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HyTech Racing BMS: Presentation 1

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Introduction / Background

- HyTech racing is interested in a custom battery management system, a data recording system, and a user interface for charging Lithium Cobalt Oxide pouch battery cells
- The end goal is efficient battery charging and health estimation

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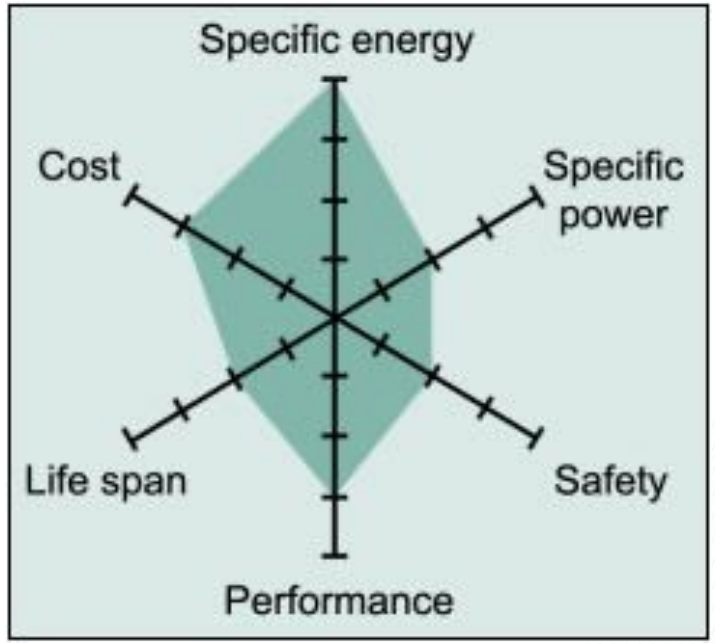
- Lithium Cobalt Oxide batteries are used because of their high specific energy but are limited by short lifespans



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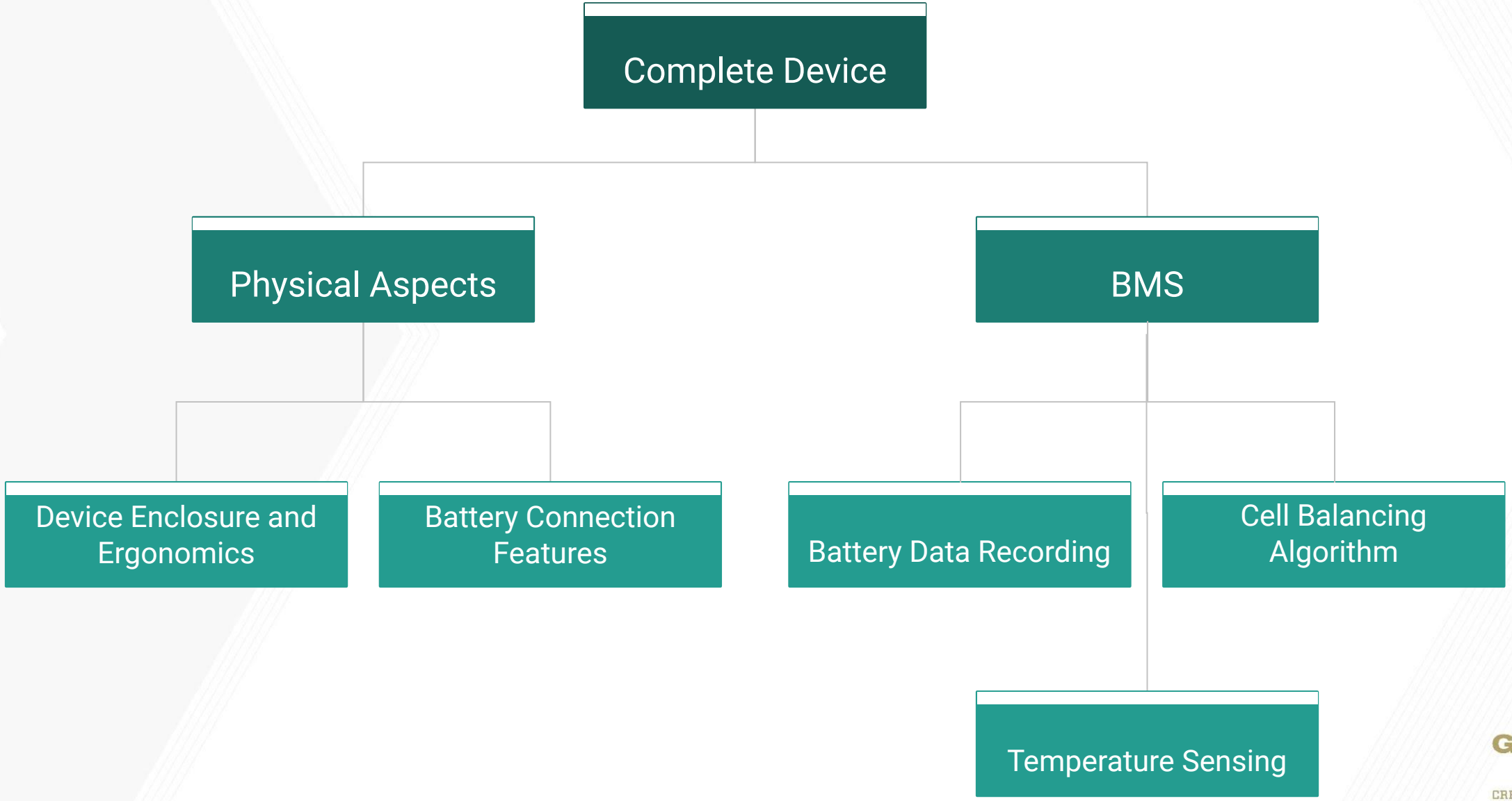
Categories of Prior Art



