizontal Extended SCS | 5 | | | x2 PushRotary | Tactilex22 | 32 | Psykhaze | 2xCLCD 40×4 |
| Encoders x8 | 6 | | | x8 PushRotary | | 8 | Ksir | |
| Pots x8 | 7 | Pots x8 | | | | 8 | Ksir | |
| LED Ring Encoders x4 | 8 | | 16×4 3mm | x4 PushRotary | | 8 | | |
| Faders 2×2 | 9 | Fadersx4 | | | | 8 | | |
| Light-Fader 2×2 | 10 | Light-Fadersx4 | | | | 8 | | |
| Long Faders x2 | 11 | Long Fadersx2 | | | | 8 | Psykhaze | |
| Motor Fader x1 | 12 | Motor Fader | 16x3mm | | | 8 | Psykhaze | |
| Switches x8 A | 13 | | | | Tactilex8 | 8 | Ksir | |
| Switches x8 B | 14 | | 8xBicolor | | Toggle 3 polesx8 | 8 | Ksir | |
| Light-Switches x8 A | 15 | | Bicolor Opt | | Light Tactilex8 | 8 | Ksir | |
| Light-Switches x8 B | 16 | | | | Light Togglex8 | 8 | Ksir | |
| Numeric Displayx2 | 17 | | | x2 PushRotary | | 8 | | 2x Numeric |
| Numeric Displayx4 | 18 | | | x4 PushRotary | | 16 | | 4x Numeric |
| 8×8 LED Modulation Matrix | 19 | | x(8×8)3mm | | Tactilex(8+8) | 16 | | |
| 16×16 LED DotMatrix | 20 | | | | | 16 | Psykhaze | 4xDotMatrix |

| Module | N° | Analog | LED | Encoders | Switches | HP | User | Display |
|---------------------------------------|----|----------------------------------|---------------|------------------------------|------------------------------|----|----------|--------------|
| 8x16 RGB DotMatrix | 21 | | | | | 16 | Psykhaze | 2xDotMatrix |
| Additional Analog In or Out Interface | 22 | Jacksx8 | | x8 PushRotary | Toggle 4 polesx2 | 16 | Psykhaze | Small-OLEDx2 |
| Crosspoint Matrix 8x4(x4) | 23 | Jacksx(8+4) | x(8x4) 3mm | | Toggle 4poles, Tactilex(8+4) | 16 | Psykhaze | |
| Adafruit Silicon 3mm 8x8 Matrix | 24 | | x(8x8)3mm | | Adafruit Silicon (4x4)x4 | 24 | Psykhaze | |
| Sparkfun Silicon 5mm 4x4 RGB Matrix | 25 | | 16xWS2812 | | Sparkfun Silicon 4x4 | 24 | Latigid | |
| RGB Encoder 4x4 Matrix | 26 | | | RGB Encoders x16 | | 24 | Latigid | |
| Joystick | 27 | 2xJoystick | 2xRGB | | | 8 | | |
| Linear Touch | 28 | 1x(Force)Linear Sensor | 8xWS2812 | | | 8 | Psykhaze | |
| Circular touch | 29 | 1x(2x)Circular Sensor | 16(x2)xWS2812 | | | 16 | Psykhaze | |
| Force touch | 30 | 4xForce touch | 4xRGB | | | 8 | | |
| MiniDeck DJ Control | 31 | 1xScratchFader+ 1xVertical Fader | x8 3mm | x1 Code Wheel +x3 PushRotary | | 32 | | |

Frontpanels Layouts



Modules Ins/Outs + Related Parts

| . | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|--------------|---|------|---|----|----|----|----|----|---|----|----|------|----|----|------|
| Digital Ins | 8 | 0>16 | / | 12 | 30 | 16 | / | 8 | / | / | / | ? | 8 | 24 | 8 |
| 74HC165 # | 1 | 0>2 | / | 2 | 4 | 2 | / | 1 | / | / | / | ? | 1 | 3 | 1 |
| Digital Outs | / | / | / | / | / | / | / | 16 | / | / | / | 16+? | / | 16 | 8>16 |
| 74HC595 # | / | / | / | / | / | / | / | 2 | / | / | / | 2+? | / | 2 | 1>2 |
| Analog Ins | / | / | / | / | / | / | 16 | / | 8 | 8 | 4 | ? | / | / | / |
| CLCD # | / | / | / | 1 | 2 | / | / | / | / | / | / | / | / | / | / |
| OLED # | 1 | 1>8 | 4 | / | / | / | / | / | / | / | / | / | / | / | / |

| . | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
|--------------|----|----|-----|----|----|----|-----|----|----|----|----|----|----|-----|----|----|
| Digital Ins | 16 | 4 | 8 | 16 | / | / | 24 | 15 | 16 | 16 | 32 | / | 3 | / | / | 12 |
| 74HC165 # | 2 | 1 | 1 | 2 | / | / | 3 | 2 | 2 | 2 | 4 | / | 1 | / | / | 2 |
| Digital Outs | 8 | 16 | 32? | 16 | 16 | 32 | / | 16 | 16 | / | / | 6 | / | / | 12 | 8 |
| 74HC595 # | 1 | 2 | 4 | 2 | 2 | 4 | / | 2 | 2 | / | / | 1 | / | / | 2 | 1 |
| Analog Ins | / | / | / | / | / | / | 0>8 | / | / | / | / | 8 | / | 3>6 | 8 | 8 |
| CLCD # | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / | / |
| OLED # | / | / | / | / | / | / | 1 | / | / | / | / | / | / | / | / | / |

