### A123 Systems

**Dr. Mike Marcel, P.E.**  
39000 7 Mile Road, Livonia, MI  48152  
mmarcel@a123systems.com  
(734) 772-0587  
Publicly Held company  
**Energy Storage (High Volume manufacturing, Research and Development of Lithium Batteries)**

A123 Systems, with corporate headquarters in Watertown, MA, employs over 4,000 employees in multiple locations worldwide. They occupy over 1,000,000 square foot of manufacturing facilities in the United States (Massachusetts and Michigan) to include the largest cell manufacturing facility in Livonia, MI. A123 is currently underway expanding its capability in Michigan with more manufacturing capability in Livonia, MI and a Powder coating facility in Romulus, MI.

A123 employs one of the largest lithium battery development teams in the country. The team is organized into research, cell development, manufacturing, and military product groups who will be involved in this program. The research group capabilities include laboratory and pilot scale production of a wide range of electrode powders, as well as laboratory and pilot scale facilities to mix and coat new electrode materials. Electrode and cell development is supported by both first principles and finite element design tools. Cell prototyping is available to a variety of formats, including coin, Swagelok, single layer pouch, 63450 and small prismatic cells, and 18650 or 26650 cylindrical cells. The small prismatic cells are produced in a semi-automated assembly shop operated in a 730 sqft dry room. All of the processes from the manufacture of raw materials through final pack assembly are performed at A123Systems facilities, which are ISO9001, and ISO14000 certified.

### A123 Systems

**Mike Wixom**  
3850 Research Park Drive, Ann Arbor, MI 48108  
mwixom@a123systems.com  
N/A  
**Business > 1000 employees**  
**battery manufacturing, grid-scale energy storage, battery safety**

A123 is a vertically integrated battery OEM, with all of the resources needed to integrate advanced management and protection technology into high volume production of electric vehicle and grid energy storage batteries. The research plan will be executed by technical staff at laboratory and development sites in Waltham, MA and Ann Arbor, MI. R&D and product development occupy >30,000 sq ft, with a staff of 70 scientists and engineers. Capabilities exist for the development of new battery active materials and other components, continuous monitoring of batteries, fabrication of prototype rechargeable batteries of a wide range of prismatic and cylindrical form factors, system integration, and comprehensive testing of assembled cells and packs for performance, safety, and life.

### Advanced Transportation Electric Center

**Mo-Yuen Chow**  
Advanced Transportation Energy Center  
North Carolina State University  
Campus Box 7571  
Raleigh, NC 27695-7571  
chow@ncsu.edu  
919-515-7360  
Academia  
**battery manufacturing, electric vehicles, grid-scale energy storage, electric vehicle charging, battery safety, controls, and power electronics**

• Develop battery and power electronic technologies to help the automobile industry develop better and more efficient PHEVs and EVs, hence allowing our nation to move away from gasoline based vehicles.

• Develop fundamental and enabling technologies that will facilitate the electric power industry to actively manage and control large amount of plug-in hybrid vehicle (PHEV) and plug-in electric vehicle (PEV).

### AES Energy Storage LLC

**Casey Jacobson**  
4300 Wilson Blvd, Arlington VA 22203  
casey.jacobson@aes.com  
(703) 682-1254  
**Business; Energy storage system operator and developer**  
**Grid-scale energy storage systems**

AES Energy Storage LLC is an energy storage owner and operator with over 70 MW of battery systems in operation in the U.S. and Chile providing frequency regulation and reserve services. We have the ability to develop, model, and test new operational control methods and software algorithms for operating storage assets efficiently.

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This document contains the list of potential teaming partners for the Advanced Management and Protection of Energy-storage Devices (AMPED), solicited in DE-FOA-0000675 Funding Opportunity Announcement (FOA) and is published on ARPA-E-EXCHANGE (https://arpa-e-exchange.energy.gov), ARPA-E's online application portal. This list will periodically undergo an update as organizations request to be added to this teaming list, and will stop updating once the AMPED FOA DE-FOA-0000675 closes. If you wish for your organization to be added to this list please refer to https://arpa-e-exchange.energy.gov for instructions, or follow https://arpa-e-exchange.energy.gov/Content.aspx?FileID=99f4f04b-85f1-4657-8b76-2201981e4602 to the specific announcement.
Appled Power Systems

