Battery Management Redefined

INTELLIGENT | CONNECTED | SAFE

Software and Systems

www.eatron.com

AI Powered BMS Software Layer

Unlocking the full potential of batteries

Better Performance

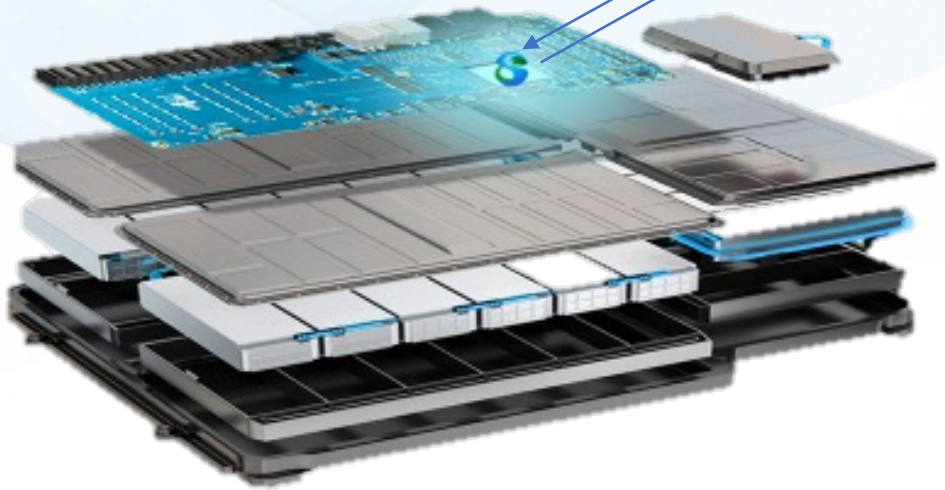
Eatron **Advanced SOX** algorithms offers best-in-class accuracy to extract maximum performance in complete safety.

Extended Lifetime

Patented approach to predicting **Remaining Useful Life** based on usage to extend battery life.

Increased Safety

AI diagnostic enables early detection of cell degradation and faults, increasing safety and reducing downtime.



Edge-Cloud Integration :

Eatron algorithms can be easily integrated in the edge **and/or** in the cloud to achieve optimal performance

Eatron end-to-end software layer enables up to 10% more range and 20+% longer life

Battery Management **Redefined**

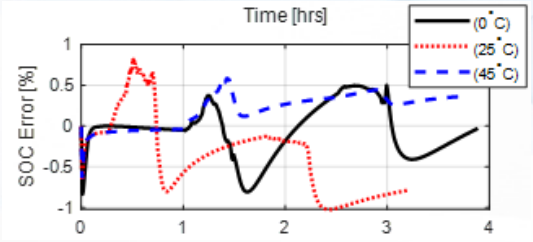
Product Portfolio

	Powernet	Light Mobility	Automotive	CV/ESS
SOFTWARE	Complete SW platform including application + basic software	Intelligent Software Layer: SoX & AI & RUL on edge and/or cloud	Intelligent Software Layer: SoX & AI & RUL on edge and/or cloud	Intelligent Software Layer: SoX & AI & RUL on edge and/or cloud
HARDWARE	Automotive grade production HW	Partner HW	Partner HW	Partner HW
	Unit Sales	*SW Licensing*	*SW Licensing*	*SW Licensing*

Best-in-class SoX Performance

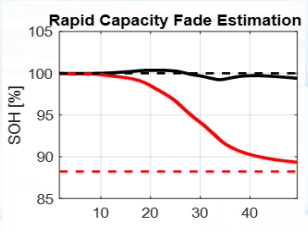
SOC performance

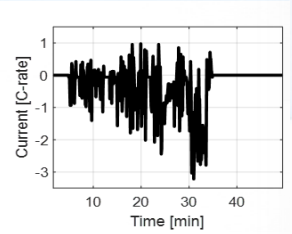
- Consistent SoC accuracy of ±1.0% achieved across the design temperature range at both cells BOL and EOL.
- Targeted SoC accuracy is retained throughout the battery lifetime despite the changes in cells' capacity/impedance.



