Battery Management Systems Seminar

Monitors • Gauges • Chargers • Protectors

October 11-12, 2022

Tuesday, October 11

Time	Location	Title	Abstract	Speaker
8:00 a.m.	**Registration – continental breakfast**			
9:00 a.m.	Texas 1-5	**Welcoming keynote**	Samuel Wong, general manager of TI's Battery Management Solutions business, will welcome attendees and give an overview of the latest BMS trends.	Samuel Wong
9:15 a.m.	Texas 1-5	**Guest keynote: EV and its battery control system**	The automotive market is undergoing a seismic industry transformation, largely driven by lithium-ion batteries and the ascendance of electric vehicles. To provide customers with a compelling driving experience they've grown used to with internal combustion engine vehicles, e-propulsion systems need to be architected to provide more power and greater efficiency. Serving as a brain of the e-propulsion system, battery management systems are adapting to be safer and more intelligent while provide greater performance and lifetime management.	Dr. Tao Wang, vice president, Visteon
9:45 a.m.	**Coffee break**			
10:00 a.m.	Texas 1-5	**Battery technology update**	This presentation gives an overview of new battery technology development during last few years. The main technology trends are diverging into pursuing higher energy cells through either capacity increase or voltage increase. Both trends have seen some break-through developments, where Si-anode batteries with higher capacity finally became available for sampling, and new high-voltage capable electrolyte results have been published which enable higher energy materials like over-lithiated (OLO) and cation-disordered oxides. At the same time battery companies are focusing on cost reduction through replacing expensive Co with cheaper and more price-consistent Ni, Mn and Fe in cathode materials. Higher discharge rate batteries (mostly around LiFePO4, and NMC) continue growth in production quantities, driven by power tools and electric vehicles. Power backup / grid management is becoming an important area where many chemistries complete. Some extreme battery life (million miles EV) has been demonstrated with single crystal NMC. Finally, futuristic technologies such as Li-air and Li-Sulphur battery are reviewed as well.	Yevgen Barsukov
11:00 a.m.	Texas 1-5	**Charging trends in low power industrial systems**	Low power battery operated systems such as earbuds, smartwatches, hearing aids and medical patches are all around us and are instrumental in enabling a better and more convenient lifestyle. With many of these products in close proximity to the end consumer, battery- powered system designers have a key responsibility in ensuring the products they design are safe, reliable and provide a rich user experience. In this presentation we will go over some of the new charging trends in low power systems and how to build a robust battery management system for your product.	Arelis Guerrero
12:00 p.m.	**Lunch break:** Texas 1-5. Ask the expert time Demo area open from 12:30-1:30 p.m.			
1:30 p.m.	Texas 6-8	**Battery charger overview – from the fundamental to the system challenges and application solutions**	This presentation explains the major differences and the technical reasons between a battery charger and a DC-DC converter. The key charger features such as power path, dynamic power management, input source detection will be introduced. The associated system challenges such as charging accuracy, power flow control, and flexible charging sources will be discussed. Different industrial application examples using different charger features will be analyzed to help the audience gain some in-depth understanding.	Eric Zhao
1:30 p.m.	Wildflower Ballroom	**Battery gauging fundamentals**	Gauging battery state accurately is a complex challenge which requires advanced algorithms. This session explains the challenges and how TI addresses them with various gauging algorithms.	Dominik Hartl
2:30 p.m.	Texas 6-8	**Switching charger PCB layout tips and example**	PCB Layout is an important part of the switching charger design. It affects charger efficiency, thermal, regulation accuracy, ripple, EMI and even converter stability. This presentation introduces several practical tips to guide you through the layout process. It covers FET and inductor selection, components placement, ground partition, layout and size optimization. An example buck boost charger is demonstrated in the presentation.	Tiger Zhou
2:30 p.m.	Wildflower Ballroom	**Using TI gauges advanced charging algorithm**	Several TI gauges can supply charging parameter information to a system based on various conditions. This session discusses how to use the advanced charging algorithm feature.	Wyatt Keller
3:30 p.m.	Texas 6-8	**Resolving battery charging common application issues**	To safely charge a battery pack, battery chargers have multiple internal feedback loops to control, and sensing circuits to monitor, input and output voltages and currents. The charger also monitors battery and charger die temperature. With such complexity, battery charger issues such as collapsing the input power source, reduced or no charge current, failure to terminate charge in a timely manner or inefficient charging are not uncommon. This presentation explores the root causes of the most common battery charger issues and not only how to resolve them but how to prevent them from occurring in the first place.	Jeff Falin
3:30 p.m.	Wildflower Ballroom	**Designing with TI gauges using TI's tool chain**	TI gauges are highly configurable for a specific battery/cell and application. To get the best performance out of TI gauges, the TI tool chain, consisting of an EVM, a PC interface and software, bqStudio, is the best tool to develop optimal configuration.	Jackson DiGiovanna
4:30 p.m.	**Reception with food and beverages provided** Demo area open. Ask the experts time			