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Existing Products / Prior Art / Applicable Patents

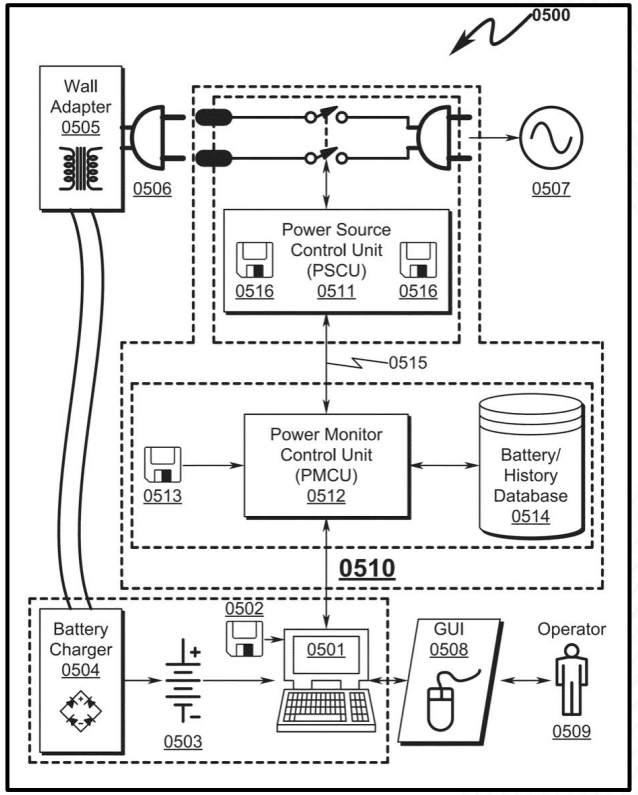
HyTech Racing:

- Already have a pre-existing BMS design utilizes LTC6804 Multicell Battery Monitors with voltage logging using a Tensey 3.2 microcontoller
- This design has already been thoroughly tested
- More functionality is still to desired (logging storage, temperature monitoring, mechanical design)

