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Study on the test platform of the battery management system for the large-scale lithium battery energy storage

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As the exponential deployment of the sustainable energy sources like photovoltaic and wind generators, electrical energy storages (EES) are also being installed globally to compensate the unstable renewables. Lithium-ion battery (LiB) is the most popular type of rechargeable battery in EES. However, LiB has safety problems such as fire, explosion or the damage of the battery itself unless it is within the proper operating range. The hazards are more critical than other secondary batteries because it has much higher energy and power density. The Battery Management System (BMS) is an essential and critical component to keep the safety of the EES. Because of these risks, there are many testing standards in various applications to provide functional safety requirements of the LiB. Some of them describe the system level requirements including BMS but it is limited and cannot fully support the test of BMS functions. The purpose of the study is to develop the test platform and procedures of the BMS that can give in-depth test of BMS. The test platform is based on the HILS (Hardware in the Loop Simulation) technology with real-time battery simulation. Inside the platform, the LiB is simulated as the electricity equivalent circuit model, and the simulated signals such as voltage, temperature, currents are provided to BMS via hardwire signals. To test BMS for the large-scale EES some signals are transferred via communication because the hardware interfaces are limited. Test procedures and scenario to verify the functions of BMS include measurement accuracy, sensor/IO fault, protections, performance and so forth. With this test platform and test procedure, it is expected to develop more reliable BMS which conclusively supports safer EES.

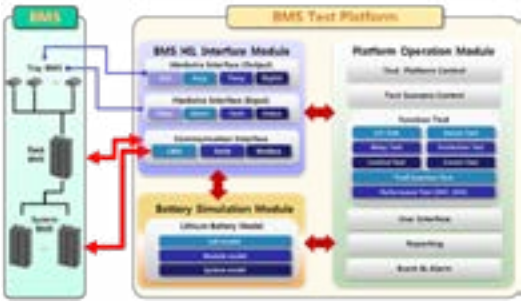

Figure 1 BMS test setup with BMS test platform for the large-scale Battery Energy Storage

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2. Y-S. Kim, C-S Hwang, E-S Kim, C. Cho , "State of Charge-Based Active Power Sharing Method in a Standalone Microgrid with High Penetration Level of Renewable Energy Sources", Energies MDPI AG , 2016.
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Biography

Changhee Cho received his B.S. and M.S. degrees from Seoul National University, Seoul, Korea and PhD degree from Pusan National University, Busan, Korea all in Electrical Engineering. Currently, he is a principal researcher of Smart Distribution Research Center in KERI (Korea Electotechnology Research Institute). He is a POC (Point of Contact) and a national expert of Korea in IEA ISGAN (International Smart Grid Action Network) A5 (SIRFN). His research interests are the control and management of distributed energy resources, new & renewable generators, network communications and the energy optimization in the microgrid.

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