MMU2S Clone using BigTreeTech SKR 1.3 and SKR Mini v1.1

DOC : 1.0 alpha

Authors :
- **Massimiliano Gargani (original docs, thks)**
- Jérémy Briffaut

1 Overview

This project aims to use Prusa MMU2S on any 3D printer based on BTT SKR1.3 and SKR Mini v1.1. The SKR1.3 is the main board to control printer and running Marlin while the mini board is used to control MMU2S.

This project is a work in progress and requires a knowledge of your 3D printer hardware and software. If you don't know what you are doing, you can/will PERMANENTLY damage your hardware. I hope you have been appropriately warned.

2 Requirements

2.1 Hardware requirements (see BOM):

- Bigtreetech SKR 1.3
- Bigtreetech SKR Mini v1.1
- Prusa MMU2S printed parts
- Screws, bolts and various hardware

2.2 Software requirements:

- Atom, Platformio IDE….
- Marlin 2.0.x-bugfix (latest commit)
- MMU2S-clone firmware (github)

3 Prusa MMU2s printed parts

Download the STL from Original Prusa i3 MK3/S or MK2.5/S MMU2S upgrade
Unzip the archive and print the flowing STL from MK3orMK25toMMU2S_upgrade_stl → mmu2s unit

- mmu2-blade-holder.stl
- mmu2-ele-cover.stl
- mmu2-filament-sensor-cover.stl
- mmu2-frame-holder.stl
- mmu2-front-PTFE-holder.stl
- mmu2-idler-body.stl
- mmu2-idler.stl
- mmu2-pulley-body.stl
- mmu2-rear-PTFE-holder.stl
- mmu2-s-holder-endstop.stl
- mmu2-selector-finda.stl
- mmu2-selector-front-plate.stl

I highly suggest to also print the buffer parts

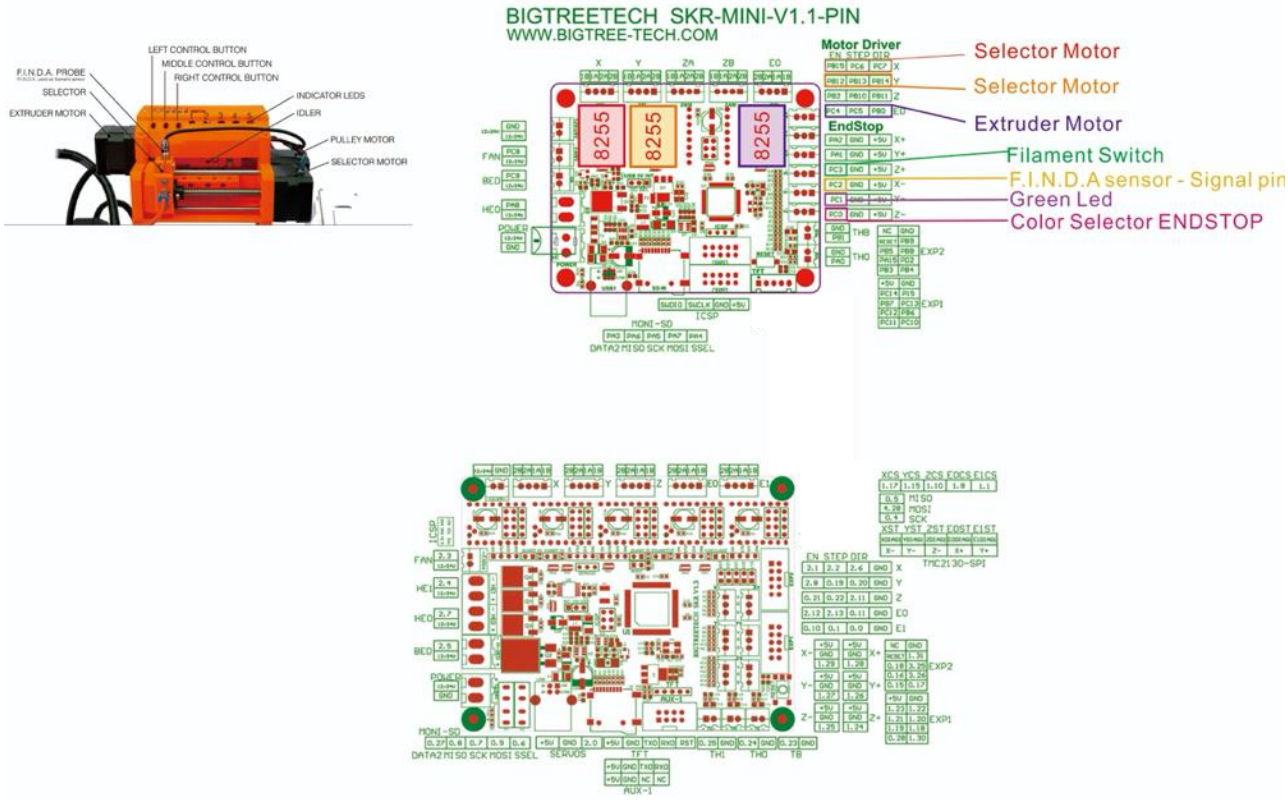
To assemble the MMU2S unit, please follow the official guide

