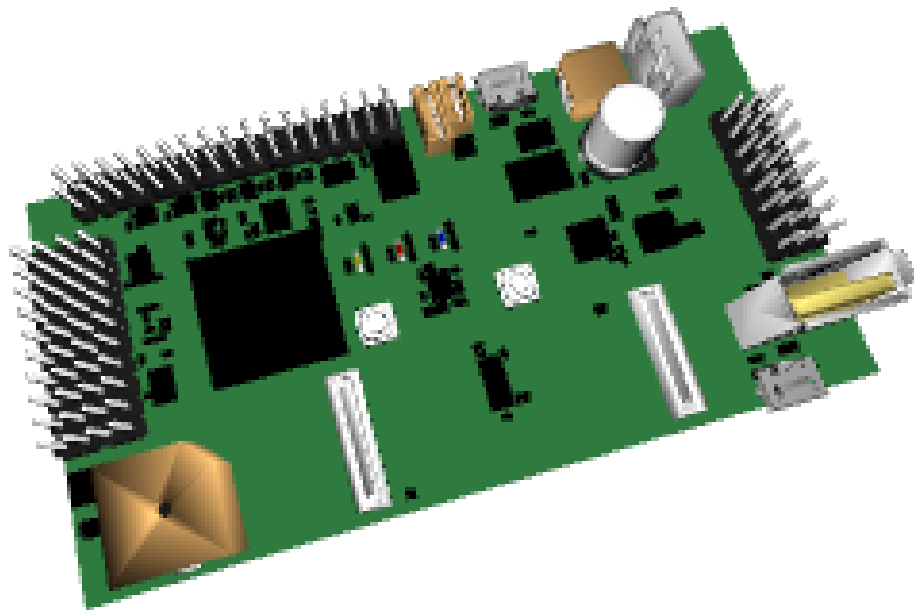


AeroCore 2 for Overo



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Board Description

MAV control board featuring an integrated Cortex-M4 microprocessor and NuttX RTOS. Compatible with: [Overo COMs](<https://store.gumstix.com/coms/overo-coms.html>), the [Pre-GO](<https://store.gumstix.com/accessories/pre-go.html>) and the [Pre-GO PPP](<https://store.gumstix.com/accessories/prego-ppp.html>).

Board Dimensions

9.6cm x 5.0cm



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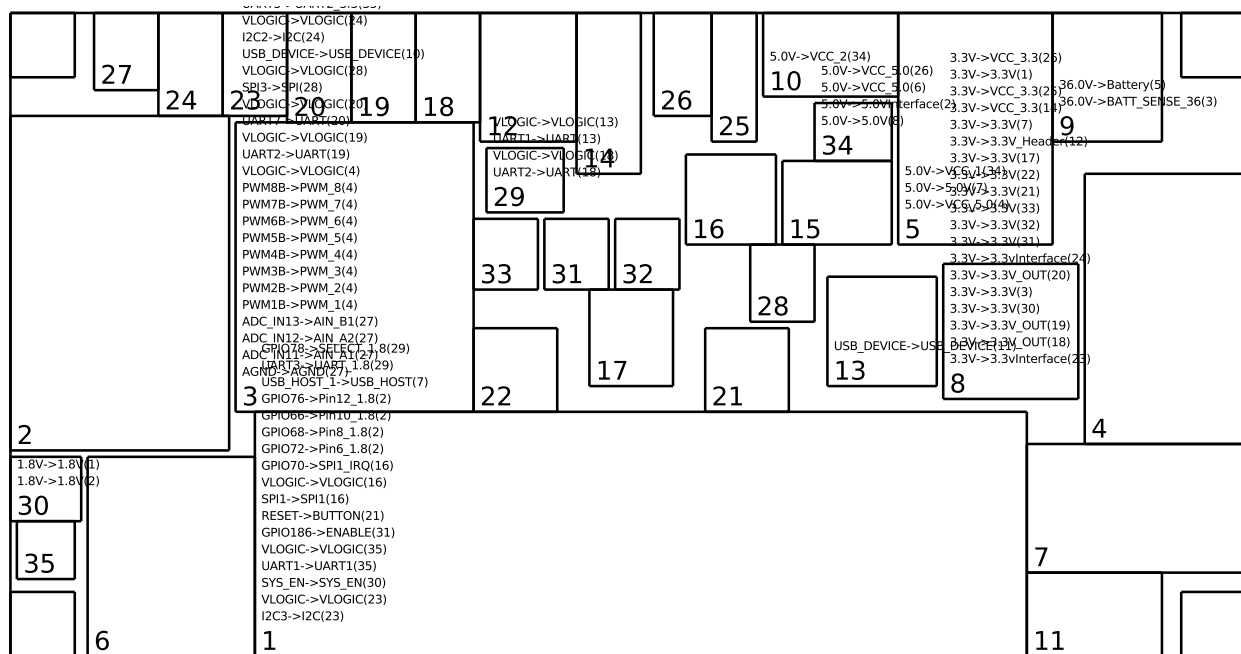
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1 Modules on Board



