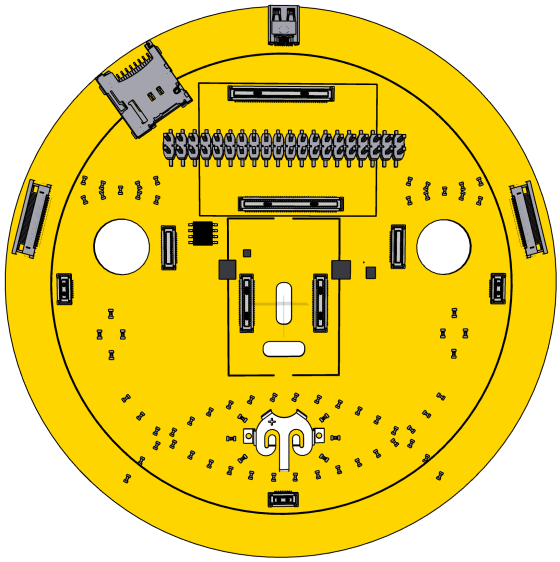
919 Smiley

Face board used to face the user and bridge daughterboards. It is used only for internal testing and development. For production of faceboards a designation of 701 is used.

It contains a MEMSIC mCube MC6470 3D movement sensor with a gyroscope and accelerometer, which is managed by the Stem MCU on the T-USB board. It communicates with the Stem MCU via the Stem I2C bus, and the SoM i.MX 8 via the SYS I2C. It exposes system control signals via the SYS I2C GPIO Expander 0 and 4.

Connectors are present to support attachment of two camera modules.

A LED matrix driver controls 120 LEDs producing expressions on the front of the board. The LEDs are 1mm long and embedded in the board in order to create a diffused light.



The board allows for experimental mounting of a an i.MX 8 Plus SoM. The production version 701 will have the SoM daughtercard and other components without mounting debug/development connectors.

Components

- 1 * MEMSIC mCube MC6470 - Mouser
- 1 * IS31FL3730 8x8 matrix output
- 2 * PCA9555 I/O Expander HVQFN24 package
- 1 * TXB0108YZPR2 8-Bit Bidirectional Voltage-Level Shifter with Auto Direction Sensing and +/-15-kV ESD Protect 20-DSBGA -40 to 85 - Mouser
- ? * Kingbright APHHS1005SYCK 1mm x 0.5mm yellow
- Würth 150040YS73220 1mm x 0.5mm yellow

Connectors placed on the board are,

- 2 * Hirose DF40C-34DS-0.4V (Mouser)
- 1 * TE Connectivity 45PIN 0.3MM 571-4-2328724-5 FPC 3-2328724-5 $0.41

- 1 * Battery clip 2894TR - Mouser - Alibaba
- 1 * Renata CR1220 cell battery - Alibaba CR1220
- 3 * Hirose DF40-20DS-0.4V mated height 1.5mm Mouser - JLCPCB socket

Development connectors placed on board are,

- 2 * TSM-120-01-F-DV Samtec 2*20 pins surface mounted .100 (Smiley model) Mouser
- 2 * Molex 22PIN 0.5mm pitch 54548-2271
- 1 * MicroHDMI (suggested Molex 46765-1301) Mouser Molex

701 components are,

- SB-UCM-iMX8PLUS System-on-Module
- 2 * PCA9555 I/O Expander HVQFN24 package
- 2 * Hirose DF40HC(3.0)-100DS-0.4V mated height 3.0mm
- M.2 key B connector H4.20mm Amphenol ICC 10128793001RLF
- M.2 key E connector H4.20mm Amphenol ICC 10128794001RLF

Alt Components [not currently used]

- LP5036 36 LED driver - Mouser
- Optional BMM150 Magnotometer
- Bosch Sensortech BHI160B - Mouser
- Würth 710-150040RS73220 1mm x 0.5mm red
- Würth 710-150040VS73220 1mm x 0.5mm green
- Würth 150040YS73240 1mm x 0.5mm yellow
- Bivar SM0402YC 1mm x 0.5mm yellow
- Lumex SML-LX0402SYC-TR 1mm x 0.5m yellow
- ROHM SML-P12YTT86R 1mm x 0.6nn yellow
- Alternate Cell Holder S8411-45R - Mouser
- 1 * EEMB / Hillflower LIR1220 Li-ion 3.6V battery rechargeable - Alibaba .. or
- 1 * ML1220 3V rechargable battery

Daughterboard for SD Card

- Micro-SD for Nintendo Switch

Plan is to source a daughterboard for SD Card building on existing.

Articles

- Led PCB Circuit Board
- Uncovering PCB Embedded Components
- Practical steps for creating embedded components with side-emitting LEDs
- Efficient LED Blinking for Embedded Systems
- Embedding of Passive Components into Flex PCB
- LED module design considerations for an aluminium board
- Led Bar array with stm32f103 microcontroller
- APA102 2020 RGB LED source
- Novel control strategy for synchronous PWM on a matrix converter

- Adafruit 16x9 Charlieplexed PWM LED Matrix Driver - IS31FL3731
- https://community.bosch-sensortec.com/t5/MEMS-sensors-forum/BNO055-vs-BHI260AB-fusion-accuracy/td-p/24263

Camera connectors

Two sets of camera connectors are on the board for left and right sides respectively. The 22 pin connector allows a Development board to be connected with a Raspberry Pi Zero compatible flex cable. The 34 pin connector allows attachment of a 201 Camera Module made for it. Signals will be transferred directly between the two connectors using voltage shifters

The dual camera connectors are also connected to the SoM. i.MX8 CSI1 is used for left module, CSI2 is used for right module.

The two 34 pin CSI connectors are wired to run in sync via the STROBE pin.

The power supplied to the 34 pins connector can be driven by the 22 pin connector or the T-USB Power Module. VSOM from power module is down-regulated to 3V3, 2V8 and 1V8 from 3.7V - 5V. This downregulation can be shared between Left and Right cameras.

The 1.8V driving the Sensor I/O of the 201 modules will also be supplied via the Self powered direct battery input.

