

ABSTRACT

Green Storage System Performance Evaluation and Prediction Using Machine Learning
By Leo Guo, Janaarthana Harri Palanisamy, Gabrielle Viray

In today's fast-paced world, energy is a quintessential need for numerous different private, commercial and industrial sectors to lead their day-to-day activities. As the energy demand grows there is a lot of excitement in the shift towards cleaner electricity. Battery Energy Storage Systems (BESS) are one such technology that enables renewable energy to be stored and released when needed. The battery energy storage market size is valued at \$9.21 billion in 2021 and is estimated to grow from \$10.88 billion in 2022 to \$31.20 billion by 2029, exhibiting a CAGR of 16.3%.

Battery management systems play a crucial role in many present-day devices/applications and can be seen everyday with the increase of electric vehicles(EVs) and smart grids. These systems perform various functions such as measuring battery temperature, monitoring battery health, and also monitoring battery remaining charge. In addition, battery management systems prevent battery degradation caused by overcharging or over-discharging. Furthermore, accurately predicting State of Health (SoH), State of Charge (SoC), and Remaining Useful Life (RUL) remains a crucial yet arduous task in ensuring the batteries' performance, lifetime, and safety operations.

A web application that uses data driven machine learning methods to accurately predict different features of the battery is proposed in this project. Various public datasets are analyzed to learn useful information for the estimation of specific features of the battery and to evaluate the performance of different battery types. The web application also allows the user to explore the datasets of different battery types by using the preloaded datasets or by uploading their own dataset to the web app. A dashboard with the prediction result and other data will be displayed to the user as per their choice of dataset and feature they choose.