1.1 COM Connectors

1.1.1 Gumstix - Overo COM Connector (v33) (1)

Each of these two 70-pin connectors (Kyocera Series 5602) accepts signals from computers-on-module in the Overo series; a total of 140 possible signals that can be interfaced using these connectors (including power). COM to expansion board connectors in the Overo series are labelled J1 and J4, each carrying different types of signals. The correct orientation of these connectors is important; your Geppetto design will have a silkscreened footprint for a COM showing the correct orientation.

On the bottom of an Overo COM with silkscreened text oriented north, J4 is the connector located on the eastern the edge of the PCB. Connector J4 carries extended memory bus and MMC signals, detailed at <http://goo.gl/lbTDPO>.

Likewise, on the bottom of an Overo COM with the silkscreened text oriented north, J1 is the connector located approximately 1.3 mm from the western edge. Connector J1 carries LCD, PWM (pulse-width modulation) and analog signals, detailed at <http://goo.gl/noPRac>.

The Overo connectors require the following inputs:

- 3.3V from 3.3V/1.5A Regulator (8)
- 1.8V from 1.8V/0.6A Regulator (30)

The Overo connectors provide the following outputs:

- RESET to Tactile Switch (21)
- GPIO76 to 40 Pin Header (2)



- SPI1 to SPI Bridge (16)
- GPIO70 to SPI Bridge (16)
- USB_HOST_1 to USB Standard-A Jack (vertical) (7)
- SYS_EN to 1.8V/0.6A Regulator (30)
- GPIO186 to Red LED (31)
- UART1 to UART-UART (35)
- UART3 to UART Mux (2 output) (29)
- GPIO66 to 40 Pin Header (2)
- GPIO72 to 40 Pin Header (2)
- VLOGIC to:
 - I2C Header (23)
 - UART-UART (35)
 - SPI Bridge (16)
- GPIO68 to 40 Pin Header (2)
- GPIO78 to UART Mux (2 output) (29)
- I2C3 to I2C Header (23)

1.2 Headers

1.2.1 40 Pin Header (v11) (2)

The 40-Pin header connects up to 16 GPIO or PWM signals and outputs them at 3.3V or 5.0V. An additional voltage rail and ground is provided for compataibility with standard 3-pin headers.

The header also includes two ground pins, a 1.8V/3.3V reference, and an output level reference.

The 40-pin header has the following connections:

- Pin8_1.8 to GPIO68 from Gumstix - Overo COM Connector (1)
- Pin12_1.8 to GPIO76 from Gumstix - Overo COM Connector (1)
- Pin10_1.8 to GPIO66 from Gumstix - Overo COM Connector (1)
- Pin17 to PA9 from ST Micro Cortex-M4 (3)
- Pin13 to PC8 from ST Micro Cortex-M4 (3)
- Pin11 to PC7 from ST Micro Cortex-M4 (3)
- Pin19 to PA10 from ST Micro Cortex-M4 (3)
- Pin6_1.8 to GPIO72 from Gumstix - Overo COM Connector (1)
- Pin9 to PC6 from ST Micro Cortex-M4 (3)
- Pin5 to PE5 from ST Micro Cortex-M4 (3)



- Pin3 to PC9 from ST Micro Cortex-M4 (3)
- Pin2 to PB8 from ST Micro Cortex-M4 (3)
- Pin1 to PB9 from ST Micro Cortex-M4 (3)
- Pin7 to PE6 from ST Micro Cortex-M4 (3)
- Pin15 to PA8 from ST Micro Cortex-M4 (3)
- Pin4 to PB0 from ST Micro Cortex-M4 (3)

1.2.2 Octal PWM Header (v9) (4)

This module offers eight PWM headers for controlling servo motors and other PWM-controlled devices.