Board Power

The board can be powered by 3V+ via a directly attached battery, or a pin on back GPIO header, which is down regulated. The self power input will power the Motion Engine and camera sensors with 1.8V. This can be used to run the board in an always on mode that records movement while disconnected from the power module.

When the Power module is connected it supplies VSOM, which powers the MotionEngine, LED Matrix driver and camera modules. VSOM is down regulated from around 4V to 1V8, 2V8 and 3V3. When connected, no power is drawn from the battery on the bridge board.

Voltage pins are

- Self powered 2V+ input
- Always on 1V8 output VCC_RTC
- Powered 1V8 output
- Powered 2V8 output
- Powered 3V3 output
- Powered 5V output
- VSOM output

[?] Is it possible to support both 5V in and out on the GPIO header? 5V input would be downregulated to 4V if power module isn't connected. 5V output would be upregulated VSOM.

VSOM Supplied by power module over multiple pins. When all pins are connected it is passed on to full-on mode components as VCC_FULL.

VCC_RTC This powers always-on components on attached modules. It is sourced from any of the power module VCC_RTC (1V8), or VSOM pins and downregulated.

Power module provides either,

- No power
- VCC_RTC only
- Some VSOM pins
- Full VSOM (all pins)

The power provided will force the system state to be

- Off
- Detached
- Suspended (fully powered)
- Running (fully powered)

The battery connector may be change to use LIR1220(3.6V) or ML1220(3V), which are rechargable. Additional circuitry will be added in the future to charge the battery from VCC_FULL(VSOM).

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage IMU Analog Domain	IMU_VDD	1.71	1.8	3.6	V
Supply Voltage IMU I/O Domain	IMU_VDDIO	1.71	1.8	1.89	V
MotionEngine running CPU/Sensing		0.5	1	2.8	mA
LED Matrix chip	LED_VCC	2.7		5.5	V
LED Matrix chip	LED_IOUT		40		mA

T-USB Power connectors

The system power is driven by the T-USB module via the two 50 pin connectors. There is no need to power the board from other connectors than USB-C.

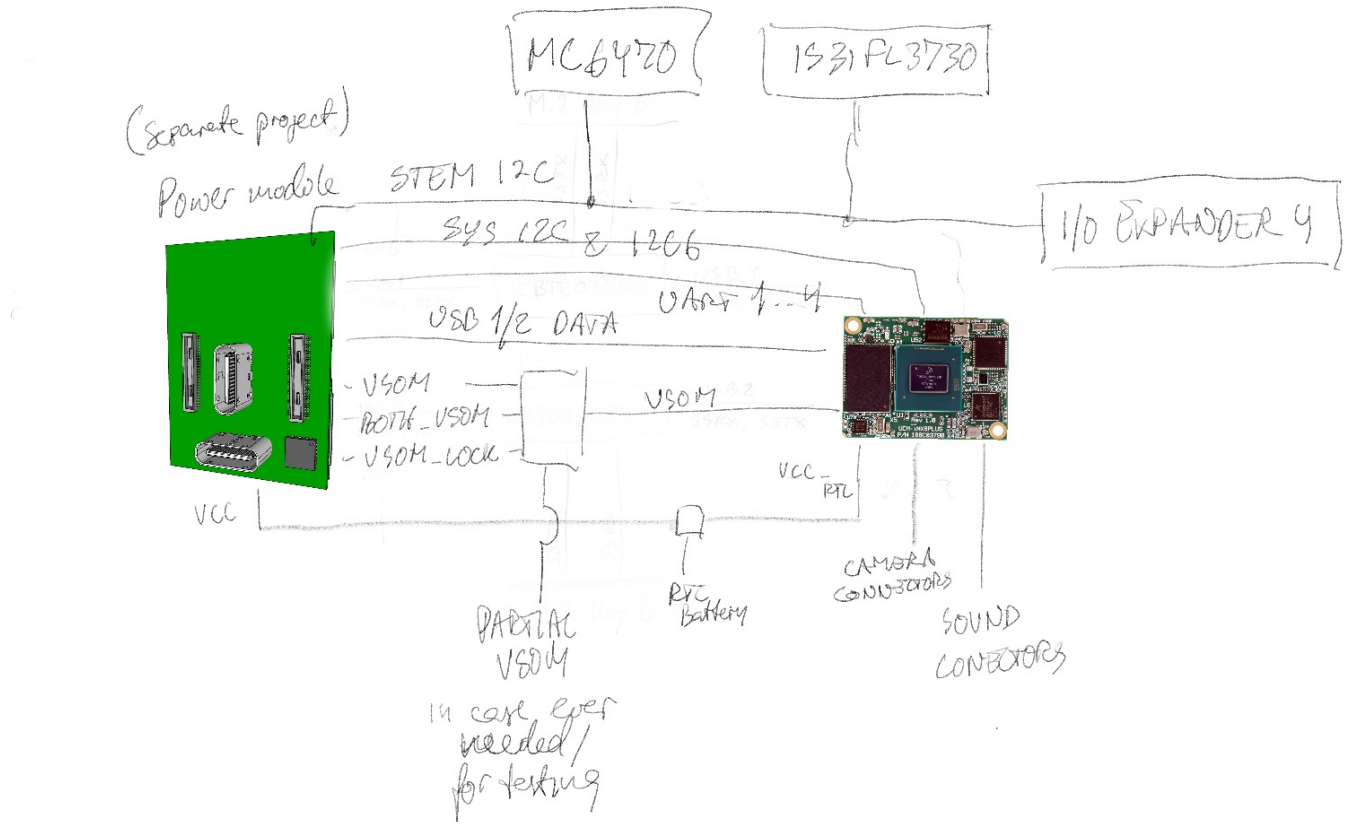
According to the UCM-IMX8PLUS Referene Guide the Supply Voltage is 3.45V to 4.4V. VSOM from the Power module provides this level. From it 5V0, 3V3, 2V8, and 1V8 are derived. 5V is stepped up from VSOM. These should not be mixed with the VIN_5V and VIN_3V3 on the T-USB module connector, which are for experimenting with power source role.