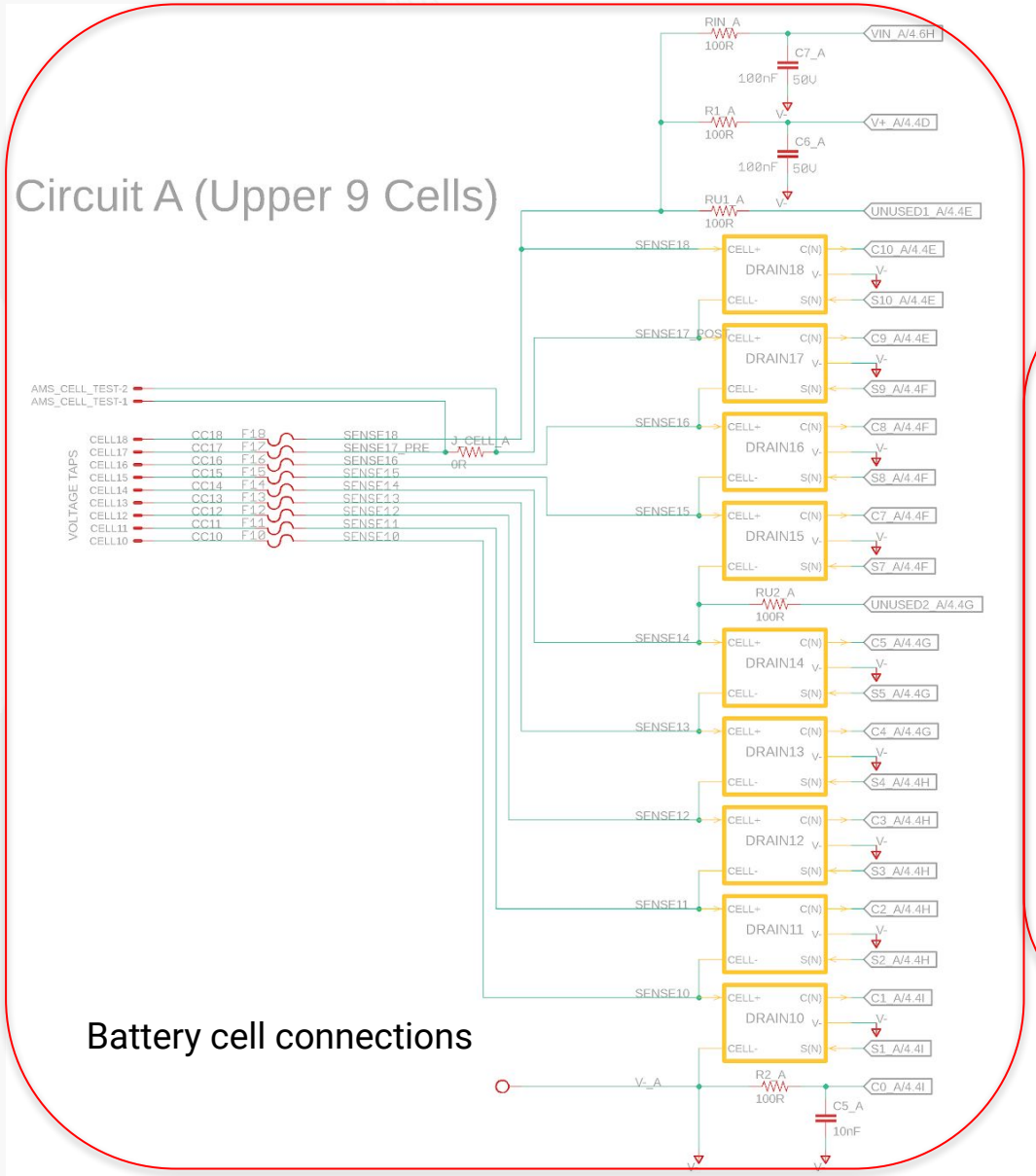
Orion BMS

- Was used previously by HyTech
- Has many great features and is field programmable
- Orion BMS in the end was not a desirable solution for HyTech
- Large size and weight
- A lot of features that were not needed