This header offers PWM outputs connected to:

- PWM_1 to PWM1B on ST Micro Cortex-M4 (3)
- PWM_2 to PWM2B on ST Micro Cortex-M4 (3)
- PWM_3 to PWM3B on ST Micro Cortex-M4 (3)
- PWM_4 to PWM4B on ST Micro Cortex-M4 (3)
- PWM_5 to PWM5B on ST Micro Cortex-M4 (3)
- PWM_6 to PWM6B on ST Micro Cortex-M4 (3)
- PWM_7 to PWM7B on ST Micro Cortex-M4 (3)
- PWM_8 to PWM8B on ST Micro Cortex-M4 (3)

1.2.3 SPI Header (v11) (12)

This header breaks out SPI1 on ST Micro Cortex-M4 (3) .

1.2.4 CAN Header (v5) (14)

The CAN header is connected to CAN1 on ST Micro Cortex-M4 (3).

1.2.5 UART Header (v8) (18)

The UART header provides a 2-wire interface alongside power and ground pins for UART signals.

This module is connected to the UART2 bus on UART Mux (2 output) (29).



1.2.6 UART Header (v8) (19)

The UART header provides a 2-wire interface alongside power and ground pins for UART signals.

This module is connected to the UART2 bus on ST Micro Cortex-M4 (3).

1.2.7 UART Header (v8) (20)

The UART header provides a 2-wire interface alongside power and ground pins for UART signals.

This module is connected to the UART7 bus on ST Micro Cortex-M4 (3).

1.2.8 I2C Header (v12) (23)

This header breaks out I2C3 on Gumstix - Overo COM Connector (1) .

1.2.9 I2C Header (v12) (24)

This header breaks out I2C2 on ST Micro Cortex-M4 (3) .

1.2.10 Spektrum DSM-2 Remote Connector (v7) (25)

This header is used to connect to a Spektrum DSM/X satellite receiver. It uses a UART RX signal and has a switched 3.3V power supply.

This module is connected to the UART8 bus on ST Micro Cortex-M4 (3).

1.2.11 Five-pin GPS Header (v6) (26)

The off-board GPS header provides a 2-wire UART interface alongside power and ground pins for use with the Gumstix PRE-GO GNSS board. It also works with some third party positioning modules.

This module is connected to the UART1 bus on ST Micro Cortex-M4 (3). Analog header. Provides access to 4 ADC pins and supplies a GND.

1.3 Processors

1.3.1 ST Micro Cortex-M4 (v33) (3)

An ARM Cortex-M4 processor of ST Microelectronics 32F427. The processor runs at 168MHz at 1.8 or 3.3 volts – and has a hardware floating point unit. The battery voltage is sensed on ADC_IN10 with a gain of 0.09091.

Requires:

- 3.3V from 3.3V/1.5A Regulator (8)
- BATT_SENSE_36 from Battery 2-Cell Balance Connector (9)



Provides:

- RESET to Tactile Switch (22)
- PB9 to 40 Pin Header (2)
- PWM1B to Octal PWM Header (4)
- BOOT0 to Buzzer (6)
- PB8 to 40 Pin Header (2)
- PWM5B to Octal PWM Header (4)
- PA10 to 40 Pin Header (2)
- PWM3B to Octal PWM Header (4)
- PWM7B to Octal PWM Header (4)
- SPI2 to SPI Bridge (16)
- SPI3 to:
 - Barometer (28)
 - 9-Axis IMU (17)
- SPI1 to SPI Header (12)
- PB0 to 40 Pin Header (2)
- SPI4 to FRAM (128 KB) (15)
- PD4 to 9-Axis IMU (17)
- PD3 to 9-Axis IMU (17)
- PD2 to 9-Axis IMU (17)
- ADC.IN12 to 4-pin Analog Header (27)
- UART1 to Five-pin GPS Header (26)
- UART3 to UART-UART (35)
- UART2 to UART Header (19)
- ADC.IN11 to 4-pin Analog Header (27)
- UART7 to UART Header (20)
- PWM8B to Octal PWM Header (4)
- UART8 to Spektrum DSM-2 Remote Connector (25)
- PB5 to Power Muxer (two 5V sources) (34)
- AGND to 4-pin Analog Header (27)
- PWM2B to Octal PWM Header (4)
- CAN1 to CAN Header (14)



