Power

- 14.8 Vin split across [14] inputs
    - 8x 12v regulator modules
        - LM2576-12WU-TR
            - 3A output ea
        - 1 power line to each module
    - 3x 5v regulator modules
        - LM2576-5.0WU-TR
            - 3A output ea
        - 1 power line to each module
    - 2x 3.3v regulator modules
        - AP63203WU-7
            - 2A output ea
        - 1 power line to each module
    - 1v reference voltage regulator module
        - TPS560430XFDBVR
            - 600 mA output
        - 1 power line in

I/O

- Base model
    - 8x ESCs
        - 8 terminal blocks tied to 12v pwr
        - 4x pcie 6 pin for motor output of ESCs (each esc uses half a connector)
            - Parts:
                - 24 pins
                - 4x 6 pin connectors
        - Route ESC output to 3 pins of 24 pin atx connectors
        - 2x(24 pin atx+6pin pcie) to daughter board
        - Located on 1 of 2 daughter boards near the end cap
                - atx 24 pin + 6 pin pcie connector to main board
                - 30 terminal blocks to connectors out
                - Parts (total)
                    - 120x Pins
                        - 4x 24 pin connectors - 96 pins
                        - 4x 6 pin connectors - 24 pins
                    - 4x 24 pin connecters
                    - 4x 6 pin connectors
        - 3x dupont pins
            - 1 tied to arduino digital pin (preset block)
            - Others tied to 5v power (pwr/gnd)
    - Pi
        - RJ45 port to pi
            - 8x dupont in from surface
                - Hot glue pins from surface in order

        - (buy external switch and remove casing)
    - USB A power to pi
        - Connected to 5v rail
        - USB A to micro-USB cable to pi
    - 4x USB C inputs from Pi
        - All ports receive 5v power from main rails
        - 2x ports to
            - 2x USB hub circuits to 6x USB A out
                - Bypass hub and power ports directly from 5v rail
                - TUSB2036VF USB hub chip (pinout+description below)

Pin	Num	Desc.	Config	Resistors and capacitors
BUSPWR	8	Indicates if the input power is used	Pull high to indicate ports are self powered	
DM0	2	0th USB port (input) data minus	Input D-	27 ohm resistor near port, 22pf cap between resistor and IC tied to ground plane, 15k ohm resistor tied to ground between 27 ohm resistor and port, shared VTS diode between 15k resistor and port.
DM1	11	1st USB port (output) data minus	Output1 D-	27 ohm resistor near port, 22pf cap between resistor and IC tied to ground plane, 15k ohm resistor tied to ground between 27 ohm resistor and port, shared VTS diode between 15k resistor and port
DM2	15	2ndUSB port (output) data minus	Output2 D-	27 ohm resistor near port, 22pf cap between resistor and IC tied to ground plane, 15k ohm resistor tied to ground between 27 ohm resistor and port, shared VTS diode between 15k resistor and port
DM3	19	3rdUSB port (output) data minus	Output3 D-	27 ohm resistor near port, 22pf cap between resistor and IC tied to ground plane, 15k ohm resistor tied to ground between 27 ohm

				resistor and port, shared VTS diode between 15k resistor and port
DP0	1	0th USB port (input) data positive	Input D+	27 ohm resistor near port, 22pf cap between resistor and IC tied to ground plane, 15k ohm resistor tied to ground between 27 ohm resistor and port, shared VTS diode between 15k resistor and port
DP0PUR	27	Indicates to the input USB when the hub is powered on	Connect to Input D+	1.5K ohm resistor tied to d+ line after cap
DP1	12	1st USB port (output) data positive	Output1 D+	27 ohm resistor near port, 22pf cap between resistor and IC tied to ground plane, 15k ohm resistor tied to ground between 27 ohm resistor and port, shared VTS diode between 15k resistor and port
DP2	16	2nd USB port (output) data positive	Output1 D+	27 ohm resistor near port, 22pf cap between resistor and IC tied to ground plane, 15k ohm resistor tied to ground between 27 ohm resistor and port, shared VTS diode between 15k resistor and port
DP3	20	3rd USB port (output) data positive	Output1 D+	27 ohm resistor near port, 22pf cap between resistor and IC tied to ground plane, 15k ohm resistor tied to ground between 27 ohm resistor and port, shared VTS diode between 15k resistor and port
EECLK	5	Acts as a clock for the EEPROM if one is connected	Leave floating (no EEPROM)	
GANGED	6	Indicates how the overcurrent protection will detect	Tie Low (unused)	

