Exploring Golden Opportunities for
Battery OEMs

Intelligent Connected Batteries

BOSCH
Invented for life
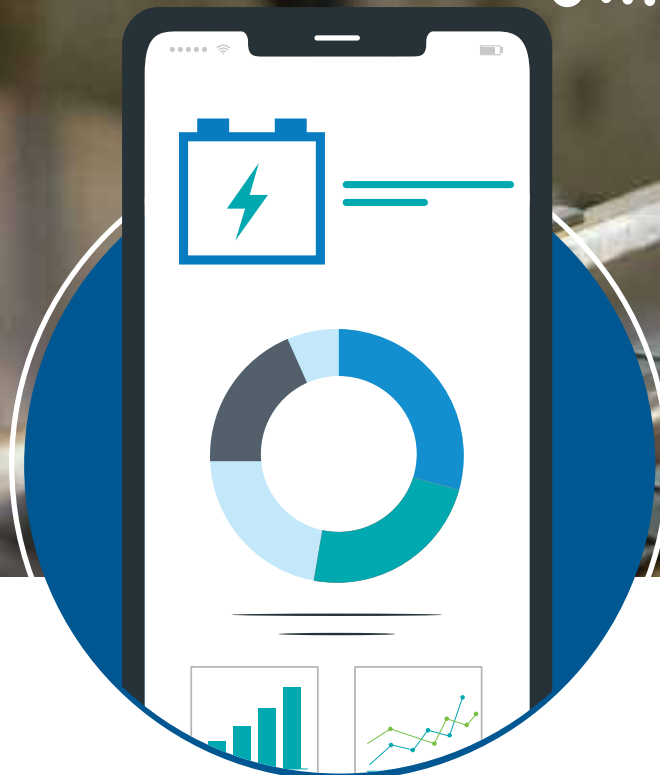
Bosch Global Software Technologies
alt_future

Executive Summary

<<

The motivation to implement Artificial Intelligence of Things (AIoT) may vary; This document highlights specific underutilized levers that has the potential to change a lead-acid battery OEM's way of doing business. It also examines the ways of creating added revenue in a segment that is leveling out.

Despite lithium-ion technology seemingly directing innovation in the battery industry, there remains scope for innovation and differentiation within the lead-acid segment. A comprehensive overview entails a strong case for why lead-acid original equipment manufacturers (OEMs) should consider becoming AIoT-driven to manage the complete ecosystem.

>>

Connectivity and, more specifically, computing has changed business permanently, and businesses are increasingly becoming aware that they have to prepare to maneuver with technology and not around it. The fact is that numerous organizations have integrated technology into all aspects of the business. The worldwide pandemic has spurred this on.

The Internet of Things (IoT) has been around for a while and has successfully connected numerous assets, providing a great prospect to collect data and make sense of it. However, coupled with Artificial intelligence (AI), IoT offers real-time data deciphering and actuation capabilities. Combining the intelligent use of sensors, software, and services, AI + IoT (AIoT = Artificial Intelligence of Things) transforms traditional products and business models into powerful data-driven solutions and services.

BGSW

Why Connect Batteries?

Intelligently implemented solutions enable manufacturers to monitor performance and use at a product level and seamlessly return user data to gain powerful insights.

Among a host of other applications, these solutions will also influence the battery industry significantly. It becomes imperative for executives of these corporations to tap into this opportunity to revamp business models and augment service levels.

However, they face grappling questions, such as -

▶ Can existing OEMs build a new business with AIoT?

▶ What are the tangible business outcomes of AIoT?

▶ Can IoT ever be strategic, or is it a Fear of Missing Out (FOMO) decision?

▶ Is AI IoT another excuse for endless innovation budgets?

With warranty costs reaching unacceptable levels across the industry and returns subsequently diminishing, it presents a cause for concern for the industry at large. From an operational perspective, limited battery visibility across the value chain, with close to no view after distribution, causes further hindrances. With limited data captured, the understanding of performance statistics is unclear.

Today two significant technologies control the majority of the market share in the industry: lithium-ion and lead-acid batteries. While growth potential presents a different picture, lead-acid batteries are likely to remain the tech of choice for numerous applications such as starting, lighting, and ignition. Although lithium-Ion technology is rapidly dominating the battery market, lead-acid batteries remain relevant with regards to use for uninterruptible power supply, telecom power back-up, and cost-effective electric vehicles. Therefore, lead-acid battery OEMs need to look at optimizing profit and ideally improving it.

