ICEVENTURE

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Project – Study of the economic impact and performance of AI/ML solutions on the battery industry value chain

Abstract

Introduction

An increasing number of publications discusses the use of artificial intelligence (AI) and one of its technologies machine learning (ML) as the next disruptive tool for companies. While these, often until now hypothetical, use cases are very interesting, it is of importance to understand what works, what not and where and when an investment by companies in the technology pays off.

But - the use cases of AI/ML in the battery industry value chain are very interesting and worth investigating.

This statement is based on two constraints the energy storage industry is faced by: First there are the challenges for battery development and production that are numerous. There is for example the questions around (new) materials, the battery chemistry, cell design as well as production at competitive cost, battery management systems, safety and charging cycles influenced by ageing behavior of the cell chemistry.

Then there is the innovation cycle known from hard-science driven industries. The problem is that progress in hard science is mostly slow and marked by a lot of failures. In addition, traditional research methods have been limited to measuring data in test environments while the elaboration and assessment of real data is limited by the capacity to collect and availability of highly qualified and trained scientists and development engineers. Also, the pool of available talent is small and follows the educational cycle which is long.

While these are factors are influencing the overall industry, the competitive situation for European based participant of the battery industry is especially challenging due to the dominance of Asian players. Thus, there is a key interest **in advanced**, **new technologies leveling the competitive field** helping to win competition.

To identify why this could be AI/ML and to what extend is the key objective of this study which starts with the research hypothesis that this in fact is possible.

The key for this prognosis is that AI/ML enable new ways of addressing the named issues. The first new approach is to use the existing data in a new and unprecedented way. The promise of artificial intelligence and one of its main techniques - machine learning – is that it could provide an enormous benefit due to faster, speeded up analysis. The elaboration of data is no longer dependent on trained scientists only but can be facilitated by IT talent deploying an increasing number of computer models and analysis in parallel. Thus, the analysis of available data is no longer limited only to the evaluation by development engineers determined by market-driven factors constraining their time. In addition, deploying AI/ML opens up the possibility that computers in large datasets can find new correlations engineers and scientists did not think of yet. Also, there is a better match between modeling of battery systems and real performance data.

The second point is that a totally new set of data can be used and added to the machine learning process (made possible by cheaper sensors). The first set of data that could be included are pictures. We think it is an untapped opportunity to evaluate massive amounts of visuals from batteries e.g. showing corrosion or other kinds of damage. The second type of data that has not been used to the best of our knowledge so far – is audio. What if a company would be able to take audio files of batteries and see if a change in the noise level or sound relates to failure providing new insight into the battery lifecycle?

AI/ML could therefore be the game changer for fast movers in the battery industry. The reason for this is that electrochemical energy storage by its very nature and definition is based on hard science progress that improves with data and more research.

But the question is of course if these promises hold true and if real economic benefits can be reaped. Our aim is to close this white spot and provide an evaluation to decision makers.

Outcome of the study, target group, methodology and pricing

Aim of the study is to provide a comprehensive overview of available data on AI/ML costs/benefits for each step in the battery industry value chain. In addition, real use cases implemented by companies and service providers will be included. An overview of patents, university research and market activity by market participants will give decision makers a fast access to the current picture and provide strategic input for own initiatives

Target group

CEOs/CIOs and head of research/product development of companies that either run their own project (for comparison) or want to understand the competitive implications of AI/ML in the field. Every stakeholder interested in AI/ML and battery technology

Research approach

Desk research about available AI/MI cost data / economic performance data in the battery industry

Interviews/emails with e.g. developers, stakeholders and service providers about trials, prototypes or case studies

Review of existing academic studies / review of patents

Research on solutions, companies and service providers

Comparison with existing technologies

Pricing and partnerships

Please contact us at info@iceventure.de or +49 8131 260224 for information.

Authors and availability

Planned publication/availability

End 2019 – exclusive customers; Early 2020 - general public.

Authors

Arnbjörn Eggerz (supervisor and author) and an associate.

Related publication

"THE UNTAPPED OPPORTUNITY OF MACHINE LEARNING (ML) AND ARTIFICIAL INTELLIGENCE (AI) IN THE GERMAN/EUROPEAN ENERGY STORAGE INDUSTRY"; <u>www.electrical-energy-storage.events</u> Study on the economic impact and performance of AI/ML solution on the fuel cell value chain.

About Arnbjörn Eggerz

Arnbjörn Eggerz, the managing director of Iceventure has 10+ years of experience in business development, business consulting, new technologies (focus SaaS/Cloud technologies, battery technology) having worked on projects in Germany, Austria, Italy and Iceland.

Competencies and fields of service include SaaS, electrochemical energy storage, financial services (Fintech), innovation processes, digitalization and national/local innovation systems.

As part of the business activities he frequently edits reports about technology impact or the impact of major events on the economy. He blogs on <u>www.iceventure.de/blog.html</u> where examples of articles can be found. For example, an analysis of Tradeshift, an introduction to the German ecosystem, the sale of Wunderkind and some coverage of the Euro crisis as well as the business model issues of second life use cases. He interviewed e.g. Philippe Botteri and Ari Helgason on SaaS. We have been reposted/featured by e.g. Blick Log (award winning German financial blog), Griechenlandblog and by Tradshift's Christian Lanng (on Twitter).

About Iceventure

Iceventure offers business development and business intelligence on the German market for German and foreign companies and often deals with aspects around market entry questions.

The credo is that the 21st century with the raise of the network economy and data availability requires a new approach to consulting. It requires connected thinking combined with excellent analytics of sectors and drivers of dynamics as well as an understanding of propositions of individual actors and decision makers.

We are active in the field of SaaS/Cloud (10 years), digitalization and energy storage (business side) for 6 years. We also address topics of energy storage and digitalization like the use of blockchain in grid connection scenarios or the effects of machine learning/digital twins for batteries.

Iceventure also connects the key players and information under the education brand Iceseminars.

An example of one of our network activities: We are co-founders of the "Batteriestammtisch", a regular networking event on electrochemical energy storage in Munich and beyond. The meeting is now entering into the 5th year and its 16th appointment. Speakers (and guests) range from the industry and research (e.g. among others BMW, Audi, Wacker, Bosch, M. Braun, GE, TU Munich, LH Landshut, Ludwig-Maximilians-Universität Munich, Fraunhofer, SGL & ZAE).

www.iceseminars.eu/batteriestammtisch.html