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Wednesday, October 12

Time	Location	Title	Abstract	Speaker
8:00 a.m.	**Registration – continental breakfast**			
9:00 a.m.	Texas 1-5	**Systems consideration for monitors for high cell count industrial applications**	When designing for high-cell count applications, determine the best system architecture can be time-consuming. This presentation will examine the pros and cons between basic system configuration options, including gauges, monitors and primary or secondary protectors while offering examples for different battery types.	Andria McIntyre
10:00 a.m.	Texas 1-5	**Battery charging challenges and features for high-power and high-cell count applications**	Battery charging challenges and features for high-power and high-cell count applications. This presentation will discuss the challenges and features of high power, up-to 70-V bidirectional battery charging. Switching frequency synchronization and ideal diode control allow seamless paralleling of multiple high-voltage battery packs during charging and discharging. The implementation of MPPT charging, bidirectional operation supporting USB-PD 3.1 power profile, and battery charging profiles for different chemistries will also be introduced.	Alvaro Aguilar
10:45 a.m.	**Coffee break**			
11:00 a.m.	Texas 6-8	**USB Type-C PD3.1 extended power range, and the benefits of Type-C + BQ solution**	This presentation targets introducing customers to USB Type-C PD and the new PD3.1 EPR PD spec which allows for up to 240 W to be supplied on a USB Type-C port. As more portable devices begin to transition to being powered via a USB Type-C port, and with the power range being raised from 100 W to 240 W, an all-inclusive USB Type-C PD + battery charger solution can be very valuable.	Adam McGaffin and Deric Waters
11:00 a.m.	Wildflower Ballroom	**Stacking systems for UPS/BBU/ESS applications**	Many energy storage systems need for stacking AFE systems to achieve high cell counts battery packs. This presentation contains details on the stacking and non-stacking systems using Texas Instruments AFEs. We will look into the design considerations, system trade-off and how our devices can solve customers' challenging problems.	Xiaodong Cai
12:00 p.m.	**Lunch break:** Texas 1-5. Ask the expert time Demo area open from 12:30-1:00 p.m.			
1:00 p.m.	Texas 6-8	**Designing high cell count automotive applications with BQ79616-Q1**	The BQ79616-Q1 automotive battery monitor provides state-of-the-art technology in terms of feature-set, performance and BOM cost for designers working with various battery architectures and module sizes. This presentation will dig deeper into the design considerations for the application circuits needed to ensure proper functionality and performance in harsh automotive environments.	Taylor Vogt
1:00 p.m.	Wildflower Ballroom	**Optimizing monitor usage with multiple parallel FETs for high power applications**	Lithium ion battery packs commonly use MOSFETs to prevent battery charge and discharge when conditions are outside a normal operating range. Design engineers have many FET topologies to choose from, however selecting the right topology and placing it properly can be challenging. This presentation will examine how to select and position FETs in industrial battery packs.	Luis Hernandez Salomon
2:00 p.m.	Texas 6-8	**The next generation Wireless BMS using the CC2662R-Q1**	The SimpleLink CC2662R-Q1 automotive 2.4-GHz wireless MCU is optimized for the low-power TI Wireless BMS protocol. The TI WMBS protocol is a robust, scalable, low-latency high throughput wireless protocol that enables engineers to reduce the system cost and weight while still enabling a path for system-level functional safety communication layers up to ASIL D. This presentation will introduce the concept of Wireless BMS and dive deeper into the advantages it brings for BMS design as well a high-level overview of the wireless protocol itself.	Evan Wakefield
2:00 p.m.	Wildflower Ballroom	**TI gauges for rarely discharged applications**	Rarely discharged applications can be difficult for gauges that rely on learning how a cell ages. This session shows how to design a rarely discharged system so that TI gauges can be used without impacting gauging accuracy too much.	Dominik Hartl

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265