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Active control network applied to hydrogen and ion lithium energy storage systems

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The research of efficient renewable energy generation, storage and distribution technologies is an important step towards the implementation of continuous energy supply in an electric power grid, due to the intermittency of photovoltaic and wind generators microgrids. Funded by strategic research call of the Brazilian National Electric Energy Agency (ANEEL) the development of innovative Smart Grid Management methodologies employing predictive model analysis was proposed for a hybrid energy storage system consisting of a ion -lithium battery bank and hydrogen storage system using electrolysis fed by a set of photovoltaic plants with interconnected wind turbines as a micro energy network. The development of a robust system of instrumentation and control applied to the project contemplates the development and testing of a control mesh that includes the wireless integration and secure access with own point-to-point encryption applied. The research is part of a structure that was initiated with the implementation of a photovoltaic and wind farm with investments by Companhia Energetica de Sao Paulo (CESP) in previous ANEEL research projects, and is now complemented with the energy storage and dispatch approach. The quality and energy efficiency requirements can be verified in the experiments performed and behavioral models defined for the elaboration of representative mathematical models based on the predictive analysis of the collected data. In the context of increasing use of distributed generation, micro-energy and resource availability efficiently, it is expected to collaborate with the generation of tools from the predictive analysis as a basis for the prospective analysis enabling the development of control and monitoring systems appropriate to the expansion of the use of distributed renewable energy.



Figure 1: Basic control diagram of storage research

Biography

Eloi Fonseca has been working with critical embedded systems applied to aircrafts, UAVs, small satellites, biomedical engineering electronic systems and security systems since 1995. He has completed his Graduation in Environmental Engineering, Data Processing Technology and Aeronautical Communications Technology; Master's degree and PhD in Applied Electronic Systems Engineering. Currently, he is a Research Coordinator at Universidade Estadual Paulista "Julio de Mesquita Filho" of the project "Efficiency analysis of complementary energy storage near hydroelectric plants, using electrochemical and hydrogen storage technologies" funded by Companhia Energetica de Sao Paulo-CESP. His entrepreneurial vision allows act him to act as a researcher involved with new approaches for renewable energy systems monitoring and control development.