Patents

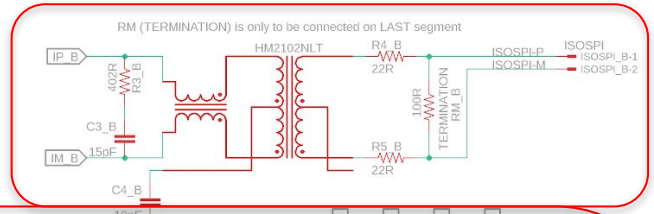


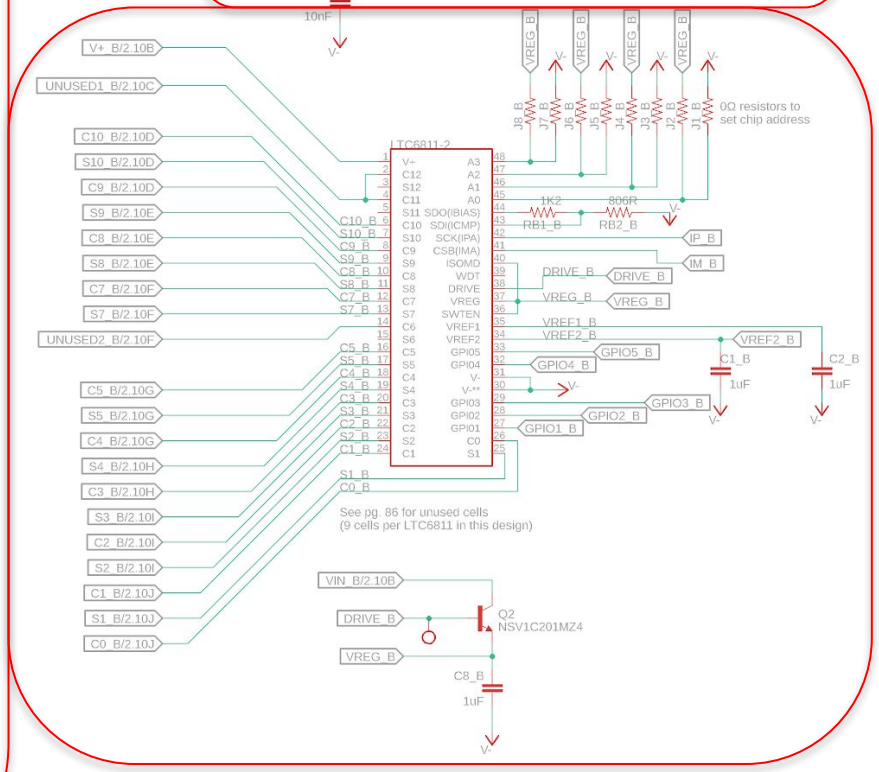
Prior Art: HyTech BMS Design



Battery cell connections

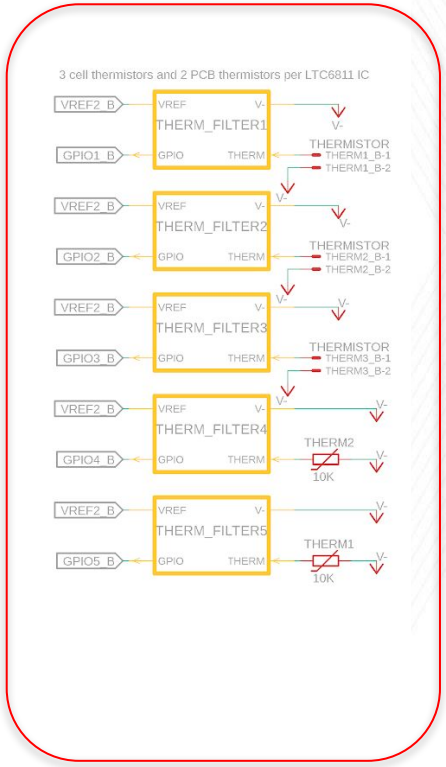
isoSPI transformer





BMS chip (LTC6811) connections

Thermistor connections



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Prior Art: HyTech BMS Design