- PWM4B to Octal PWM Header (4)
- VLOGIC to:
 - Octal PWM Header (4)
 - UART Header (19)
 - UART Header (20)
 - Barometer (28)
 - I2C Header (24)
 - 9-Axis IMU (17)
 - SPI Header (12)
 - 40 Pin Header (2)
 - Power Muxer (two 5V sources) (34)
 - Five-pin GPS Header (26)
 - FRAM (128 KB) (15)
- ADC_IN13 to 4-pin Analog Header (27)
- PWM6B to Octal PWM Header (4)
- I2C2 to I2C Header (24)
- PC8 to 40 Pin Header (2)
- PC9 to 40 Pin Header (2)
- PE9 to Blue LED (32)
- PA8 to 40 Pin Header (2)
- PE5 to 40 Pin Header (2)
- PE6 to 40 Pin Header (2)
- PC6 to 40 Pin Header (2)
- PC7 to 40 Pin Header (2)
- PC4 to SPI Bridge (16)
- PC5 to SPI Header (12)
- USB_DEVICE to Micro-B Jack (10)
- PA9 to 40 Pin Header (2)
- PE15 to Spektrum DSM-2 Remote Connector (25)
- PE10 to Yellow LED (33)



1.4 Power

1.4.1 5V/5A Regulator (v3) (5)

Takes 6 - 36V input from Battery 2-Cell Balance Connector (9) and provides up to 5A at 5V to:

- Octal PWM Header (4)
- USB Standard-A Jack (vertical) (7)
- Power Muxer (two 5V sources) (34)

1.4.2 3.3V/1.5A Regulator (v9) (8)

This DC to DC step down regulator provides a 3.3V DC output at 1.5A needed by certain components on this board. It is capable of accepting an input voltage between 3.1 to 16V DC. Currently, its input is 5V from Power Muxer (two 5V sources) (34).

This regulator provides 3.3V to:

- I2C Header (23)
- UART Header (18)
- UART Header (19)
- 1.8V/0.6A Regulator (30)
- ST Micro Cortex-M4 (3)
- UART Header (20)
- I2C Header (24)
- Red LED (31)
- Blue LED (32)
- Yellow LED (33)
- Tactile Switch (21)
- Tactile Switch (22)
- 9-Axis IMU (17)
- SPI Header (12)
- USB Standard-A Jack (vertical) (7)
- CAN Header (14)
- Spektrum DSM-2 Remote Connector (25)
- Gumstix - Overo COM Connector (1)
- Five-pin GPS Header (26)



1.4.3 1.8V/0.6A Regulator (v6) (30)

This DC-DC regulator has an integrated inductor and tiny footprint. It provides power to modules that need a 1.8V input.

- 3.3V from 3.3V/1.5A Regulator (8)
- SYS_EN from Gumstix - Overo COM Connector (1)

The following modules receive 1.8V DC from this regulator:

- 40 Pin Header (2)
- Gumstix - Overo COM Connector (1)

1.4.4 Power Muxer (two 5V sources) (v5) (34)

Takes 5V input from 5V/5A Regulator (5) or Micro-B Jack (10) and provides up to 1.25A at 5V to:

- 3.3V/1.5A Regulator (8)
- 40 Pin Header (2)
- Buzzer (6)
- Five-pin GPS Header (26)

1.5 Audio

1.5.1 Buzzer (v7) (6)

This SMT buzzer provides an audible indicator for the signal BOOT0 on ST Micro Cortex-M4 (3).

1.6 USB

1.6.1 USB Standard-A Jack (vertical) (v3) (7)

A standard A USB host port (vertical entry) that allows you to connect USB devices to the board. This port is connected to USB_HOST_1 on Gumstix - Overo COM Connector (1).