- m.2 connectors are based on 3V3 and 1V8
- Sound is based on 3V3 or 1V8
- Cameras are 1V8, 2V8 and 3V3
- HDMI can supply 5V / 50 mA
- HDMI signal level is 5V
- LED matrix may need 5V
- Debug connector has 5V

So there are in total three(four) uses of 5V

1. HDMI supply and signal (50 mA) from upregulated VSOM
2. LED matrix(not on 801/909 board) may need 5V
3. 5V supply (100 mA) to T-USB module which is externally supplied (VIN_5V).
4. Debug connector for measuring/testing (directly connected with VIN_5V soldering pad)

VIN_5V is optional and separate from the power on the board. It is supplied from the soldering pad/point.



Physical T-USB Connection Establishment

When connecting the T-USB module to the Bridge Board VSOM is provided over multiple pins on both connectors. The bridge board can draw a limited current from individual pins, but must only drive the System Module with power when all VSOM pins are connected. This allows for avoiding damage or strange behavior, if the power module is partially inserted.

Stages of insertion are,

- No VSOM pins connected
- At least one VSOM pin is connected
- VSOM Pins from both connectors connected
- All VSOM pins connected (including VSOM_LOCK)

When at least one pin is connected the Bridge Board can power components that are low power and always-on. It should provide VCC_RTC to the System Module from the T-USB module whenever it is plugged in or from a VCC_RTC pad/connector.

When pins from both connectors are supplying VSOM the Bridge Board should raise BOTH_VSOM. The Power Module may restrict VSOM to some pins dependent on BOTH_VSOM.

The locking mechanism of the backplate is also used to drive one of the VSOM connectors, named VSOM_LOCK. This prevents the system activating until modules are locked in place

As the first step in the detachment of the power module the physical unlock button must be pressed which raises PMIC_STBY_REQ. The next step is to turn the back plate which will disconnect the conditional VSOM_LOCK pin.

This requires logic on the 701/801/909/919 boards.

Powering Sensors and Camera modules

- Camera modules should receive power regardless of VSOM_LOCK supplying.
- Sensors (MC6470, VM3011) should receive power regardless of VSOM_LOCK supplying.
- EEPROM 24C08 should receive power regardless of VSOM_LOCK supplying.
- PCA9555 EX4 should receive power regardless of VSOM_LOCK supplying.
- USB Multiplexers should not receive power unsless all 10 VSOM are connected.

Power Logic on Bridge board

The T-USB module is inserted onto the bridge board. As this gets inserted the bridge board must detect it and enable power as connection is established. This relates to when to provide the System Module and m.2 module with VSOM

a) If at least one VSOM pin on both connectors is high, BOTH_VSOM is raised high by the bridge board. b) Directly connect VCC_RTC on T-USB connectors, soldering pad and System Module. c) If all 9 VSOM pins are supplying power, use it to power the System Module d) If all 10 VSOM and VSOM_LOCK pins are supplying power, deliver upregulated 5V e) If all 10 VSOM and VSOM_LOCK pins are supplying power, deliver 2.8V to camera modules f) If all 10 VSOM and VSOM_LOCK pins are supplying power, deliver power to m.2 modules g) If some VSOM pins are powered deliver it to always running circuits(like IMU) on bridge board(not on 909c).

[?] Connector layout and pin orientation diagram. [?] Full power logic

LED layout

LEDs are laid out as eyebrows and a mouth. They are connected to the multiplexer as 7 sets of 9 LEDs (7x9 mode).

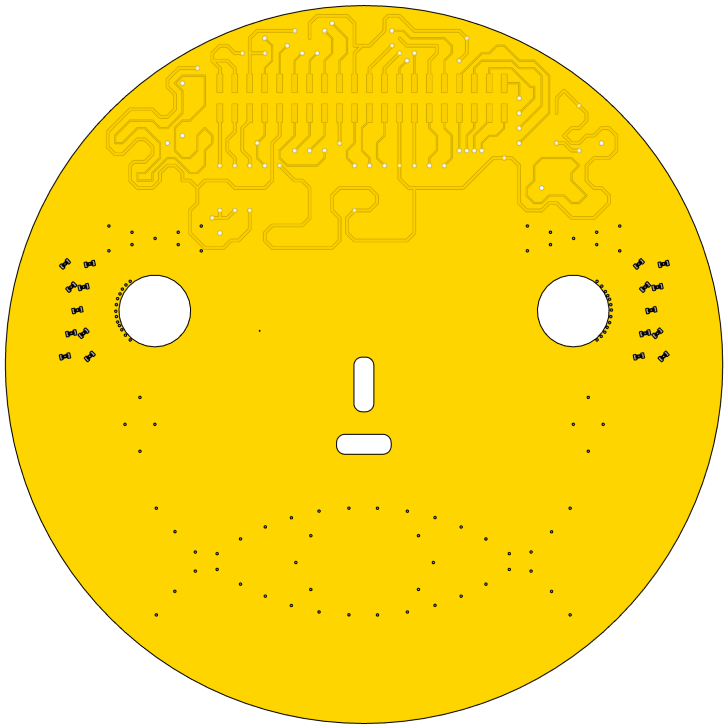
Orientation A rows:

0. Left Brow
1. Right Brow
2. Left side smile
3. Right side smile
4. Cheeks, split 4 left 4 right. (8)

Oritentation B (reverse) rows:

0. Left Eyes to the side
1. Right Eyes to the side

2. Left side sad mouth
3. Right side sad mouth
4. O mouth (6)



Numbering of individual LEDs are from top-left to right. The eyebrow sets are doubled up with the eye side using reverse polarity. The eye sides get signals from VIAs close to the eye hole.

The smile if formed by a left side and a right. LED numbering starts in the middle. A sad smile uses the same multiplexer banks but with reverse polarity.

LEDs are marked with identifiers on the connector side, but not on the front side.

Leds should be oriented perpendicular to the line they are arranged on. The orientation on the 3D model doesn't reflect what is intended.

LED Matrix driver

The LEDs are controlled via a IS31FL3730 chip connected to the Stem via STEM I2C.

