Department of Electrical & Computer Engineering

**Florida International University**

College of Engineering & Computing

In Conjunction with the

Institute of Electrical and Electronics Engineers, Inc.

**Industry Applications Society**

# Precision Battery State of Charge and State of Health Assessments

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**Place:** ECE Department, FIU

10555 W. Flagler Street, Miami, Florida

Energy Systems Research Lab. (EC3960)

## Abstract:

Many electric devices in everyday use do not have the capability for accurate estimation of power remaining in storage or state-of-charge (SOC). Industry products such as cellular phones, portable computers, and uninterruptible power supplies (UPS) utilize the classical method known as coulomb- counting, relying only on current to make their estimations. Unfortunately, this method alone is weak as it does not take into account the age of the battery nor the number of cycles the battery has charged and discharged. As a result, these devices can report false information, initially depicting a full charge and only minutes later reveal that the battery has been exhausted. Historical information is crucial for depicting the capacity-loss that is associated with batteries overtime and continuous use. Battery history can aid in determining not only a precise SOC but also the condition or state-of-health (SOH) of the battery. Through the implementation of an advanced book- keeping system and incorporating other battery parameters and measurements, the accuracy of the SOC and SOH assessments can be dramatically increased leading to the development of a more precise measurement tool.

In this research, the lifespan of a lead-acid battery is evaluated to help develop a superior method to determine its SOC and SOH. A complete battery testing system is constructed using the LabVIEW Development Platform to record measurements from the battery. In addition to data taken during charging and discharging to produce a master SOC, an additional phase was engineered within the software to administer high frequency test pulses on the battery in order to profile battery SOH.

These high frequency pulses were then analyzed using frequency characterization and neural network training to develop a method in determining any battery's age without historical data present.

**For Lecture Information Contact: Energy Systems Research Lab. (305) 348-6109**