<table>
<tr><td></td><td></td><td>devices</td><td></td><td></td></tr>
<tr><td>EXTRMEM</td><td>26</td><td>Indicates if an EEPROM is attached (an EEPROM could indicate device information such as rating, manufacturer, etc.)</td><td>Tie to 3.3v to indicate no EEPROM</td><td></td></tr>
<tr><td>GND</td><td>7,28</td><td>GND</td><td>GND</td><td>N/A</td></tr>
<tr><td>PWRSW</td><td>21</td><td>Power switching for self powered hubs</td><td>Tie to GND so system waits 100ms to connect</td><td></td></tr>
<tr><td>OVRCUR1</td><td>10</td><td rowspan="3">Detects overcurrent on usb outputs</td><td rowspan="3">Tie High (unused)</td><td rowspan="3"></td></tr>
<tr><td>OVRCUR2</td><td>14</td></tr>
<tr><td>OVRCUR3</td><td>18</td></tr>
<tr><td>PWRON1</td><td>9</td><td rowspan="3">Power on/off control signals to the usb outputs</td><td rowspan="3">Tie Low (Unused)</td><td rowspan="3"></td></tr>
<tr><td>PWRON2</td><td>13</td></tr>
<tr><td>PWRON3</td><td>17</td></tr>
<tr><td>RESET</td><td>4</td><td>Initialises the system, and can reset the logic</td><td>Receive signal from Voltage Monitor IC (TPS3823-33QDBVRQ1) on powerup
<table><tr><td>Pin</td><td>Num</td><td>Circuit</td></tr><tr><td>GND</td><td>2</td><td>GND</td></tr><tr><td>MR</td><td>3</td><td>Manual Reset (unused) leave floating</td></tr><tr><td>RESET</td><td>1</td><td>Sends reset pulse to USB hub IC</td></tr><tr><td>VDD</td><td>5</td><td>Input voltage and supply voltage</td></tr><tr><td>WDI</td><td>4</td><td>Watchdog input (unused) leave floating</td></tr></table></td><td></td></tr>
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SUSPND	32	Suspend the hub operations (for power saving/sleep purposes)	Tie Low (Unused)	
MODE	31	Clock speed mode	Tie low to indicate 6MHz crystal	
NP3	24	Number of ports is 3	Tie low to indicate 3 output ports	
NPINT0	22	Number of internal ports	Tie to GND	
NPINT1	23			
Vcc	3,25	Power in	3.3v in	4.7 uf cap tied to gnd
XTAL1	30	Clock input	Crystal (ABL-6.000MHZ-B2) Input	
XTAL2	29	Clock output	Crystal (ABL-6.000MHZ-B2) Output	

                - 2x ports (superspeed) directly connected to USB A out
                    - Replace power lines with 5v sys power
            - GPIO pins
        - Arduino
            - Custom hat / dupont cables w/ 3d printed case for cable management
                - Combine dupont pins into 40 pin blocks
                - Ignore power/gnd pins
            - Dupont 40 pin ribbon cable to mainboard
            - USB A (superspeed) to arduino input
                - Usb A to USB B
- Expansion
    - Labeled and arranged Arduino plus pi GPIO pins (some will be system reserved for necessary components)
    - 10x 5v power pins
    - 10x 3.3v power pins

Onboard monitoring

- Status Leds for each power line
- Thermistors on board and near heat generating components
- Ground plane for heatsinks
- Transistors/relays to disable all power lines individually
    - Accept signal from BMS boards
    - Accept signals from switch board
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Safety

- Fan headers
    - 12v power rail

- Siphon power from each 12v power rail
- WARNING: nothing but fans