SOH performance

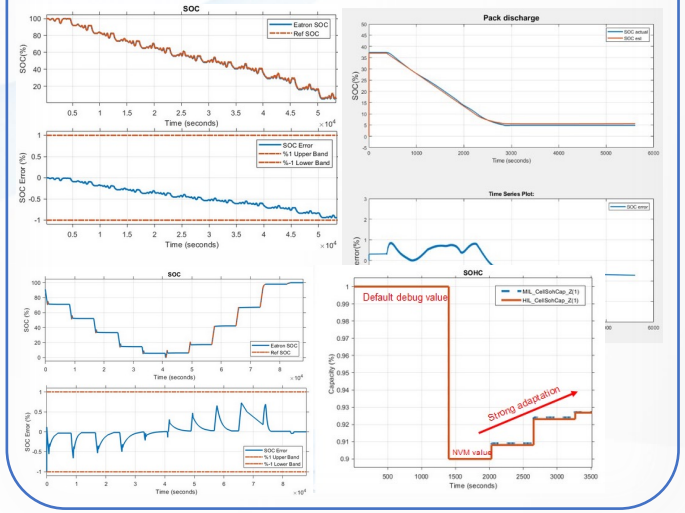
- Consistent Capacity-SoH accuracy of ± 2.0% achieved across the lifetime of the cell.
- Rapid convergence (within 40min drive cycle)
- Improved accuracy of power limit estimation in high power applications.





Track Record across Different Chemistries & Applications

- Consistently better than existing solution on several customer applications:
  - NMC
  - LFP
  - LTO
  - Traction Batteries (HV / 48V)
  - Powernet Batteries (12V / 24V)



Best-in-class SOC accuracy: 1% vs. 3% industry benchmark

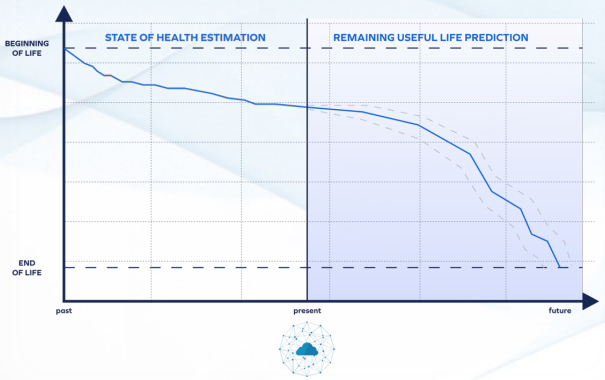
Proprietary and Confidential

World leading **Artificial Intelligence Solutions**

US Patent Granted

SOH Forecast & RUL Prediction

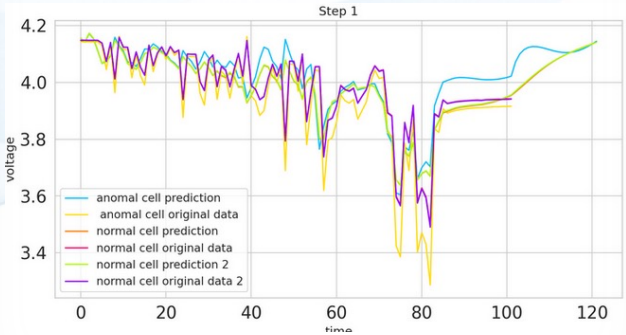
- SOH trajectory solution learns and predicts aging knee points
- Patented hybrid Remaining Useful Life prediction algorithm powered by AI and electrochemical model
- Dynamic prediction of remaining battery life depending on real world usage



US Patent Pending

Advanced Diagnostics

- **Cell anomaly** detection algorithm by neural cell model enables detection of cell failures and thermal runway weeks in advance.
- **Lithium plating** detection by proprietary feature extraction achieving 0 false positive rate and 90% accuracy.