4 BOM

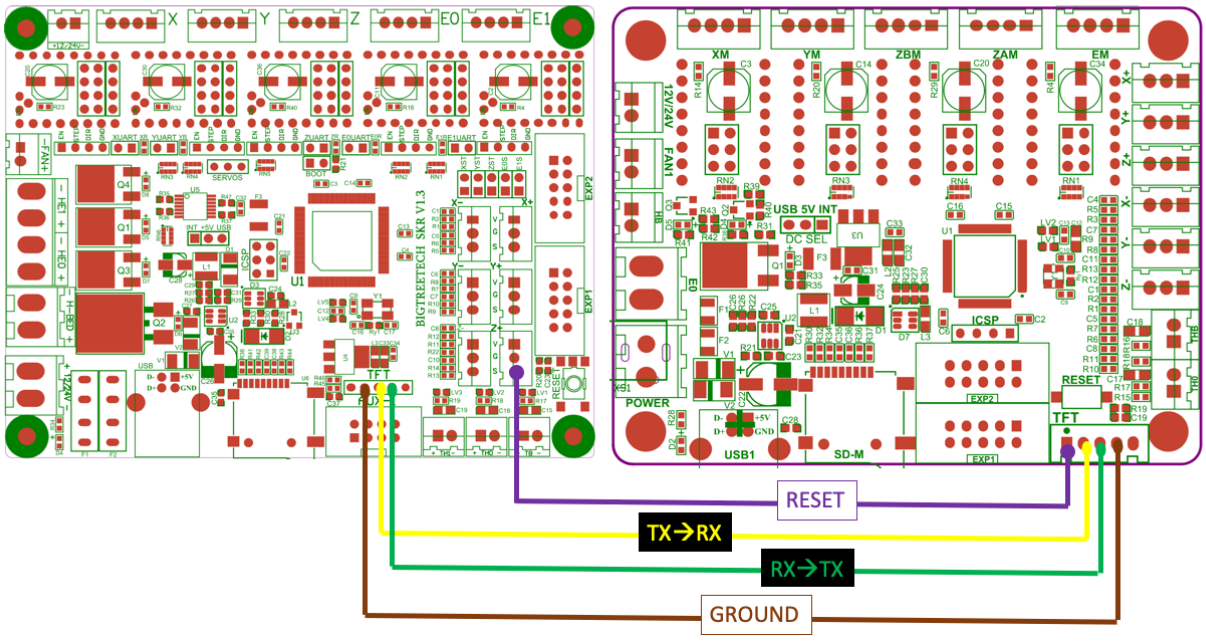
Item	Q.ty	Link	Notes
Set Prusa i3 MK3 Multi Materials 2.0 Aluminum 120mm Smooth Rods And Brass Tube 5x6x25bt	1	Aliexpress	
Prusa i3 mk2/mk2s F.I.N.D.A. Probe	1	Aliexpress	
5pcs Filament Gear Motor Gear Filament Pulley	1	Aliexpress	
625 ZZ (10PCS) 5*16*5mm Miniature Ball Bearings	1	Aliexpress	
Kande Bearings 5x8	1	Aliexpress	
Kande Bearings 5x5	2	Aliexpress	
1 M PTFE Tube	1	Aliexpress	
10pcs Push In Quick Release Fitting Connector 3D Printer Tube Connectors	1	Aliexpress	
20pcs compression spring 15mm	1	Aliexpress	
100pcs/lot DIN 562 Square Thin Nut M3	1	Aliexpress	
1M PTFE Tube Clear Teflon PiPe 3x4	7	Aliexpress	For buffer
Lead Screw 150mm 3D Printers Parts 8mm Trapezoidal Screws Copper Nuts Leadscrew	1	Aliexpress	
10PCS/Pack Durable Bicycle Stainless Steel Ball 7mm	1	Aliexpress	
10pcs Stainless Steel Rod shaft Linear Rail Round Shaft Length150mm * Diameter 5mm	1	Aliexpress	
Lot of M2, M3 severals lenght			

