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written by Abdullah • November 9, 2023

Nanyang Technological University, Singapore and Durapower Technology Singapore have developed a cloud-based technology that can greatly enhance the lifespan and safety of lithium-ion batteries.



As the global shift towards renewable energy and electric vehicles (EVs) accelerates, the demand for efficient, safe and sustainable batteries has become a pressing concern. Similarly, with the rise in cloud computing, the demand for energy storage systems for data centres has been growing.

Powered by the [Internet of Things](#) (IoT) and Artificial Intelligence (AI), this new solution can help companies and data centres

lower the risks associated with lithium-ion batteries, including potential fire hazards, particularly in hot and humid climates like Singapore.

Over the last four years, the joint team developed a Fire & Explosion Management System (FXMS), which utilises Digital Twin technology – where a virtual replica of an actual battery is created to mirror the one in real life – offering high-accuracy, real-time monitoring, as well as predictions of battery conditions up to five years.

The team estimates that their patent-pending technology can help to extend the lifespan of lithium-ion batteries by more than 50 per cent, significantly reducing carbon emission through the reduction of battery waste, as batteries require a lot of resources and energy to manufacture.

Hung Dinh Nguyen, Cluster Director of Renewables' Integration & Microgrids at the Energy Research Institute at NTU said, "Our main aim is to enhance the safety and efficiency of large-scale energy storage systems and Electric Vehicles, as a single faulty cell can spark off a chemical fire that is extremely hard to put out. Since our technology is cloud-based, it is scalable and can easily be adapted for consumer electronics such as mobility devices, laptops and mobile phones, helping the batteries to last longer and in the long run, reduce electronic waste and carbon footprint,"

Chief Executive Officer of Durapower Group, Kelvin Lim said, "With the global mandate for sustainability, smart mobility, and a carbon neutral future, we're seeing widespread adoption of energy storage systems and uptake of EVs. The development of a customisable software platform like FXMS furthers efforts towards robust and comprehensive digital infrastructure based on Machine Learning and Artificial Intelligence to capture increasingly complex battery and energy usage in the EV

market. The outcomes from this joint initiative with the EMA, NTU and Durapower on FXMS will enable better decisions based on data and analytics, facilitating optimal battery health, performance, and longevity.”

NTU Vice President (Industry) Professor Lam Khin Yong, said, “the collaboration between NTU and Durapower demonstrates how new technology in the green economy can be pioneered through a strong academia-industry partnership supported by the Singapore government.”