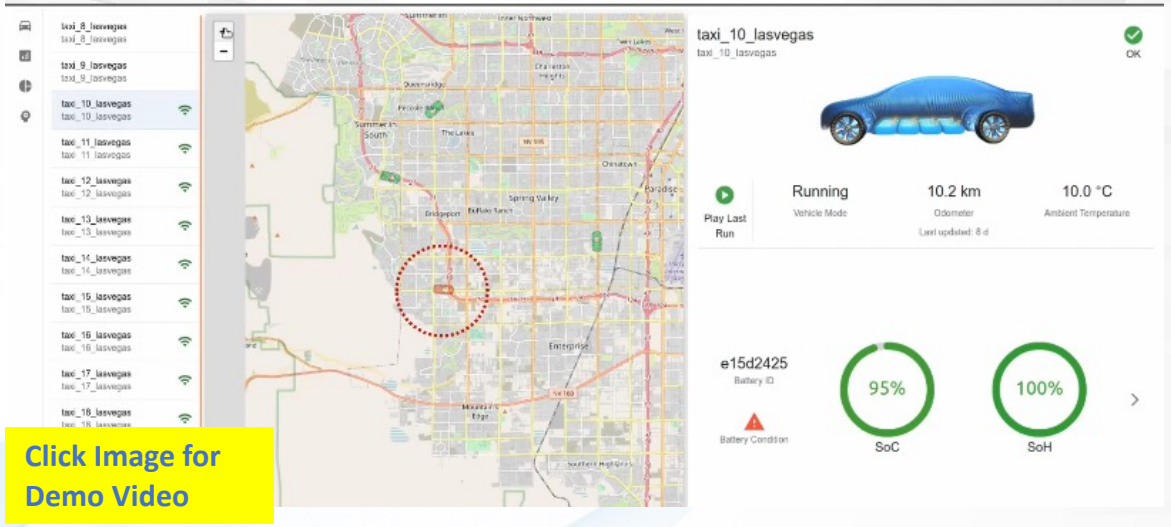
SOH accuracy < 1% and RUL accuracy < 80 cycles

Benefits at a glance

Customer Benefits:

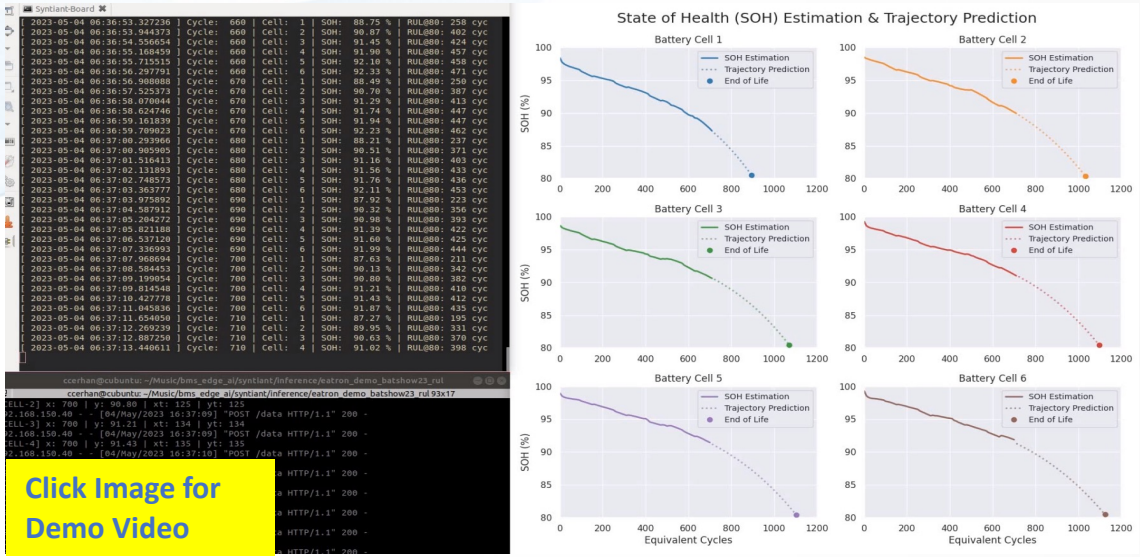
- Better Performance
  - Proprietary Patented Models for best-in-class accuracy
  - Edge / Cloud integration for optimal performance
- Faster time to market
  - Proprietary AI pipelines
  - Proprietary Model Parametrizations methods
  - Cloud Infrastructure Available
- Cost Benefit
  - Minimum upfront investment
  - Volume based subscription model enabling economies of scale
- Maintain Competitive Edge
  - Benefit from Eatron continuous investment in its software platform and learnings from growing number of batteries in the field
  - Access to a team of Battery, Software and AI Experts without the overheads.

