Control Enabling Solutions with Ultrathin Strain and Temperature Sensor System for Reduced Battery Life Cycle Cost

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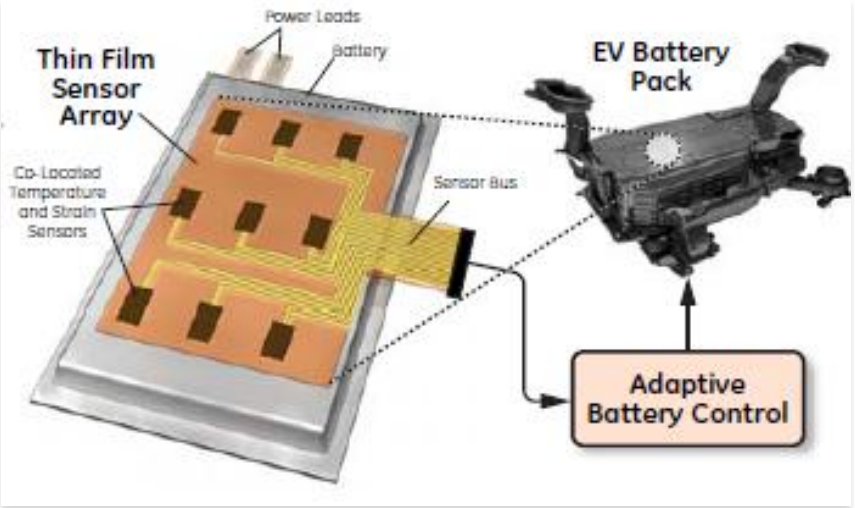
Technology

Based on sensor technology, which can leverage high-volume, low-cost manufacturing, GE will develop an ultrathin sensor array capable of measuring strain and temperature across multiple cells within a pack. These sensors will bring increased observability to the health of the battery. U-M will use multiphysics models for selecting the critical sensor locations, extracting the thermal and stress features for new battery control algorithms. The sensors and control will be implemented in a battery pack and tested by Ford.



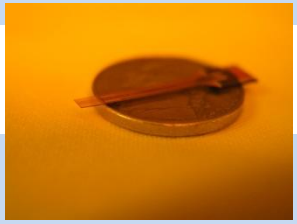
Advantage and Differentiation

This sensor system has several advantages over existing technology:

- 25 times smaller temperature sensors than those used in EVs today
- Addition of new observability parameter – strain
- Placement of sensors in locations not accessible by today's sensor technology
- Ability to create sensor arrays in order to map strain and temperature distributions

Using these sensors in combination with multiphysics battery modeling and parameterized reduced order models, a minimalistic sensing system can be created and new battery health algorithms can be developed.

Performance Targets



The program objective is to demonstrate that the sensor and controls implemented lead to increased cell utilization by 20% as compared to an un-instrumented pack under a drive cycle (likely US06 or similar) for HEV battery.

Please contact regarding: applications, manufacturing