REPORT ON BATTERY MANAGEMENT SYSTEM [Module-2]

Table of Contents

What is a BMS why is it Important?

Batteries are the most important propellant today. With increasing power density, the volatility of the batteries increase. There have been many cases of spontaneous outbreak of fire through such batteries for example, The most widespread example of this is the Lithium ion batteries, which is applied in applications from inverters at home to powerful power sources for vehicles each one of which requires very high levels of safety. Lithium ion batteries need intricate monitoring of the incoming and outgoing charge. When the each lithium ion cell is connected in a series or parallel configuration the resultant battery pack as a whole should charge and discharge equally thereby preserving its state of health and protecting from over-discharge or charge. Battery Management system (to be referred as BMS) serves the following purpose.

- Prevent cells from over-current.
- Prevent cells from under-voltage.
- Prevent cells from high temperature thermal runaway.
- Balance each and every cell in the battery pack for the same amount of charge.
- Data logging of current and voltage data.

Application definition & Requirements

Application

The problem statement requires us to make a BMS for the power-train of an electric vehicle with a total of 400 cells configured as 40s10p meaning 40 cells are connected in series and corresponding 10 cells are connected in parallel.

Table of Requirements

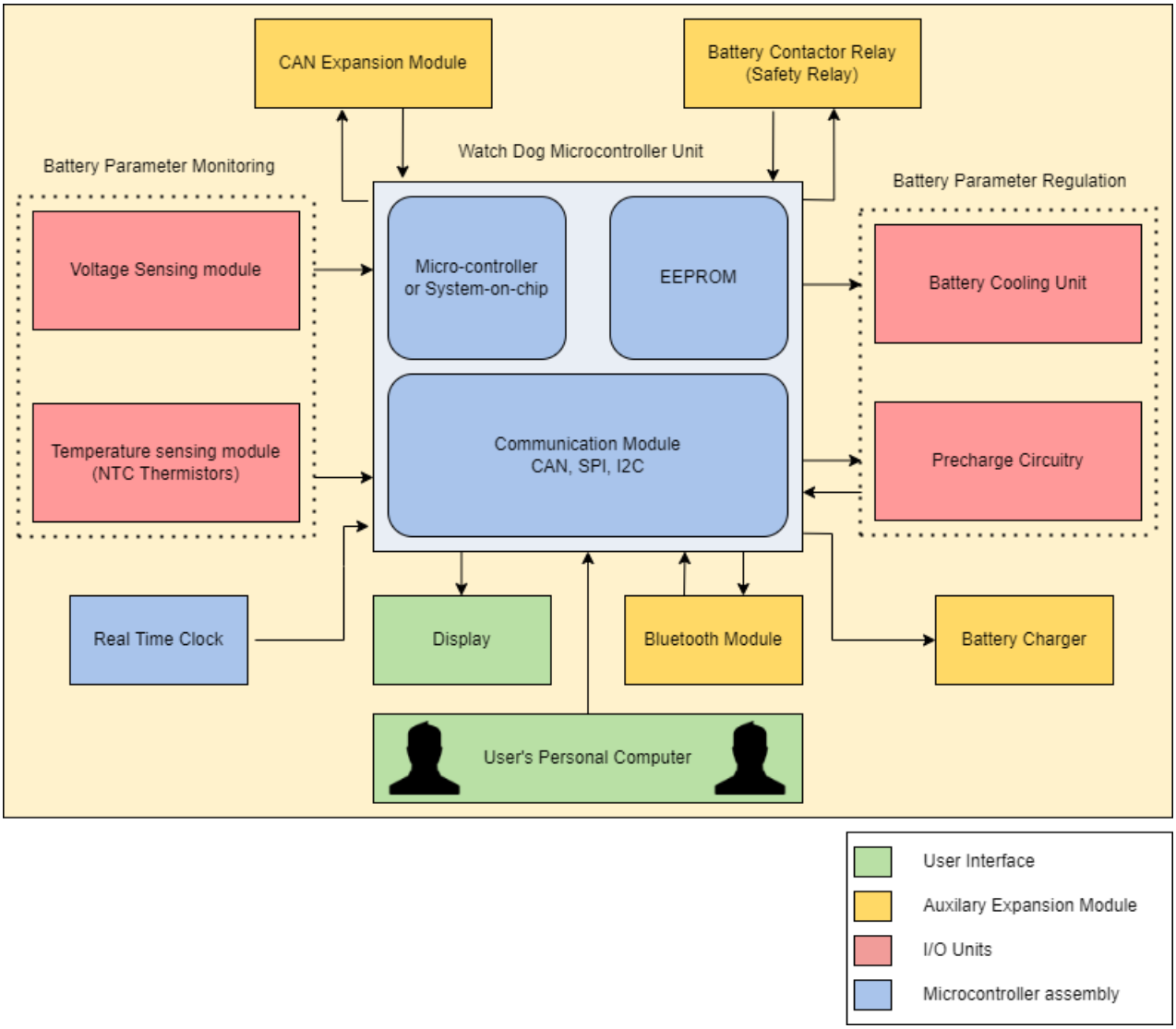
High Level Requirements

Requirement ID	Design Consideration
HL-1	Maximum 40 sensing wires
HL-2	Thermal Runaway protection (>65ºC)
HL-3	Under-voltage protection (<2.5V)
HL-4	Over-current Protection (>200A)
HL-5	Maximum Voltage (180V)
HL-6	Watchdog Embedded System for DAQ

Low Level Requirements

Requirement ID	Low Level ID	Design Considerations
HL-1	LL-1	Wire resistance < 0.05Ω
	LL-2	Wire positive locking
	LL-3	CANBUS Support
	LL-4	Error Signal LED
HL-2	LL-1	Use NTC thermistor (10K)
	LL-2	Voltage divider with 10KΩ
HL_3	LL-1	500 Ω/V Galvanic Isolation
HL-4	LL-1	Use Hall Current Sensor.
HL-5	LL-1	Contactor Shutdown switch
HL-6	LL-1	CANBUS support
	LL-2	Fast floating point calculation
	LL-3	ARAI Approved
	LL-4	Expansion module support

Block Diagram of the Embedded System



Document made by VIGNESH BHAT.
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