Data indicates that to differentiate in the battery industry, enabling OEMs with AIoT is the path to a more sustainable value chain. AIoT will aid immensely in inventory forecast, inventory optimization, supply chain excellence, and Just in Time production. With a clearer understanding of various elements up and down the line, OEMs and their partners across the industry can reposition themselves to reduce costs and increase revenue.

BGSW

AIoT Opportunity

OEMs have achieved successes across industries using IoT to connect assets to understand data. However, businesses have realized that merely being connected is not enough, and there need to be tangible gains coupled with enhanced actuation. Adding AI to the mix allows data to form actionable insights from connected assets. Organization-wide data coupled with powerful AI becomes a key asset for the OEMs across its value chain to become AIoT-driven.

Ultimately, the ability to provide a personalized experience to consumers will ensure breakout growth.

AIoT-driven OEMs provide value-added services to end-users, thereby adding a stream of annual recurring revenue coupled with cost savings on the back end. Furthermore, it will enable a granular guarantee of service levels across the value chain, from manufacturing to recycling.

With data collected and processed in real-time, AIoT-driven OEMs can use that data to enhance their research and development process. Data collected directly from end-users and service technicians are relayed to OEMs. Powerful AI deciphers individual product-level operational parameters and performance statistics. AIoT also enables pinpointing of troubleshooting, maintenance, and replacements, enhancing service productivity and effectiveness.

AIoT-driven OEMs would benefit from it and make fast and efficient improvements while positioning themselves to control the ecosystem. With real-time feedback from end-users and a continuous stream of data from all stakeholders, the time to market reduces immeasurably. Individual product-level performance insights will be at your disposal.

Personalized consumer experiences result in breakout growth

BGSW

Future-Proofing Batteries

The Foundational Step

A stable ecosystem managed by AIoT driven OEMs is key to unlocking potential at all levels of the value chain. Orchestrating the AIoT Ecosystem is the heart of what enables OEMs to be AIoT driven
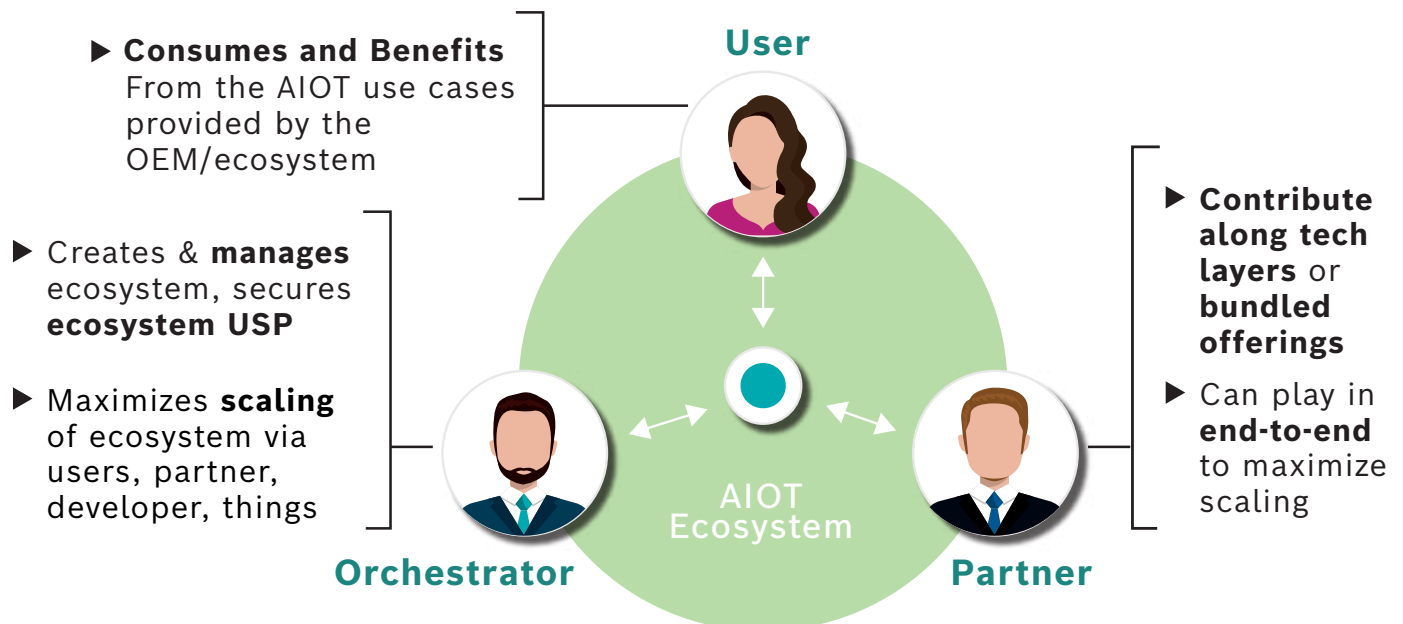
The AIoT Ecosystem