It can be driven by 2.7V - 5.5V I/O can be up to Vcc+0.3V

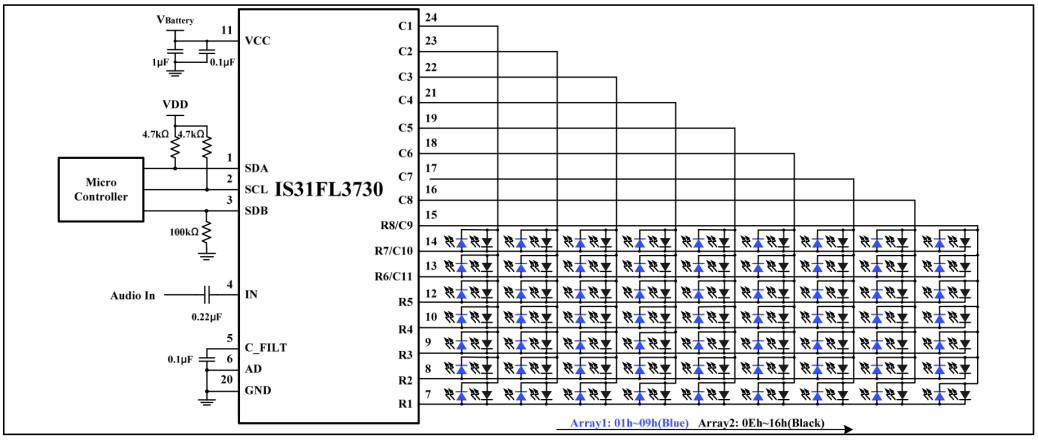


Figure 2 Typical Application Circuit Dual 7×9

LED mounting

Most LEDs are mounted by embedding them into the board. The PCB being 1mm thick a recess is made to fit the LED of 0.4mm. In the center a 0.4mm hole is drilled to let through light. We must determine the best way to produce accurate holes for a good fit. It is essential that the LEDs are placed accurately to have an equal distance between them.

While making the inital prototypes it will be very valuable to create boards that use a variation of LEDs such as yellow vs white. Variations in the embedding would also be great to test such as how deeply they are recessed or the thickness of the PCB. Pinhole or not is another variation to test.

Motion I2C Sensor

The MC6470 combines a 9 DoF (9 Degrees of Freedom) accelerometer, magnetometer and rotational sensor solution in 2x2mm single package for the consumer electronics market.

The motion sensor is connected to Stem I2C on addresses 0x98/0x99(or 7 bit 0x4C). It triggers STEM_INT when motion is detected

Gyro device drivers

The MC6470 contains the optimized sensor fusion unit that can support the patented mCube iGyroTM engine.

mCube iGyroTM support exists for Android version 4.x.x and beyond. Access to the iGyroTM functionality and data is done via the standard Android APIs, as described in android development website. http://developer.android.com/guide/topics/sensors/sensors_overview.html

I/O Expander 0

Expander #0 combines control signals. It is driven by SYS I2C. It is present used with and without SoM / m.2 modules.

The development board uses a single Expander. The 909 and 801 uses 2x PCA9555 to control more states The system expander input triggers interrupt via EX0_nINT (GPIO4_IO19). This expander deals with activity relevant during waking.

This first expander, which is also on the dev. board maps,

Expander	Connected to
EX0.0	mPCIe_PERST on M2 Key B
EX0.1	
EX0.2	
EX0.3	
EX0.4	MUX_OTG_USB2_SEL - SoM USB1
EX0.5	MUX_OTG_USB3_SEL - SoM USB1

Expander	Connected to
EX0.6	MUX_HOST_USB2_SEL - SoM USB2
EX0.7	MUX_HOST_USB3_SEL - SoM USB2
EX0.8	CSI1_PWR_DWN_B
EX0.9	LEFT_CAM_RESET
EX0.10	LEFT_ATT_INT
EX0.11	LEFT_ATT_XSHUT
EX0.12	CSI2_PWR_DWN_B
EX0.13	RIGHT_CAM_RESET
EX0.14	RIGHT_ATT_INT
EX0.15	RIGHT_ATT_XSHUT

This allows control of motion and camera module state

Edge Sound Expansion connectors

One the edge there are three 20 pin connectors that allow connecting expansion modules providing Sound/Sensor support.

1.8V signals are needed for suspended state. Should it be 3.3V for audio?

Most LEDs are mounted by embedding them into the board. The PCB being 1mm thick a recess is made to fit the LED of 0.4mm. In the center a 0.4mm hole is drilled to let through light. We must determine the best way to produce accurate holes for a good fit. It is essential the LEDs are placed accurately to have an equal distance between them.

