Specifications:

The device must be capable of supplying $24V$ at $10A$.

The device must be capable of supplying $12V$ at $5A$.

The device shall be powered by rechargeable batteries.

The device must be capable of operating on a single charge during the entirety of a competition event.

The device must have a battery management system with the below protection features:

- Short circuit protection
- Over-charge protection
- Over-discharge protection
- High-temperature protection

The device shall be equipped with a display.

The display must provide the user with the following information:

- Battery temperature
- Battery voltage
- Current output

The device shall be equipped with an SD card reader.

The device must be capable of logging battery temperature, battery voltage, and current output to the SD card, at the behest of the user.

The batteries in the device shall be recharged via the use of an external AC wall power adapter.

The device must be housed in a modular, compact, fireproof, waterproof, and easy to assemble/disassemble enclosure, supplied by the ME team.

Stretch Specification:

The device must be Bluetooth enabled.

The device shall be accompanied by an Android application.

The accompanying Android application must be capable of interfacing with the device via the use of Bluetooth technology.

The user must be able to log battery temperature, battery voltage, and current output via the use of the accompanying Android application.

Component	Circuit type	Specification Targeted	Validation method
	BMS		Test
BMS IC		The device shall be powered by rechargeable batteries.	
ESP32		The device must be capable of operating on a single charge during the entirety of a competition event.	
Power mosfets		Battery protection features	
current sense resistor		• Short circuit protection	
thermistor		• Over-charge protection	
schottky diodes		• Over-discharge protection	
complementary caps and resistors from the lab		• High-temperature protection	
18650 battery cells		The device must be capable of operating on a single charge during the entirety of a competition event.	
	DC Input for Recharging		Inspection
AC-DC Wall Power Adapter		The batteries in the device shall be recharged via the use of an external AC wall power adapter.	
Barrel Jack			
fuse			
fuse holder			
	Dual Voltage DC Output		Test
DC-DC converters		The device must be capable of supplying $24V$ at $10A$.	
complementary caps and resistors from the lab		The device must be capable of supplying $12V$ at $5A$.	
fuse holders		The device must be capable of operating on a single charge during the entirety of a competition event.	
fuses			
deutsch connector			
	User Interface		Inspection
Display		The device shall be equipped with a display.	
Momentary Switch		The display must provide the user with the following information:	
		• Battery temperature	
		• Battery voltage	
		• Current output	
	Info Logging		Test
SD card module		The device shall be equipped with an SD card reader.	
SD card		The device must be capable of logging battery temperature, battery voltage, and current output to the SD card, at the behest of the user.	
	Miscellaneous		
Jumper Wires of various gauges			

Table 1: Device component breakdown