The AIoT ecosystem will accelerate OEM's growth, providing stakeholders across the value chain with a differentiated experience. There are three distinguished roles in the AIoT ecosystem: Users, OEMs, and Partners, all enabled seamlessly by the AIoT stack. The user will consume the benefits produced by the ecosystem and feed performance, and use data in real-time to the OEMs.
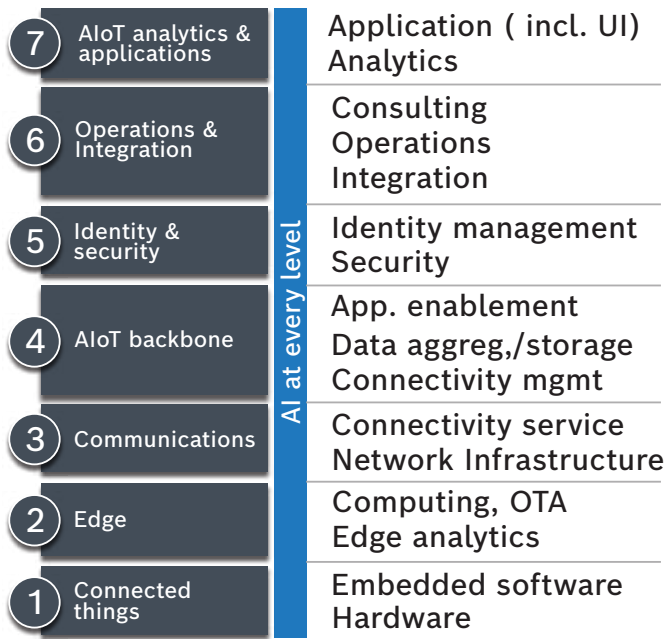
Partners contribute across the AIoT solution, hardware, software, AI, etc., to empower OEMs with the technological enablers to drive an AIoT ecosystem. AIoT driven OEMs would create and control the entire ecosystem, which allows them to secure and chart the future with the ecosystem Unique Selling Proposition (USP).

AIoT facilitates data gathering, processing, and translation into real-world and actionable strategies right across the value chain. At every step, AIoT is incumbent in realizing its full potential, from management perspectives to operation. At every design and implementation level, one should carefully consider AIoT aspects to ensure that OEMs maximize potential gains from the entire ecosystem. The continuous loop plugs data leaks between stages to allow for optimal efficiency.

▶ **Consumes and Benefits**
From the AIOT use cases provided by the OEM/ecosystem

▶ Creates & **manages** ecosystem, secures **ecosystem USP**

▶ Maximizes **scaling** of ecosystem via users, partner, developer, things

User

Orchestrator

AIOT Ecosystem

Partner

▶ **Contribute along tech layers** or **bundled offerings**

▶ Can play in **end-to-end** to maximize scaling

AIoT Stack

7	AIoT analytics & applications	Application (incl. UI) Analytics
6	Operations & Integration	Consulting Operations Integration
5	Identity & security	Identity management Security
4	AIoT backbone	App. enablement Data aggreg,/storage Connectivity mgmt
3	Communications	Connectivity service Network Infrastructure
2	Edge	Computing, OTA Edge analytics
1	Connected things	Embedded software Hardware

AI at every level

Enabling Orchestration of the AIoT Ecosystem

An intelligent battery is created with the battery monitoring unit hardware, role-relevant software, and AI algorithms. The integration of SaaS, IaaS, PaaS, design and development ecosystems, and battery hardware engineering and manufacturing ecosystem, enabled with AIoT is key to ensuring OEMs can orchestrate the ecosystem.