3D Model libraries

https://kicad.github.io/packages3d/

Data to/from the Power Module

- STEM, SYS I2C
- USB data Host/OTG
- LVDS data
- UARTx_xXD

Control/power signals from the Power Module

- VSOM
- BOTH_VSOM
- VSOM_LOCK
- VCC_RTC
- GND

- PWRBTN, ALT_BOOT, QSPI_BOOT_EN_3P3
- SYS_RST_PMIC, PMIC_ON_REQ, PMIC_STBY_REQ
- EX0_nINT

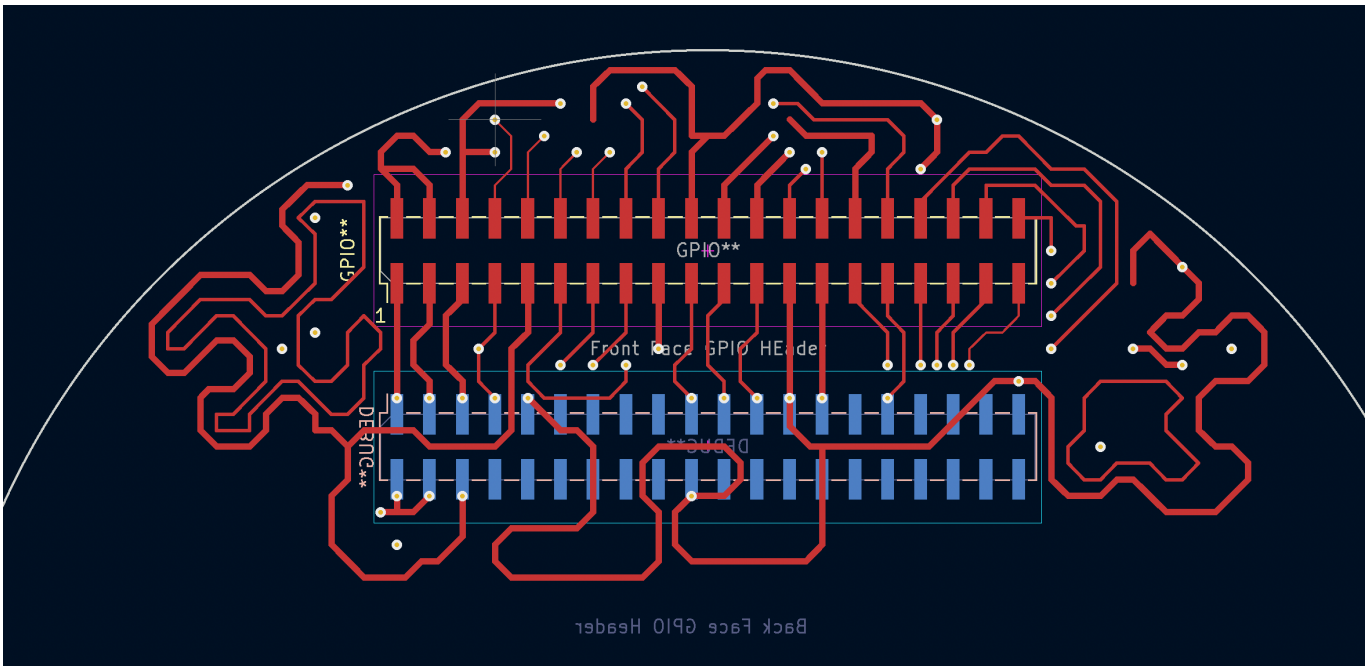
I2C EEPROM

Add an EEPROM like 24C08 present on the UCM carrier board.

Front facing GPIO header decoration

Exposed copper is routed around the GPIO header with certain objectives.

1. It aims to look brain like by being bulb shaped and avoiding straight lines.
2. The routing is gold plated and as exposed as possible considering risk of shorts
3. Ground routing is extended for decoration
4. Connection to back GPIO header where possible.

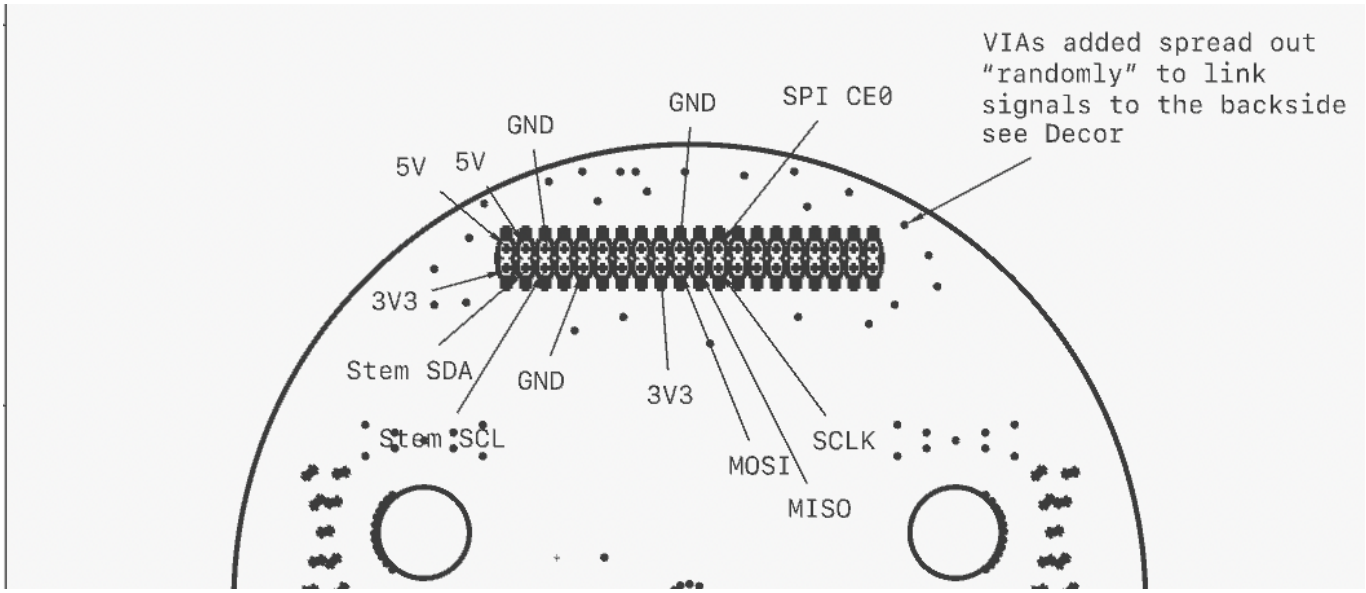


Note that the two GPIO headers are oriented so pins 1 and 39 are aligned side by side on the two. The specific layout is in the KiCAD project in Decor.

919 Connector Pinouts

Front facing GPIO header

The GPIO header is made to be compatible with RPi expansion hardware. It has fewer GND pins which are mapped to GPIO or receiving pins.



The front facing header is meant for adding sensors and satelite MCU like Pico/nRF53. It represents the pins of the zimbus plus ECSPI2 from the SoM.