Parts References

Parts Datasheets

| Designation | Datasheet Link | Reference |
|--------------------------|---|---|
| Serial Register IN | 74HC165 | cd74hc165 |
| Serial Register OUT | 74HC595 | cd74hc595 |
| Line Driver | 74HCT541 | cd74hct541 |
| OptoCoupler | 6N138 | 6N138M |
| Analog>Digital Converter | MCP3208 | MCP3208 |
| Multiplexer switch | MOS4051 | cd74hc4051 |
| Digital>Analog Converter | MAX525 | MAX525 |
| Operational Amplifier | MCP600X | MCP6008 |
| Crosspoint Switch | CD22m3494 | CD22m3494 |
| Switch Rotary Encoder | Alps EC11E | EC11E15244B2 |
| 5mm WS2812 LED | WS2812 | APA-106-F5 |
| 5mm RGB LED | RGB LED | SL-R596CR4G3B5W-F12 |
| Tactile Switch | Small Round Tactile Switch | SKHHDTA010 |
| Tactile Switch 2 | Square Tactile Switch | 03.0752 |
| Light-Tactile Switch | Square Light Tactile switch | B3W-9000-G1N, B3W-9000-R1N, B3W-9000-Y1N, B3W-9000-RG2N |

| Designation | Datasheet Link | Reference |
|-------------------------------|---|--|
| Toggle Switch 3/4 Poles | Toggle Switch | 100SP1T2B3M2QEH |
| Light-Toggle Switch | Light Toggle Switch | G12JPCF |
| Code Wheel+ Optical Encoder | Encoder+ Code Wheel | HEDB-9100-C12 |
| Fader | Bourns PTA | PTA3043-2015CPB103,PTA6043-2015CPB103 |
| Long Fader | ALPS RS series | RSA0N11S9A0K |
| Long Fader 2 | Bourns PTB | PTB0143-2010BPB103 |
| Light-Fader | Bourns PTL | PTL30-10G1-103B2, PTL30-15R1-104B2, PTL60-10G1-103B2, PTL60-15R1-104B2 |
| Motor Fader | Alps MotorFader 60mm | RS60N11M9A0F |
| Rotary Pot | ALPS Rotary pot | RK09L1140A66 |
| SD Card Socket | SD Socket | SDCRD-GM-271 |
| OLED 256x64px 3,12" | Newhaven OLED | NHD-3.12-25664UMY3 |
| OLED 256x64px 3,2 " | 3.2" OLED | ER-OLEDM032 |
| OLED 128x64px 0,96" | 0.96" OLED | ER-OLEDM0.96 |
| CLCD 20x4 | 20x4 LCD | ERM2004 |
| CLCD 40x4 | 40x4 LCD | ERM4004 |
| 8x8 Monochrome DotMatrix | 8x8 Dotmatrix | TC15-11EWA |
| 8x8 RGB DotMatrix | 8x8 RGB Dotmatrix | YSM-2388CRGBC |
| 3 Digits Numeric Display | 3 Digits Numeric Display | BA56-12SRWA |
| Silicon 4x4 Button Matrix 5mm | Silicon 4x4 5mm Button Matrix | / |
| Silicon 4x4 Button Matrix 3mm | Silicon 4x4 3mm Button Matrix | / |
| jack 3,5mm mono | Jack 3.5mm | 35RAPC2AV, PJ301BM |
| Joystick 1 | Joystick 1 | / |
| Joystick 2 | Joystick 2 | / |
| Force Touch Sensor | Interlink FSR402 | 34-00015 |
| Ring Sensor | Interlink Ring Sensor | 40-24131 |
| Linear+Force Sensor | Interlink linear+force sensor | 34-00022 |
| Linear Touch Sensor | SpectraSymbol SoftPot | SP-L-0100-103-ST |
| Circular Touch Sensor | SpectraSymbol SoftPot | SP-R-0046-103-ST |

Buy Places

- [Mouser](#)
- [Buydisplay](#)
- [Interlink Force Sensors @ Digikey](#)
- [Interlink Ring Sensor @ Roboshop](#)
- [SpectraSymbol Circular Tactile Sensor @Adafruit](#)
- [SpectraSymbol Linear Tactile Sensor @Adafruit](#)

Software / Firmware

- **JUCE Ressources**

A **GUI** will be developped with JUCE Library to make your **MIDI mapping** upon your custom control interface and make your **custom infos display on OLED / CLCDs / LEDs Matrixes**. Upon a list of **Pre-made functions**, you would be able to connect a **MIDI mapping** to Controller / Sequencer / Other MIDibox apps functions into the JUCE GUI

TODO: Make a inkscape sketch For the JUCE GUI then remake it with **Projucer**

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