Several questions and challenges arise while one tries to leverage and scale the AIoT system.

▶ How can AIoT provide value to industry stakeholders?

▶ What do OEMs do to attract participants to scale the ecosystem?

▶ What is the strategy to deploy features across the solution?

▶ What is the best way to monetize smartly?

▶ Will AIoT be able to deliver efficiently?

Carrying out in-depth research and analysis of industry reports, real-time data, and use-cases to reach the right target market and create value across the lead-acid battery ecosystem is crucial.

Identifying users, partners, and developers with agility is just as essential to craft USPs for the ecosystem's primary scaling lever. Analysis of potential indirect revenues and addressing and resolving legal framework and data privacy is another area that needs consideration. Aligning the short to medium-term organizational structures with the ecosystem's goals wraps up the requirements.

For all the above reasons, a fitting AIoT solution and partner can expedite the entire process.
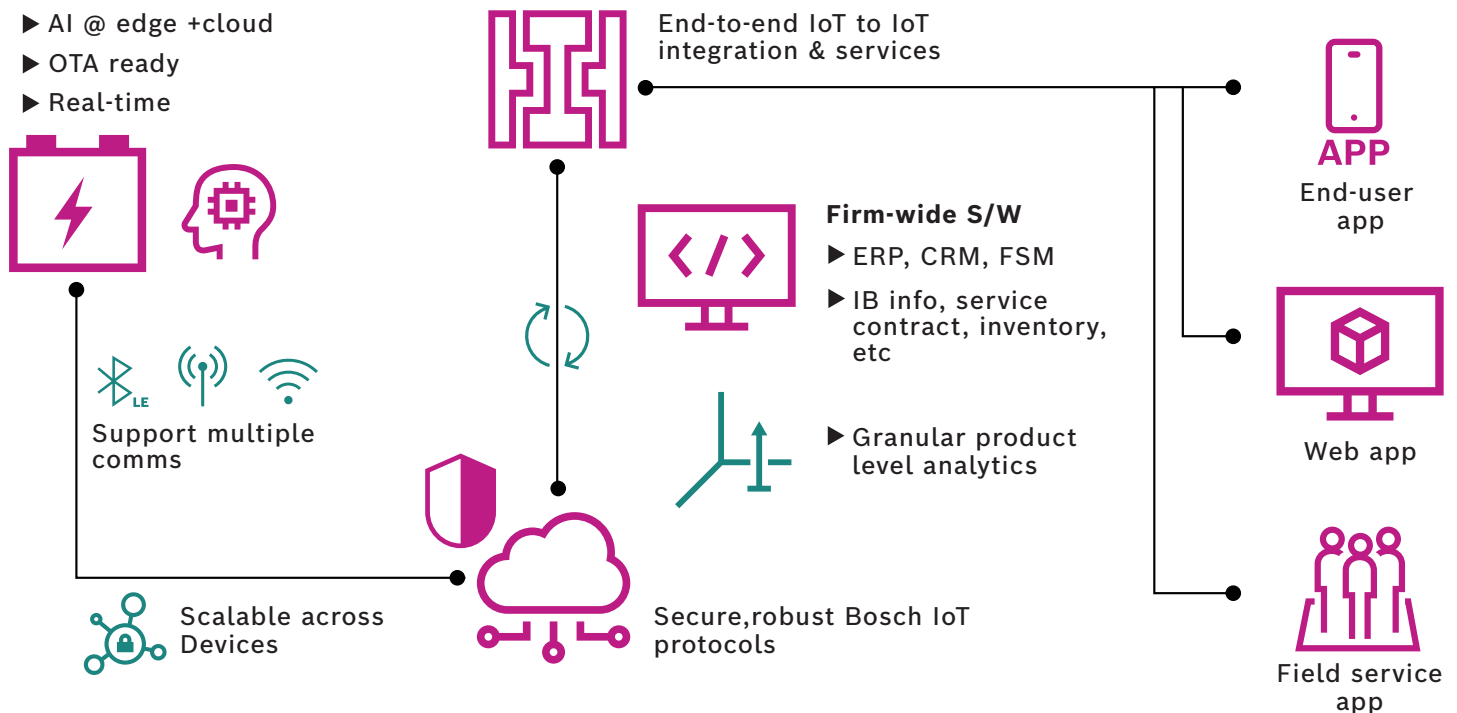
BGSW

Bosch Intelligent Battery Solution

A tried-and-tested solution with robust IoT protocols will ensure that security is never compromised. Expert guidance should be assured at all levels of implementation, including software solutions (enterprise resource planning, customer relationship management, and field service management) across the board and service and inventory management tools.