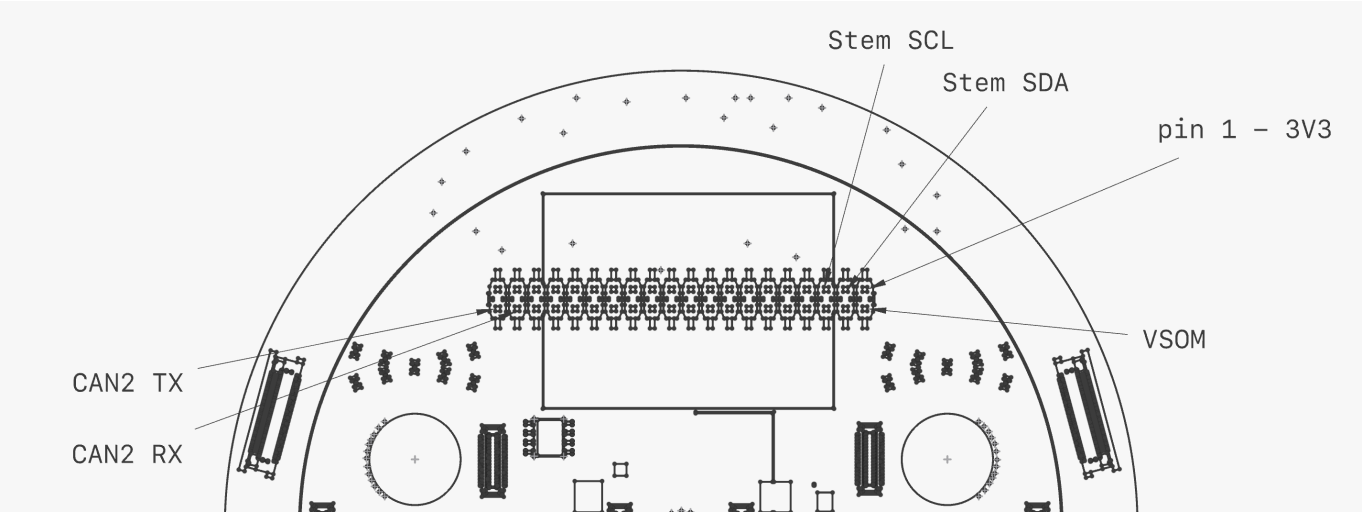
Left side	Function	Pin	Pin	Function	Right side
When VSOM fully connected	3V3	1	2	VCC_FULL	When VSOM fully connected
STEM_SDA	SDA	3	4	VCC_FULL	When VSOM fully connected
STEM_SCL	SCL	5	6	GND	
STEM_INT	INT	7	8	TxD	UART1 TxD
	GND	9	10	RxD	UART1 RxD
		11	12	SWD	SWDCLK for attached
SDIO DAT3 / GPIO2_IO18	SDIO	13	14	SWD	SWDIO for attached
SDIO CLK / GPIO2_IO13	SDIO	15	16	SDIO	SDIO CMD / GPIO2_IO14
When any VSOM connected	3V3	17	18	SDIO	SDIO DAT0 / GPIO2_IO15
ECSPI2_MOSI / GPIO5_IO11	MOSI	19	20	GND	
ECSPI2_MISO / GPIO5_IO12	MISO	21	22	SDIO	SDIO DAT1 / GPIO2_IO16
ECSPI2_SCLK / GPIO5_IO10	SCLK	23	24	SPI CE0	ECSPI2_SS0/GPIO5_IO13
	GND	25	26	SCL	NIGHT SCL
SYS I2C	SYS SDA	27	28	SCL	SYS I2C
NIGHT_INT	INT	29	30	(GND)	
NIGHT_SDA	SDA	31	32	TxD	UART3 TX
UART3 RX	RxD	33	34	CAN1	CAN1 RX / GPIO4_IO25 (RPi GND)

Left side	Function	Pin	Pin	Function	Right side
		35	36	CAN1	CAN1 TX / GPIO4_IO22
SDIO DAT2 / GPIO2_IO17	SDIO	37	38	CAN2	CAN2 RX / GPIO4_IO27
	(GND)	39	40	CAN2	CAN2 TX / GPIO4_IO26

The layout is kept mostly compatible with Raspberry 4 allowing emulation and easy comparison.

Back facing GPIO header

The back facing also loosely follows RPi GPIO layout.



Left side	Function	Pin	Pin	Function	Right side
When VSOM fully connected	3V3_ON	1	2	VCC_FULL	When VSOM fully connected
I2C3 SDA / STEM_SDA	SDA	3	4	VCC_FULL	When VSOM fully connected
I2C3 SCL / STEM_SCL	SCL	5	6	GND	
STEM_INT	INT	7	8	TxD	UART2 TxD
	GND	9	10	RxD	UART2 RxD
		11	12	SWD	SWDCLK for T-USB
SDIO DAT3 / GPIO2_IO18	SDIO	13	14	SWD	SWDIO for T-USB
SDIO CLK / GPIO2_IO13	SDIO	15	16	SDIO	SDIO CMD / GPIO2_IO14
When any VSOM connected	3V3	17	18	SDIO	SDIO DAT0 / GPIO2_IO15
ECSPI2_MOSI / GPIO5_IO11	MOSI	19	20	GND	
ECSPI2_MISO / GPIO5_IO12	MISO	21	22	SDIO	SDIO DAT1 / GPIO2_IO16
ECSPI2_SCLK / GPIO5_IO10	SCLK	23	24	SPI CE0	ECSPI2_SS0/GPIO5_IO13
	GND	25	26	SCL	NIGHT SCL

Left side	Function	Pin	Pin	Function	Right side
SYS I2C	SYS SDA	27	28	SCL	SYS I2C
NIGHT_INT	INT	29	30	(GND)	
NIGHT_SDA	SDA	31	32	TxD	UART4 TX
UART4 RX	RxD	33	34	JTAG	SoM JTAG CLK (RPi GND)
Battery measuring point	BAT_LDO	35	36	JTAG	SoM JTAG DIO
SDIO DAT2 / GPIO2_IO17	SDIO	37	38	CAN2	CAN2 RX / GPIO4_IO27
(GND on RPi)		39	40	CAN2	CAN2 TX / GPIO4_IO26

The back facing also loosely follows RPi GPIO layout.

50 pin B2B connectors

Two connectors tie the daughterboard to the bridge board. Both are of a 50 pin Highrose B2B type.

