

The low voltage power supply will be built inside 3.2235 inches by 6.5394 inches container to follow FSAE Rule guidelines, and we have a budget of 1000 dollars. The battery management system inside the container powers on the dual output for 24 V at max 10 A and 12V max 5A. The components procured for the low voltage power supply include BMS(Battery Management) IC(Integrated Circuit), ESP 32 microprocessor, ESP 32-S2 Development Kit, cell stacks, data bus, power adapter(AC-DC wall adaptor), dual port to power the SAE race car, SD card, SD Card module, and voltage regulator. We will also procure additional subcomponents needed to support the main components, including power MOSFETs, current sense resistors, resistors, thermistor, voltage regulators, fuse holders, Icd wire, momentary switch, Schottky diodes, complementary capacitors, barrel jack, and Deutsch connector. We will develop our own embedded software to control and support components like the ESP 32 microcontroller, data bus, and potentially our android app.

## **BMS IC**

Our BMS(Battery Management system) has multiple requirements, including charging, discharging, and temperature readings, and to be able to meet these requirements, we need to procure the BMC IC. The BMS IC has EEPROM(Erasable Programmable Read-Only memory) capabilities and a control unit that will be needed as part of our development to store information like displaying temperature readings, and it's also compatible with our microcontroller.

## **ESP 32-S2 WROVER Development KIT**

Our low-voltage power supply needs a microcontroller compatible with our BMS IC. The ESP 32-S2 WROVER development kit will be procured because the ESP32-S2 WROVER Development kit is compatible with our BMS IC, and the ESP32-S2 WROVER can be configured to provide functionalities needed for our development, including ADC and DAC. Also, The ESP 32-S2 WROVE development kit comes with an ESP 32-S2 module that SoC with IO capabilities and 4MB and 2MB PSRAM.

## **Lithium Ion cell stacks**

We will procure more than 6 Lithium cell stacks because the BMS IC that we purchase depends on Lithium cell stacks. Also, the capacity of the batteries we need is about 200 Wh to ensure that the Low Voltage Power supply can be used during competition.

## **Data bus**

We will develop a Data bus to connect the BMS IC and the ESP32-S2 Development Kit(Microcontroller) to receive and transfer data like voltage and current.

## **Power Adapter (AC to DC wall Adapter)**

We will procure an AC Power Adapter, which will be needed to recharge the batteries.

## **Dual output Port to power SAE race car**

The battery management system inside the container powers the dual output port, which powers the SAE race car's low voltage electronics at 24 V at max 10 A or 12V max 5A. The container (that will house the BMS) already has a dual output Port, so we do not need to procure or develop the output port.

## **Voltage Regulator**

We will procure a voltage regulator to control the voltage and current, which will serve as a dual output to charge the car for 24 V at max 10 A and 12V max 5A, which will be done by splitting the voltage of the batteries into two different rails. Therefore, we will procure a voltage regulator because our Low Voltage Power supply must have dual output capabilities.

## **MicroSD card**

We will procure a MicroSD card to read and collect data like the voltage, current, and temperature. The MicroSD is inexpensive and needed to collect and read data for our Low Voltage Power Supply Project.

## **SD Card Module**

We will also procure an SD Card Module to facilitate the connection between our Micro SD card and Microcontroller.