Bosch intelligent battery solution consists of a battery monitoring unit, software for multiple stakeholders, and most importantly, intelligent high-resolution

algorithms that couple with data to make batteries AIoT-ready. AI/machine learning will constantly iterate algorithms based on real-life performance, decode the high-resolution state of change and health data, and predict and prescribe battery key performance indicators (KPIs).

AI-enabled Edge hardware incorporated with firmware over the air can process data and cloud/edge computing split based on application needs. With reliability-tested printed circuit boards—designed, manufactured, and delivered—AIoT OEMs are now presented with the opportunity of monitoring key aspects across all business and operational functions with tailor-made interfaces for each level.

- ▶ AI @ edge +cloud
- ▶ OTA ready
- ▶ Real-time

Support multiple comms

Scalable across Devices

Secure, robust Bosch IoT protocols

End-to-end IoT to IoT integration & services

Firm-wide S/W
- ▶ ERP, CRM, FSM
- ▶ IB info, service contract, inventory, etc
- ▶ Granular product level analytics

APP
End-user app

Web app

Field service app

BGSW

Application Example

The end-user mobile app will have features that allow them to request a service or get in touch for assistance from experts, wherever they are.

Depending on requirements and customization level, one of the working scenarios is an end-user mobile application that will allow OEMs or partners to offer value-added services.

▶ The app will be able to monitor battery health and place service requests and replacement orders.

▶ Field representatives would be able to interact directly with customers. This

will also allow for seamless and accurate data collection. AIoT will be able to process the data and prescribe near-perfect solutions.

▶ The predictive capabilities of powerful AI will also enhance service technicians' ability to be ready for the most common scenarios. With an easy-to-use interface, the field service application will arm them with remote diagnosis, performance monitoring and allow for pinpointed troubleshooting.

▶ An all-access web-based app, entailing field to business insights and a real-time view of asset performance will ensure clear visibility across all functions. Inventory management, right from batteries to spares, will be transparent.

BGSW

Lead the Change

Access to intelligible data across functions combined with strategic implementation is key to ensuring OEMs control ecosystems. OEMs are then equipped to unlock the value they seek by adding revenue channels, reducing warranty and operating costs while optimizing profits.

As OEMs embrace a holistic AIoT presence, they are also future-proofing their business to remain competitive. Having the technological ability and suited infrastructure, OEMs will benefit from reduced time to market, performance insights, supply chain excellence, and enhanced forecast across functions. Therefore, long-range planning becomes less opaque to make critical decisions ahead of demand trends and with a clear understanding of how to optimize operational expenditure.

Given plateauing growth, market leaders must differentiate with technology. Control over the ecosystem is instrumental in capturing and extending market share by disrupting a stagnant market and win bigger across financial, operational, and environmental KPIs.

With Bosch's technology and engineering excellence, automotive-industrial grade expertise, global manufacturing presence, AI capabilities, and partnerships, Bosch Intelligent Battery Solution is well suited to solve the problems of OEMs trying to scale their solutions. The ideal partner would optimize OEM's profits through market growth and cost savings and provide OEMs with a hassle-free customer experience. By collaborating with the right AIoT specialist, OEMs could position themselves to control the ecosystem on time.

BGSW

Author:

Vishwas V S

Is currently IoT Business Head at Bosch Software and Digital Solutions. Having extensive experience in IoT and connected mobility space, he has steered business and product development initiatives across numerous IoT-led digital transformation for global OEM's. Vishwas specializes in IoT business development, portfolio management and driving new-age business models.

Author:

Manu Menon

Is an IoT Business Lead at Bosch Software and Digital Solutions. Having been a Business Strategist in corporate and consulting roles, he has enabled design and execution of numerous IoT-led digital transformations. Manu specializes on AIoT strategy & emerging business models

Get In Touch

Bosch Global Software Technologies Pvt. Ltd.

India | USA | Europe | UK | Japan | Middle East | China

For more information, send your enquires to
connect@in.bosch.com

BGSW