1.6.2 Micro-B Jack (v8) (10)

A USB micro-B port allows your design to connect as a USB device to a USB host.

This module is connected to USB_DEVICE on ST Micro Cortex-M4 (3).

It supplies 5.0V to:

- Power Muxer (two 5V sources) (34)



1.6.3 Micro-B Jack (v8) (11)

A USB micro-B port allows your design to connect as a USB device to a USB host.

This module is connected to USB_DEVICE on USB-UART (13).

1.7 Power Connectors

1.7.1 Battery 2-Cell Balance Connector (v6) (9)

This is a standard 2S LiPo balance connector (XH Type). Although it's a 2S connector, it can provide 16.0V or 36.0V.

This connector provides 36.0V to:

- ST Micro Cortex-M4 (3)
- 5V/5A Regulator (5)

1.8 Connectivity

1.8.1 USB-UART (v14) (13)

Also known as an FTDI, this USB to UART converter allows a USB connection to the board to behave as a virtual RS232 serial connection. It offers direct and complete access to the system from a development machine.

This USB to UART converter connects a host machine from Micro-B Jack (11) to UART1 on UART Mux (2 output) (29).

1.8.2 SPI Bridge (v9) (16)

The SPI bridge connects two SPI interfaces on different modules, allowing them to communicate.

This module connects SPI1 on Gumstix - Overo COM Connector (1) to SPI2 on .

1.8.3 UART Mux (2 output) (v5) (29)

A bidirectional 2 x SPDT switch connects two UART interfaces (RX/TX only). A SELECT line is used to control which UART is output.

This UART 2-output mux switches between UART on USB-UART (13) or UART on UART Header (18) to UART3 on Gumstix - Overo COM Connector (1).

The output is controlled by GPIO78 on Gumstix - Overo COM Connector (1).

1.8.4 UART-UART (v6) (35)

A UART-UART bridge interfaces two modules with UART lines (e.g., interfacing two processors).



This UART bridge connects UART1 on Gumstix - Overo COM Connector (1) to UART3 on ST Micro Cortex-M4 (3).

1.9 Memory

1.9.1 FRAM (128 KB) (v8) (15)

This 128 KB non-volatile FRAM memory module is connected via SPI and is useful for storing small amounts of data.

This module is connected to SPI4 on ST Micro Cortex-M4 (3).

1.10 Sensors

1.10.1 9-Axis IMU (v16) (17)

This module provides 3-axis acceleration, 3-axis rotational rates and 3-axis magnetic field information. It is connected via a SPI bus. Data-ready pins are provided.

Its SPI bus is connected to SPI3 on ST Micro Cortex-M4 (3)

It has the following data ready signals:

- ACCEL_DRDY to PD3 on ST Micro Cortex-M4 (3)
- GYRO_DRDY to PD2 on ST Micro Cortex-M4 (3)
- MAG_DRDY to PD4 on ST Micro Cortex-M4 (3)

1.10.2 Barometer (v6) (28)

An ultra-compact, low-power barometer useful for aerial vehicles. The barometer module offers a high resolution reading, accurate to within 10 cm and is optimized for altimeter and variometer applications. At altitudes close to sea level, covering the barometer module with a light piece of foam may help to improve the accuracy of readings.

This module is connected to SPI3 on ST Micro Cortex-M4 (3).

Visit <http://www.meas-spec.com/downloads/MS5611-01BA03.pdf> for details.

1.11 IO

1.11.1 Tactile Switch (v9) (21)

This 4.9 sq. mm light touch switch provides a user input for the signal RESET on Gumstix - Overo COM Connector (1).



1.11.2 Tactile Switch (v9) (22)

This 4.9 sq. mm light touch switch provides a user input for the signal RESET on ST Micro Cortex-M4 (3).

1.11.3 Red LED (v11) (31)

This 1608 standard size red LED provides an indicator for the signal GPIO186 on Gumstix - Overo COM Connector (1).

1.11.4 Blue LED (v14) (32)

This 1608 standard size blue LED provides an indicator for the signal PE9 on ST Micro Cortex-M4 (3).