5 Wire schematic

5.1 Wiring boards



SKR v1.3 SKR Mini v1.1



6 Firmware configuration

We assume that you have appropriated knowledges. This chapter describes the changes required to implement MMU2S support on Marlin 2.0.x-bugfix. All other parameters must be set to fit your own 3d printer.

6.1 SKR 1.3

6.1.1 Configuration.h

```
#define SERIAL_PORT -1
//#define SERIAL_PORT_2 2 (leave this commented by //)
#define BAUDRATE 115200
```

[….]

```
#define EXTRUDERS 5
#define PRUSA_MMU2
[…]
#define NOZZLE_PARK_FEATURE
```

6.1.2 Configuration_adv.h

```
#define ADVANCED_PAUSE_FEATURE
```

[…]

```
#define MMU2_SERIAL Serial
#define MMU2_RST_PIN P1_24 //as per above wiring diagram
#define MMU2_MENUS
#define MMU2_DEBUG
```

6.1.3 mmu2.h

Change the file mmu2.h under Marlin/src/feature/prusa_MMU2

from:

```
#if SERIAL_USB
  #define MMU_RX_SIZE 256
  #define MMU_TX_SIZE 256
#else
  #define MMU_RX_SIZE  16
  #define MMU_TX_SIZE  16
#endif
```

to:

```
/*
#if SERIAL_USB
  #define MMU_RX_SIZE 256
  #define MMU_TX_SIZE 256
#else
  #define MMU_RX_SIZE  16
  #define MMU_TX_SIZE  16
#endif
*/

#define MMU_RX_SIZE  1024
#define MMU_TX_SIZE  1024
```

6.1.4 Compile

Compile your new firmware and copy the firmware.bin in the SD card. Insert SD card in the SKR 1.3 and power it on.
Check if you see the new MMU menu

6.2 SKR Mini v.1.1

Clone or download the mmu2s-clone project from github:

```
https://github.com/kakou-fr/mmu2s-clone.git
```

Add the project to Atom and compile (it is already configured for skr mini and as per above wiring).

Copy the firmware.bin on the skr mini SD card and insert it on SKR mini board. Power it on.

6.3 Debugging MMU2 connection

Connect SKR1.3 and SKR mini to your PC and open two terminal emulator on proper serials (depending on your O.S.)
On SKR1.3 LCD got to MMU menu and select Reset MMU, you should see the following messages:

```
MMU <= reset
```

MMU2 will do its init sequence again

```
MMU => 'start'

MMU <= 'S1'

MMU => 90 (at current commit of mmu2s-clone)

MMU <= 'S2'

MMU => 168 (at current commit of mmu2s-clone)

MMU <= 'M1' (only if you enabled 12V mode in Configuration_adv.h)

MMU => ok (only if you enabled 12V mode in Configuration_adv.h)

_MMU <= 'P0'

_MMU => 0

_MMU - ENABLED
```

If you see above, the communication between the two board is working properly and if already connected stepper drivers and motors to SKR mini you should see them move.