

MB-ModulBox NG



Under Heavy Development @ 9/8/2016

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

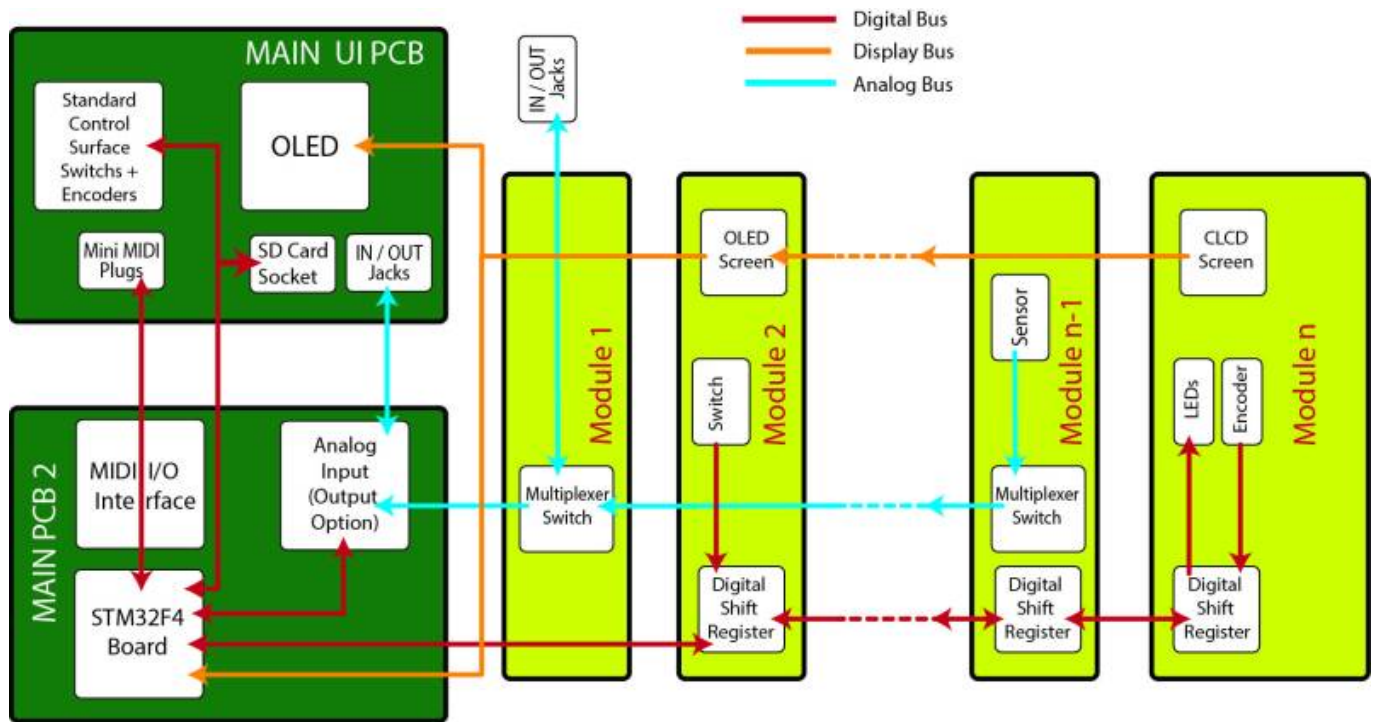
- [Inkscape Vector Drawing Software](#) - Front panel Concept Drawing
- [KiCAD PCB](#) - PCB Design | [KiCAD Libairies](#)
- [FreeCAD 3D Technical Drawing](#) - Case Design
- [Code::Blocks Integrated Development environment](#) - GUI Software - MIOS programming
- [JUCE](#) - Cross-Platform Audio/MIDI/GUI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

