

ALTEN Global Technologies Private Limited (ALTEN GT) is part of the ALTEN Group of companies with primary focus on Automotive, Aerospace, Embedded & Enterprise products and engineering services.

With strong background in Built-to-Spec Safety Critical Product Development, ALTEN GT has made significant contribution towards been working on the automotive vertical in the areas of GPS, Telematics, Motor Control Units, Communication Stacks, Bootloaders & Functional Safety Engineering Services on several customer programs

Over the years, ALTEN GT has chartered an impressive record of accomplishment In customer satisfaction, innovation, sales and profitability. This has been made possible with continuous enhancement of Competence in Technology, Quality Processes, Project Management and Customer Focus.



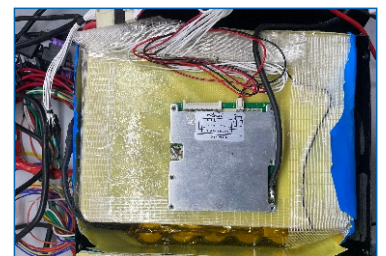
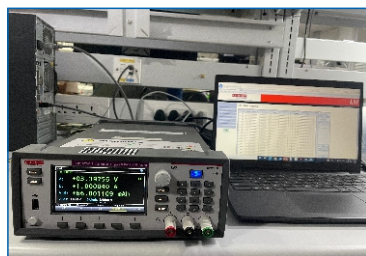
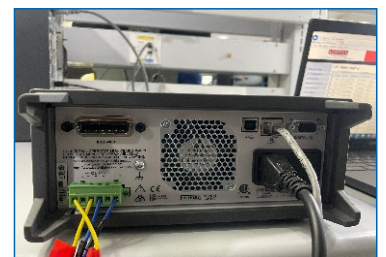
## Battery Management System Offerings

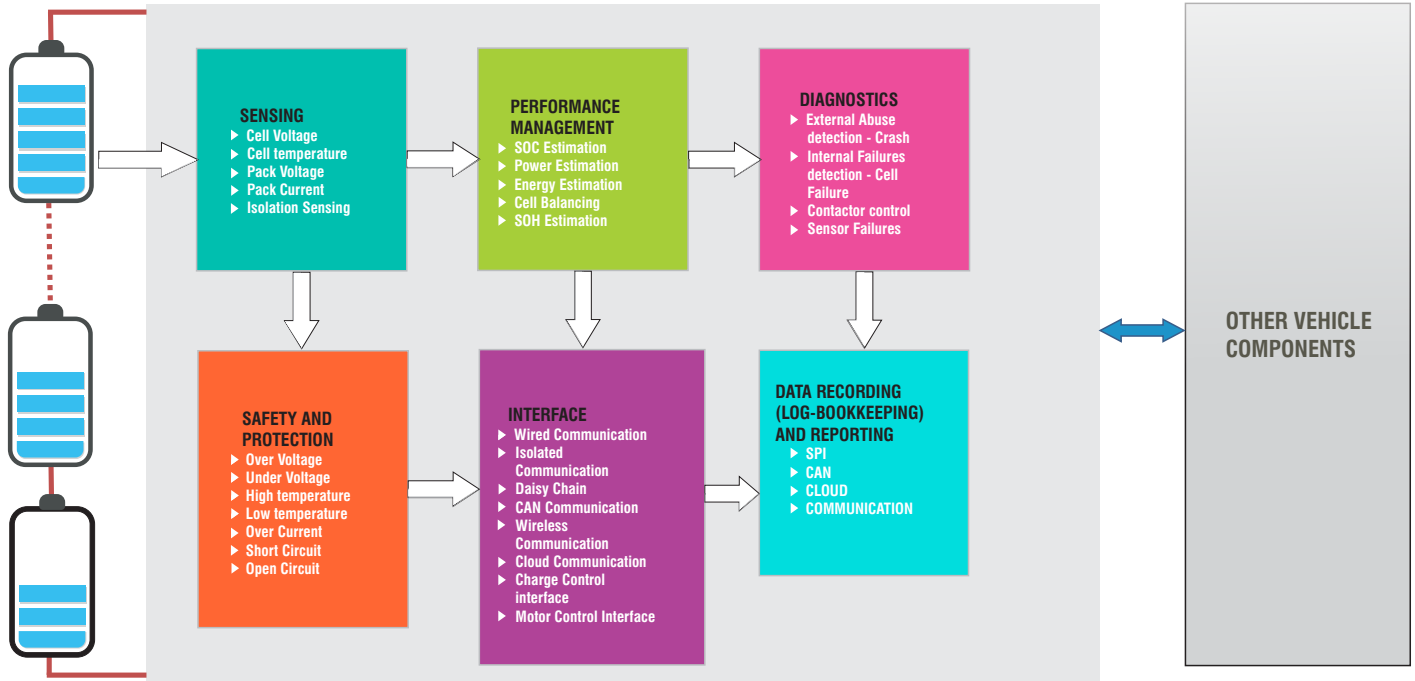
### BMS Competency Service Offerings

- In-House Battery Characterization and Data Generation
- Advanced and accurate state estimations (SoC and SoH)
- Experience with BMS AFE – NXP, AD, MAXIM, TI
- Model Based Algorithms
- Passive Cell Balancing
- Targeted for wide battery chemistry (currently Targeting LFP battery)
- Built to address centralized, modular and Distributed BMS architecture to cater to wide Verity of Vehicle Platforms



- BMS Smart Algorithms Development
- Model Based Design and Development
- Embedded Software Design and Development
- Hardware Design and Development
- SIL, MIL and HIL Testing
- Functional Safety-ISO26262



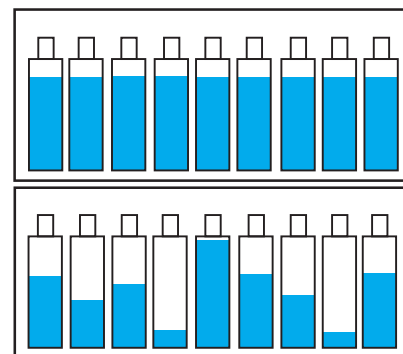
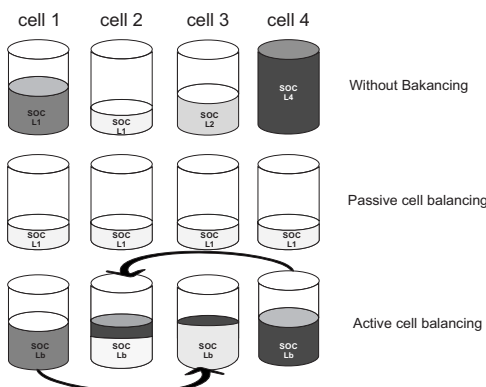


## The main functionalities of BMS includes,

- ▶ Estimates State of Charge and state of Health of a battery pack
- ▶ Controls charge and discharge process of the battery pack
- ▶ Provides fault protection and tolerance for
  - Over voltage, over current, over temperature, over charge, over discharge
  - Current limiting, and leakage and chassis shorts
- ▶ Balances the cells in the battery pack to ensure uniform energy distribution across all the cells in a battery pack

## Prons / Cons of BMS System

- ▶ Protect human safety of device's operator
- ▶ Detect unsafe operating conditions and respond
- ▶ Protect cells of battery from damage in abuse/failure cases
- ▶ Prolong life of battery (normal operating cases)
- ▶ Maintain battery in a state in which it can fulfil its functional design requirements
- ▶ Battery cells can catch fire and explode without BMS system
- ▶ Cost of the battery is high with BMS system.



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