1.11.5 Yellow LED (v13) (33)

This 1608 standard size yellow LED provides an indicator for the signal PE10 on ST Micro Cortex-M4 (3).

1.12 Mechanical

1.12.1 Mounting Hole (2.2mm)

A #0 mounting hole for securing the board with mounting pins.

1.12.2 Mounting Hole (2.2mm)

A #0 mounting hole for securing the board with mounting pins.

1.12.3 Mounting Hole (2.2mm)

A #0 mounting hole for securing the board with mounting pins.

1.12.4 Mounting Hole (2.2mm)

A #0 mounting hole for securing the board with mounting pins.



2 Module Connections Graph

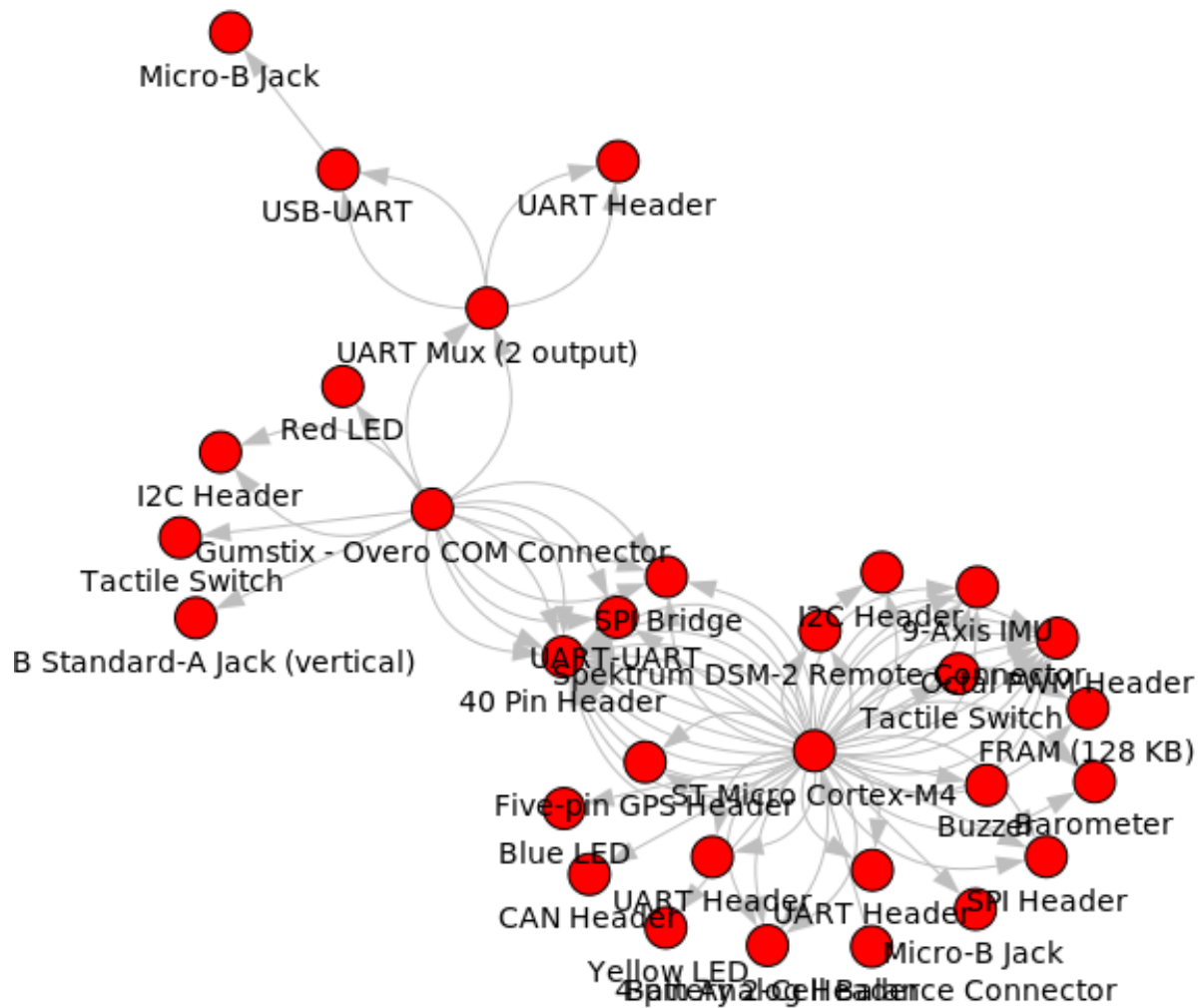
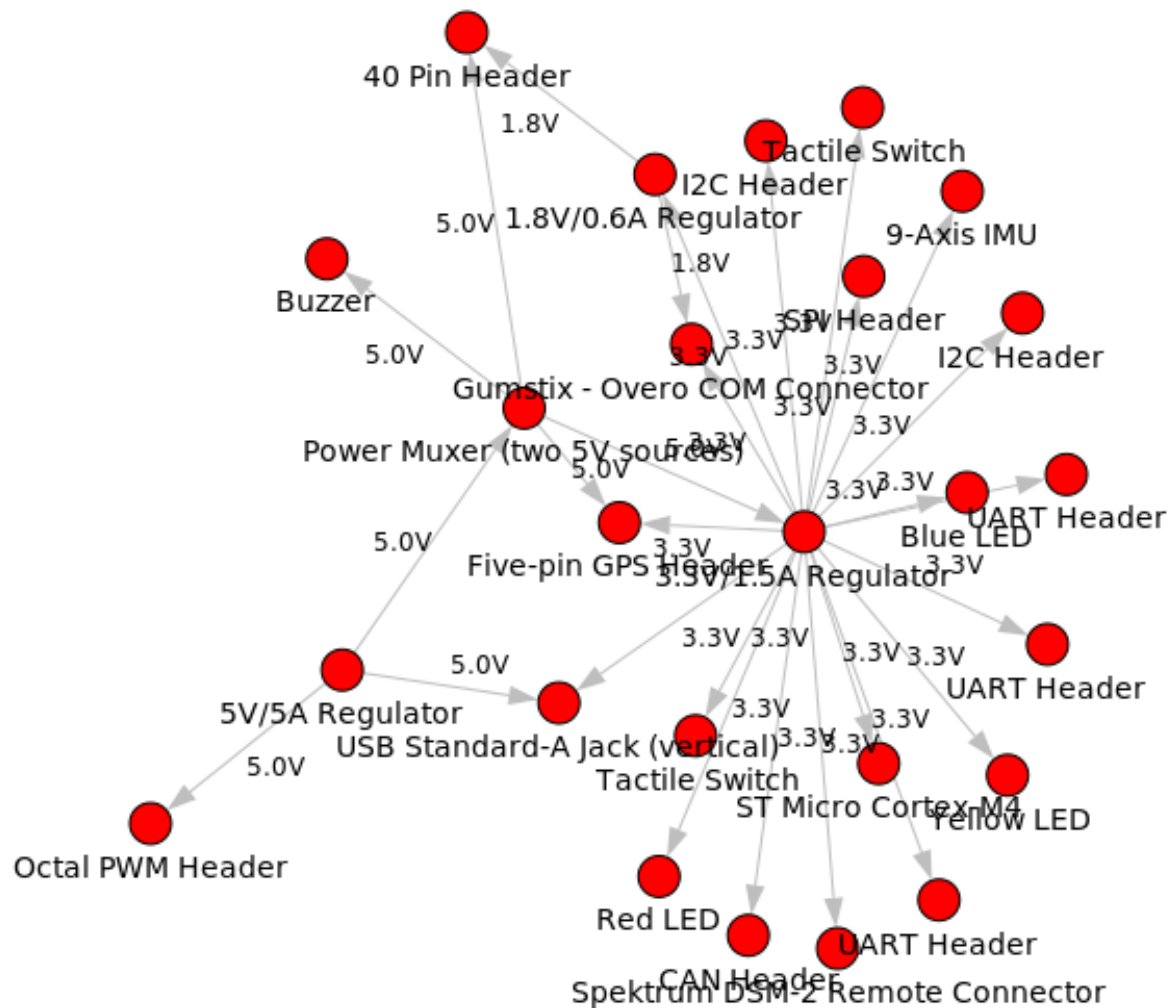


Figure 1: excludes power modules



3 Module Power Graph



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