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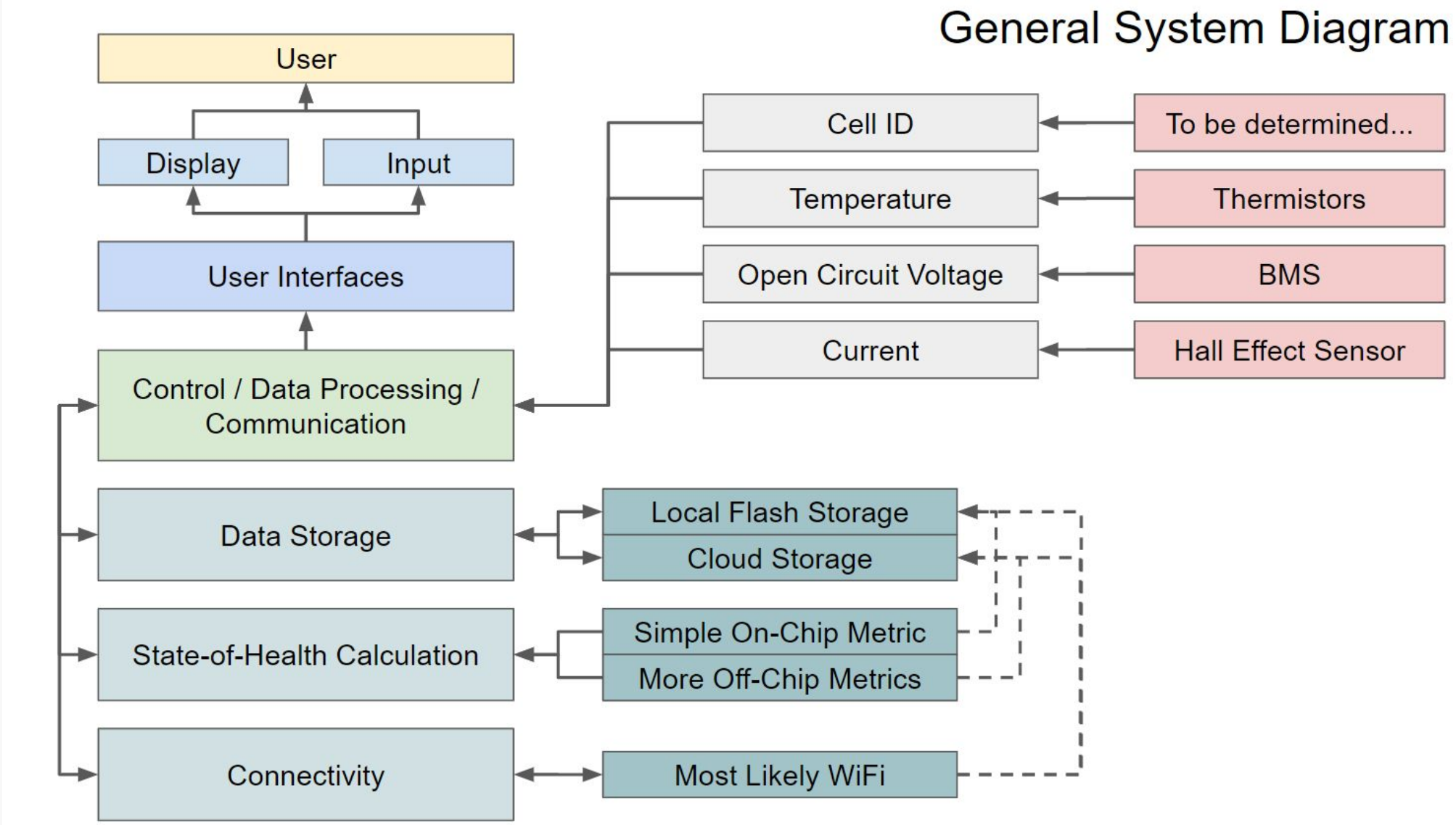
Customer Requirements / Design Specifications