- JLCPCB plug
- JLCPCB socket

default height 1.5mm

Connector 1: High Speed Data Connector 2: PD Controller, Debug, USB 2.0

Power	Max Current	Pins
VSOM	3.0 A	10
GND	3.0 A	10
VCC_RTC	600 mA	2
VIN_3V3	300 mA	1
VIN_5V	600 mA	2
LDO_3V3	300 mA	1

Connector 1 high-speed data, close to Alt Mode Breakout connectors

- 6 * GND
- 7 * VSOM

One side

Pin	Code	Type	Details	Voltage	Misc	MCU pin.
1	VSOM	Power	Main power for board 3.45V - 4.5V		Conn. detect	

Pin	Code	Type	Details	Voltage	Misc	MCU pin.
2	USB1_RX_DP	USB	USB1 RX D+ (OTG)			
3	USB1_RX_DN	USB	USB1 RX D- (OTG)			
4	GND	Power	Ground			
5	USB1_TX_DP	USB	USB1 TX D+ (OTG)			
6	USB1_TX_DN	USB	USB1 TX D- (OTG)			
7	GND	Power	Ground			
8	USB2_RX_DP	USB	USB2 RX D+ (Host)			
9	USB2_RX_DN	USB	USB2 RX D- (Host)			
10	GND	Power	Ground			
11	USB2_TX_DP	USB	USB2 TX D+ (Host)			
12	USB2_TX_DN	USB	USB2 TX D- (Host)			
13	GND	Power	Ground			
17	STEM SCL	I2C	STEM SCL			GP17 I2C0
18	STEM SDA	I2C	STEM SDA			GP16 I2C0
19	STEM INT	I2C	Sensor interrupts			
20	GND	Power	Ground			
21	SWD CLK RP	RP2040				
23	SWD DAT RP	RP2040				
24	PWR_CHARGE	Battery	Internal charge current for testing			
25	BAT_STAT	Battery	Internal charging status for testing			

Other side

Pin	Code	Type	Details	Voltage	Misc	MCU pin.
50	LVCLK+	LVDS	LVDS CLK+			
49	LVCLK-	LVDS	LVDS CLK-			
48	VSOM	Power	Main power for board 3.45V - 4.5V			
47	LVD0+	LVDS	LVDS D0+			

Pin	Code	Type	Details	Voltage	Misc	MCU pin.
46	LVD0-	LVDS	LVDS D0-			
45	VSOM	Power	Main power for board 3.45V - 4.5V			
44	LVD1+	LVDS	LVDS D1+			
43	LVD1-	LVDS	LVDS D1-			
42	VSOM	Power	Main power for board 3.45V - 4.5V			
41	LVD2+	LVDS	LVDS D2+			
40	LVD2-	LVDS	LVDS D2-			
39	VSOM	Power	Main power for board 3.45V - 4.5V			
38	LVD3+	LVDS	LVDS D3+			
37	LVD3-	LVDS	LVDS D3-			
36	VSOM	Power	Main power for board 3.45V - 4.5V			
35						
34						
20	GND	Power	Ground			
32	CAN_RX		CAN1_RX		P21.12	
31	CAN_TX		CAN1_TX		P21.14	
30	BAT_LDO	Battery	4.9V 50mA LDO for STAT LED			
28	UART_RP_TXD	Debug				GP0
27	UART_RP_RXD	Debug				GP1
26	VSOM	Power	Main power for board 3.45V - 4.5V			

Could also take in HDMI or PCIe lanes instead of LVDS

Connector 2 PD controller, close to power connectors

- 2 * VSOM, 3 * GND, 1 * VCC_RTC, 1 * VIN_3V3
- 1 * VSOM, 1 * GND, 2 * VIN_5V

One side

Pin	Code	Type	Details	Voltage	Misc
1	VSOM	Power	Main power for board 3.45V - 4.5V		Conn. detect
2	GND	Power	Ground		

Pin	Code	Type	Details	Voltage	Misc
3	USB1_DP	USB	USB1 D+		
4	USB1_DN	USB	USB1 D-		
5	GND	Power	Ground		
6	USB2_DP	USB	USB2 D+		
7	USB2_DN	USB	USB2 D-		
8	GND	Power	Ground		
9	SWD_CLK	Debug	PD Controller GPIO12		
10	SWD_DAT	Debug	PD Controller GPIO13		
11	BOTH_VSOM	Enable	Bridge board signal;VSOM connected on both sides		
12		Future			
18	SYS I2C SCL	I2C			P21.7
19	SYS I2C SDA	I2C			P21.5
15	VSOM_LOCK	Power	Main power for board 3.45V - 4.5V, if mechanical lock shorted		Mech. lock
16	SYS_RST_PMIC	Reset	PMIC reset input pin. Internally pulled up with LDO1 power rail. Once low, PMIC performs reset.		P10.9
17	POR_B_3P3	Reset	Power On reset output pin. Open drain output requiring external pull up resistor.		P10.7
18	PMIC_ON_REQ	Reset	PMIC ON input from Application processor. When high, the device starts power on sequence.		P10.5
19	PMIC_STBY_REQ	Reset	Standby mode input from Application processor. When high, device enters STANDBY mode.		P10.3
20	VCC_RTC	Power	Low power mode supply		
21	PWRBTN	Boot	Power button trigger		
22	ALT_BOOT	Boot	Alternate boot		
23	QSPI_BOOT_EN_3P3	Boot	SPI boot		P21.18
24	BAT_CE#	Charger	Charge Enable Active-Low. Connect CE to a high logic level to place the battery charger in standby mode.		