Real time insights on battery performance in the field:



Click Image for Demo Video

Dynamic prediction of Battery life depending on Usage



Click Image for Demo Video

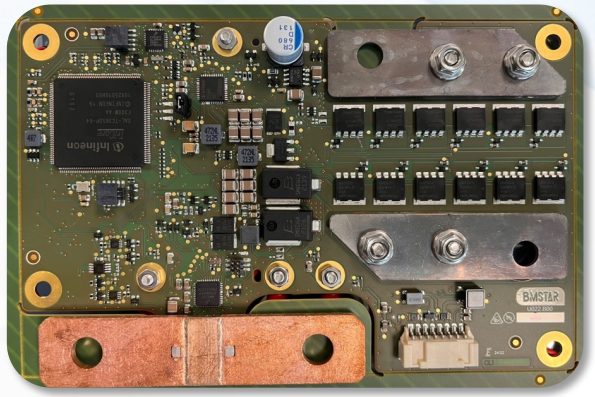
Powernet BMS

Technology Drivers & Needs

- **L3 ADAS** (Highly automated driving) is enabled by electric systems like steering and braking
- During driving the main source of power comes from DC/DC converter, but when it fails, the LV battery is the redundant power source to safely bring the vehicle to a stop
- Traditional 12V Lead Acid batteries are not suitable for **safety critical** applications

Solution

LV Li-ion battery with complex **highly safety assured BMS**



Application:

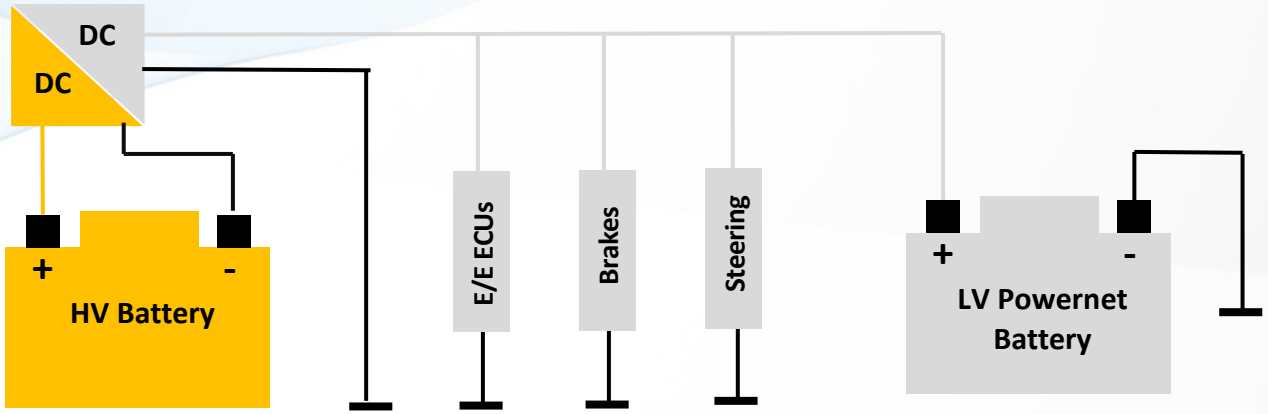
- LV Powernet safety critical batteries ASIL C(D)

Hardware:

- Design optimized for cost and high-volume production
- 12V-48V Scalable architecture

Software:

- Vector AUTOSAR stack
- Platform ASW customized to a specific OEM



Talk to an Eatronian

info@eatron.com

11A Innovation Centre
Warwick Technology Park
Warwick. CV34 6UW
UNITED KINGDOM

/eatron-technologies