Q1 Power subsystem

Q1.1 Specification

Charging module:

- Voltage input: 5V
- Voltage output to battery: 4.1V
- Current input: 0.5A
- Overcharge protection: regulates up to 18V down to 5V

Power supply:

- Voltage: 3.235V – 3.365V
- Current: 27mA
- Overcharge protection: regulates up to 18V down to 3.3V
- Schottky diode polarity protection
- Zener diode undercharge protection

Q1.2 Draft BOM

Power Module

Reference	Value	Extended	Unit Price	Total Qty	Power
C95872	1N4001		0,0069	2	0,0138
C8062	D_Zener		0,0121	1	0,0121
C19702	10uF		0,0066	3	0,0198
C25819	47k		0,001	1	0,001
C351787	AMS1117-5.0	YES	0,0731	1	0,0731
C5199435	AMS1117-3.3	YES	0,0627	1	0,0627
C11702	1k		0,0005	1	0,0005
C5240615	NMOS	YES	0,0185	1	0,0185
C2150	Transistor		0,0147	1	0,0147
C191023	D_Schottky		0,0167	1	0,0167
C17520	2.2k		0,0017	1	0,0017
Total Cost					0,2346

With the extra $3 for each extended part, the total cost is $9.2346.

https://github.com/murrayinglis/EEE3088-group-09/blob/main/PCB/SCHEMATICS/BOM.xlsx

Q1.3 Interfacing

- STM32 - providing power at 3.3V.
- HAT - providing power to the circuitry at 3.3V.
- Battery level sensor – outputs battery voltage.
- Battery - drawing power
- Battery - charging

Q2 Microcontroller interfacing

Q2.1 Specification

Micro-usb:

- Name: USB 2.0 Surface Mount Female Micro-B SMD
- Part number: C404969
- Current rating: 1.8A
- Voltage rating: 30V

EEPROM:

- Name: HX24LC02B EEPROM
- Part number: C2987267
- Operating voltage: 1.7V – 5.5V
- Operating read current: 1mA
- Operating write current: 3mA

Q2.2 Draft BOM

Microcontroller Module

Reference	Value	Extended	Unit Price	Total Qty	Power
C404969	Micro usb port		0,0333	1	0,0333
C2987267	Eprom	YES	0,092	1	0,092
C1613	3.3nF		0,0058	1	0,0058
C2286	LED		0,0054	3	0,0162
Total Cost					**0,1473**

With the extra $3 for each extended part, the total cost is $3,1473.

https://github.com/murrayinglis/EEE3088-group-09/blob/main/PCB/SCHEMATICS/BOM.xlsx

Q2.3 Interfacing

- Battery to draw power.
- Analogue sensor to ADC pin of the STM (pin VBAT).
- The digital sensor to I2C pins of the STM (pins PB10 and PB11).
- Debugger on pins NRST, T_SWCLK, T_SWDIO.
- EEPROM on pins PA9 and PA10
- FTDI serial header on pins PA7, PA8, PA11.

Q3 Sensing

Q3.1.1 Digital Sensor Specification

Optical sensor:

- Name: LTR-303ALS-01
- Supply voltage: 2.4V - 3.6V
- Interface bus supply voltage: 1.7V - 3.6V
- I2C Bus Input Pin High Voltage: 1.2V
- I2C Bus Input Pin Low Voltage: 0.6V
- Operating temperature: -30°C – 70°C
- Active supply current: 220uA
- Standby current: 5uA
- Initial startup time: 100ms
- Wakeup time from standby: 10ms

Q3.1.2 Analogue Sensor Specification

Battery sensor:

- Output voltage: 0V - 2.5V
- Output current: 27mA

Q3.2 Draft BOM

Sensing Module

Reference	Value	Extended	Unit Price	Total Qty	Power
C11702	1k		0,0005	2	0,001
C1613	3.3nF		0,0058	1	0,0058
C364577	LTR-303ALS-01	YES	0,3887	1	0,3887
C17902	10k		0,003	2	0,006
C1613	3.3nF		0,0058	1	0,0058
Total Cost					**0,4073**

With the extra $3 for each extended part, the total cost is $3,4073.

https://github.com/murrayinglis/EEE3088-group-09/blob/main/PCB/SCHEMATICS/BOM.xlsx

Q3.3 Interfacing

Q3.1.1 Digital Sensor Interfacing

- STM on pins PB10 and PB11
- 3.3V from power supply

Q3.1.2 Analogue Sensor Interfacing

- STM on pin VBAT
- Battery voltage from battery