Pin	Code	Type	Details	Voltage	Misc
25	PD_VIN_EN	Future	Enable VIN_5V/3V3 from PWR_SYS (TBD)		

Other side

Pin	Code	Type	Details	Voltage	Misc	mcu pin
50	PD_HRESET	Future	PD Controller HRESET (High)			
49	GND	Power	Ground			
48	UART1_TXD	UART	P1.72 UART1 Tx		P20.9	GP4 UART1
47	UART1_RXD	UART	P1.19 UART1 Rx		P20.11	GP5 UART1
46	UART2_TXD	UART	UART2 Tx		P20.1	GP8 UART1.
45	UART2_RXD	UART	UART2 Rx		P20.3	GP9 UART1
44	UART3_TXD	UART	P1.61 UART3 Tx		P20.2	GP12 UART0
43	UART3_RXD	UART	P1.21 UART3 Rx		P20.4	GP13 UART0
42	UART4_TXD	UART	UART4 Tx		P20.8	GP20 UART1
41	UART4_RXD	UART	UART4 Rx		P20.10	GP21 UART1
40	MIC_CLK	Sensor	frontboard mic			
39	MIC_DATA	Sensor				
38	MIC_INT	Sensor			?	
37	MOTION_INT	Sensor	frontboard motion mic on stem I2C		?	
36	NIGHT SCL	I2C	I2C6 SCL		P21.2	GP19 I2C1.
35	NIGHT SDA	I2C	I2C6 SDA		P21.4	GP18 I2C1.
34	NIGHT INT	I2C	Sensor interrupts			
33	SPI_CS	RP2040	RP SPI	3.3V		GP29 SPI1

Pin	Code	Type	Details	Voltage	Misc	mcu pin
32	SPI_CLK	RP2040	RP SPI	3.3V		GP10 SPI
31	SPI_MISO	RP2040	RP SPI	3.3V		GP28 SPI
30	SPI_MOSI	RP2040	RP SPI	3.3V		GP11 SPI
29	VIN_3V3		Supply for TPS64988 circuitry and I/O. Current 50 mA	3.3V		
28	VIN_5V	Power	System 5V power source (PPHV1, PPHV2, PP1_CABLE, PP2_CABLE). 500 mA.	5V		
27	VIN_5V	Power	System 5V power source (PPHV1, PPHV2, PP1_CABLE, PP2_CABLE). 500 mA.	5V		
26	VSOM	Power	Main power for board 3.45V - 4.5V		Conn. detect	

SPI pins will be exchanged for SDIO (MIC_INT / MOTION_INT / PD_HRESET likely to go away)

RPI FPC 22 pins

Pin	Code	Type	Details	Voltage
1	GND	Power	Ground	
2	CAM_D0_N	Data	MIPI Data Lane 0 Negative	
3	CAM_D0_P	Data	MIPI Data Lane 0 Positive	
4	GND	Power	Ground	
5	CAM_D1_N	Data	MIPI Data Lane 1 Negative	
6	CAM_D1_P	Data	MIPI Data Lane 1 Positive	
7	GND	Power	Ground	
8	CAM_CK_N	Data	MIPI Clock Lane Negative	
9	CAM_CK_P	Data	MIPI Clock Lane Positive	
10	GND	Power	Ground	
11	CAM_D2_N	Data	MIPI Data Lane 2 Negative	
12	CAM_D2_P	Data	MIPI Data Lane 2 Positive	

Pin	Code	Type	Details	Voltage
13	GND	Power	Ground	
14	CAM_D3_N	Data	MIPI Data Lane 3 Negative	
15	CAM_D3_P	Data	MIPI Data Lane 3 Positive	
16	GND	Power	Ground	
17	CAM_IO0	Power	Power Enable	
18	CAM_IO1	LED	LED Indicator	
19	GND	Power	Ground	
20	SCL	I2C	I2C SCL	
21	SDA	I2C	SCCB serial Interface data IO	
22	VCC	Power	3.3V Power Supply	

Ziloo Camera Module 34 pin connector

Just to be clear: All CSI lanes are laid out on one side of the connector with GND between.

Pin 1 is indicated on the board by a dot.

Toward thin part with microphone and other sensors

Pin	Code	Type	Details	Voltage
1	AF_VDD	Power	Reserved for Autofocus	3.3V
2	AVDD_2V8	Power	Analog, Max 500mA	2.8V
3	DOVDD	Power	Power for I/O circuit, Max 500mA	1.8V
4	VCC_1V8	Power	1.8V ,MAX 200mA	1.8V
5	GND	Power	GND	
6	CAM_FSIN	I/O	Frame sync input	
7	CAM_STROBE	I/O	Frame sync output	
8	EXTCLK	Input	External Clock Input (MCLK)	
9	ATT_INT	Output	Interrupt Attached Sensor, Active L	1.8V?
10	ATT_XSHUT	Input	Attached Sensor XSHUTDOWN	1.8V
11	Reserved	AF/PWM	PWM Motor control (NC)	
12	I2C_SCL	I/O	I2C?_SCL(pullup resistor 2.2K)	1.8V
13	I2C_SDA	I/O	I2C?_SDA(pullup resistor 2.2K)	1.8V
14	BCLK / SCK	I2S	Bit clock line	1.8V

Pin	Code	Type	Details	Voltage
15	WS / LRCLK	I2S	Word clock line	1.8V
16	SDATA1	I2S	Input data 1	1.8V
17	SDATA2	I2S	Input data 2 (NC)	1.8V

Towards image sensors

Pin	Code	Type	Details	Voltage
34	AGND	Power	Analog ground	
33	RESET	Input	Camera Reset, Active Low (RSTB)	
32	PWRDN	Input	Camera Power Down	
31	Reserved			
30	Reserved			
29	-		GND	
28	CSI_RX_D0P	Camera	MIPI_CSI_RX_D0+	1.8V
27	CSI_RX_D0N	Camera	MIPI_CSI_RX_D0-	1.8V
26	-		GND	
25	CSI_RX_D1P	Camera	MIPI_CSI_RX_D1+	1.8V
24	CSI_RX_D1N	Camera	MIPI_CSI_RX_D1-	1.8V
23	-		GND	
22	CSI_RX_D2P	Camera	MIPI_CSI_RX_D2+	1.8V
21	CSI_RX_D2N	Camera	MIPI_CSI_RX_D2-	1.8V
20	-		GND	
19	CSI_RX_CLKP	Camera	MIPI_CSI_RX_CLK+	1.8V
18	CSI_RX_CLKN	Camera	MIPI_CSI_RX_CLK-	1.8V