Deep Learning and System Analytics for Battery Systems Engineering

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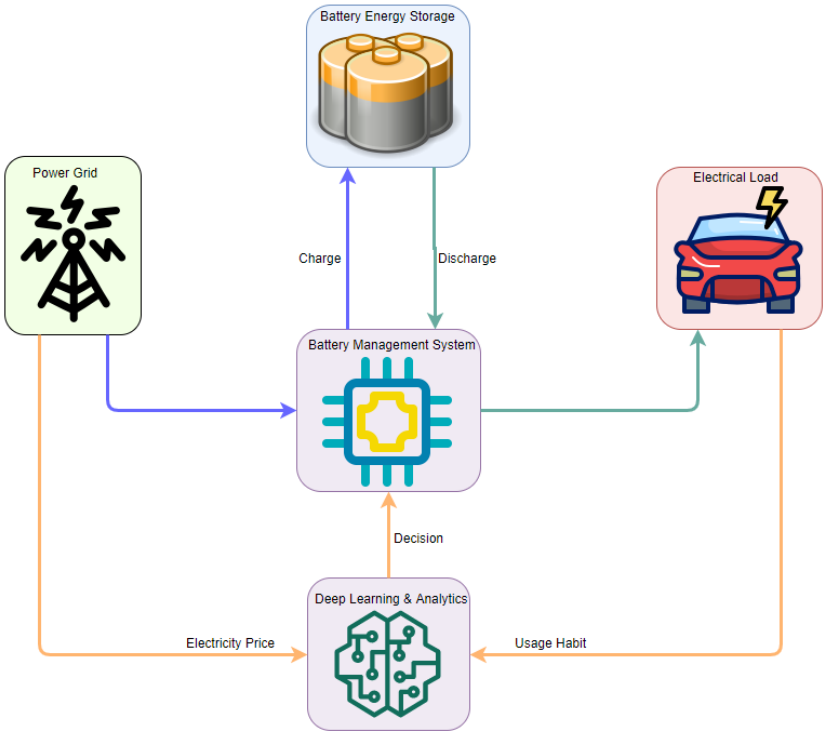
Energy storage is a growing need to increase the efficiency and effectiveness of the power systems. There are many ways to store energy (e.g., ultra-capacitor, compressed air and hydroelectricity), but batteries are the best choice for most applications thanks to their scalability for small (cell phone), medium (home energy storage) and large (gird) applications. However, safety, lifespan, and cost are three major concerns that prevent the widespread applications of battery energy storage. Currently, for a 4-hour standalone battery storage system, the unit price is about $380/kWh, which is relatively expensive compared with other energy storages system. Moreover, a battery loses its capacity during the usage and requires replacement when it reaches its end-of-life's threshold. This aging issue has an impact on the operational cost.



In this project, we aim to leverage the power of deep learning and system analytics to extract some useful information from the past data and integrate with the battery model to extend the lifespan of the battery energy storage system while fulfilling the power demand and maximizing the economic benefit. The case study will be based on the electric vehicle which comprises the vehicle model and the battery model.