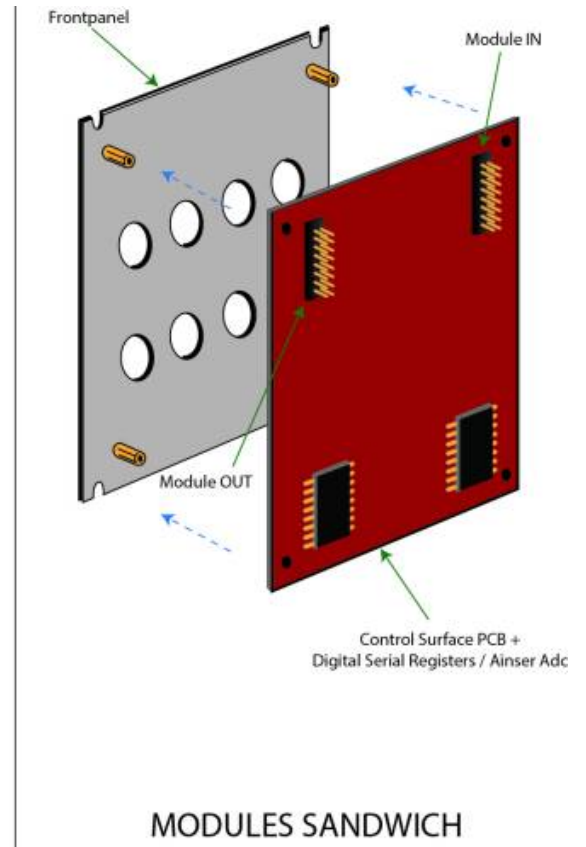
Modulbox-NG



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



 Video
  Video
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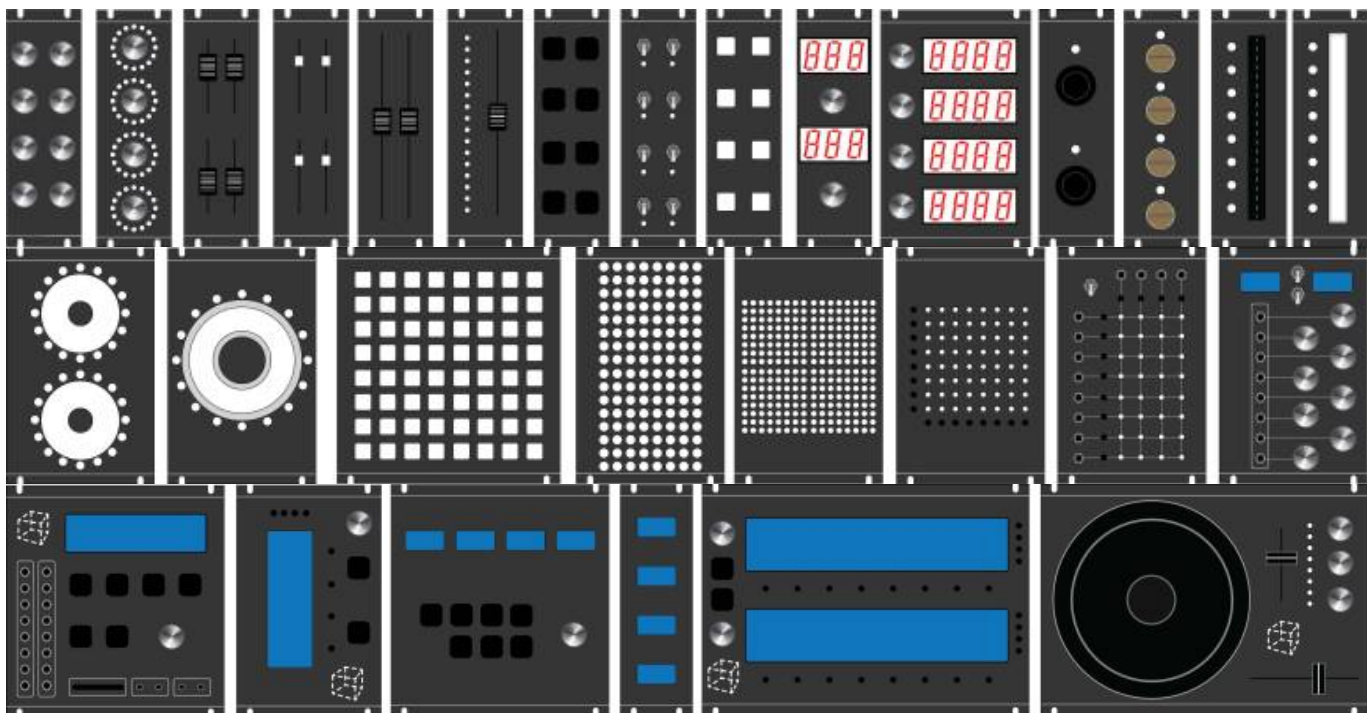


Modules List + UI Parts

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 developed 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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