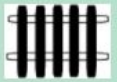
- **Function**
  - Charge 9 LiCoO2 Battery Cells with nominal capacity of 18Ah
  - Record and store current and voltage data for every cell
  - Must be compatible with Melasta SLPBA580183 battery cells
- **Electrical Characteristics**
  - Charging current of 9A (0.5C)
  - Must have a cell balancing algorithm
  - Powered from a regular electrical wall outlet
- **Safety**
  - Must be easy and safe to use

Design Concept Ideation: General System Diagram



Design Concept Ideation

Morphological Chart:

	Solutions			
Sub-Functions	1	2	3	4
Multi-Cell(9) Charging	 Velcro Straps/Net	 Elastic Band	 2-Part Slots	 Single-Part Slots (loose tolerances)
record voltage and current data	 Cloud		 flash storage	
Power Supply	 Off the shelf		 Original Design	
Temperature Management	 heat sink	 fan	 liquid cooling	 radiator
User Friendly Interface	 computer connection	 LCD	 Touch Screen	
Cell Tracking ID	 NFC	 RFID	 barcode	 QR

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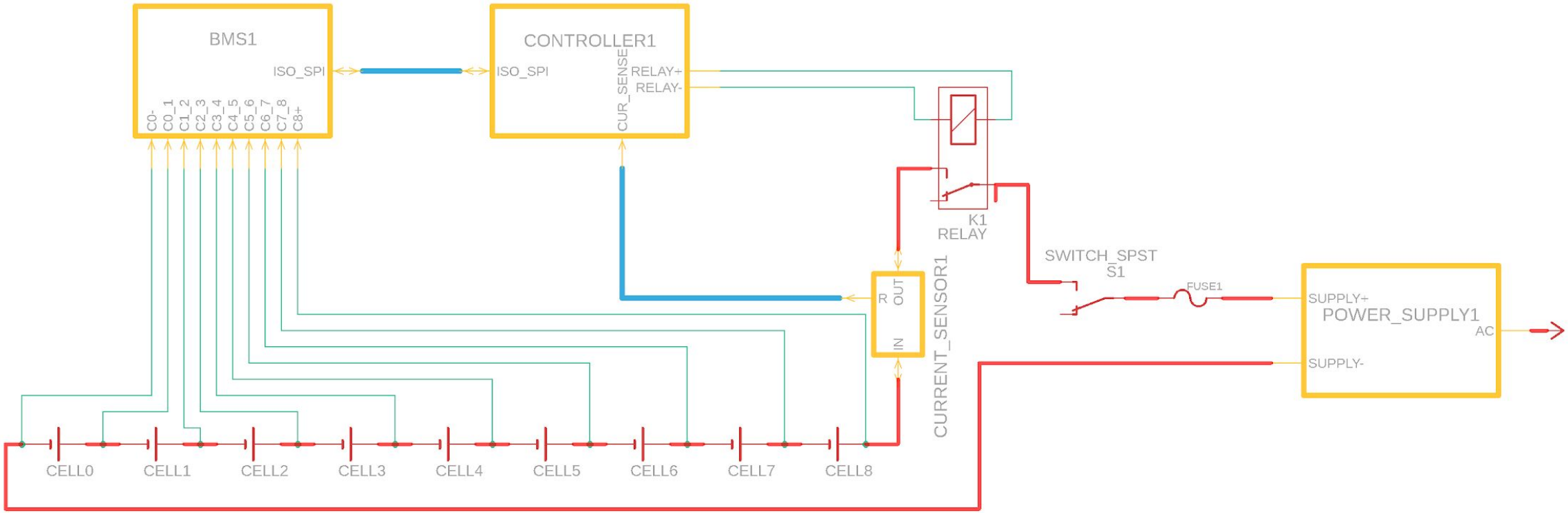
Design Concept Ideation: Electrical System Diagram



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