H. J. Wu

1) Electric Vehicles: Battery Safety / Battery Manufacturing

Applied Power Systems is a US manufacturer of power conversion products (cage code 1NRQ4). We are experts in the control of power electronics 124 Charlotte Ave. 

jwhitacre@appliedps.com

2) Electrochemical Energy Storage: Modeling & Simulation

Argonne National Laboratory

32 39th Street, Pittsburgh, PA 15201

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Hicksville, NY 11803

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Next generation vehicles test beds are connected to a 100 kW power source which contains the rest of the site. The Advanced Power Analysis Laboratory at Argonne has more than 12 years expertise in modeling, simulation and control of advanced vehicles with the development of tools such as Autonomie. The centerpiece of the technology is an innovative aqueous sodium based liquid energy storage chemistry. Over the last two years, the chemistry has been rigorously proven in a laboratory environment and certified by independent third party testing. The electrochemical couple that has emerged from this process is one that combines a high capacity carbon anode with a sodium intercalation cathode capable of thousands of complete discharge cycles over extended periods of time. The materials couple can deliver over 30 Wh/kg packaged. The device functionality is a broad range of ambient temperatures and can be repetitively cycled to no less than 95% capacity. Liquid cycle testing indicates at least 500 cycles with no fade in delivered capacity, while ongoing calendar life testing shows stable performance for over a year of continuous deep cycle use.

Aquion Energy

Jay Whitten, PhD

32 39th Street, Pittsburgh, PA 15201

aquionenergy@aep.com

312-269-5558

Fidelity National Company

Battery Manufacturing

Aquion Energy is producing a safe, reliable, affordable means to manage and store energy. The cornerstone of the technology is a novel sodium-based battery optimized for stationary storage applications with a commercial release in 2013. Applications include micro-grid support, off-grid generator applications, and off-grid energy services. The competitions of the technology is an aqueous sodium solution based liquid energy storage chemistry. Over the last two years, the chemistry has been rigorously proven in a laboratory environment and certified by independent third party testing. The electrochemical couple that has emerged from this process is one that combines a high capacity carbon anode with a sodium intercalation cathode capable of thousands of complete discharge cycles over extended periods of time. The materials couple can deliver over 30 Wh/kg packaged. The device functionality is a broad range of ambient temperatures and can be repetitively cycled to no less than 95% capacity. Liquid cycle testing indicates at least 500 cycles with no fade in delivered capacity, while ongoing calendar life testing shows stable performance for over a year of continuous deep cycle use.

Argonne National Laboratory

Mark L. Petri

Argonne National Laboratory

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9700 South Cass Avenue

Center Energy Storage Systems.

Electrical Vehicles: Battery Safety / Controls / Power Electronics / Charging / Modeling & Simulation

1) Electric Vehicles: Battery Safety / Controls / Power Electronics / Charging / Modeling & Simulation

Argonne National Laboratory

9700 South Cass Avenue

Argonne, Illinois 60439

mcpetri@anl.gov

Vehicular Battery Testing Program

Argonne serves as DOE's lead lab for EV Codes and Standards development and EV connectivity and communications to Smart Grid. We are a large user of IGBTs and SCRs and have excellent relationships with the leading manufacturers of these components.

Aquion is currently capable of manufacturing up to 100 kWh of batteries per month in their Pittsburgh, PA pilot facility. They will open a full-scale manufacturing facility in 2013 capable of producing over 100 MWh/year starting in over 500 MWh/year (to be released in 2015).

Our products are used in a variety of industrial, military and commercial applications. We have designed and built high precision, high power magnet manufacturers of these components.

We have also developed a wide range of custom products. We are a large user of IGBTs and SCRs and have excellent relationships with the leading manufacturers of these components. Our products are used in a variety of industrial, military and commercial applications. We have designed and built high precision, high power magnet manufacturers of these components.
Focus area 1: Electromechanical Energy Storage

The Electromechanical Energy Storage Theme is largely focused on advanced Li-ion, Lithium metal and other beyond Li-ion technologies that hold the promise for dramatically reducing the cost and increasing the energy density as compared to commercially available technologies such as lead-acid batteries.

- Argonne has recently added three new facilities, with DOD-FEBA and ARPA-E leading, to help speed the development cycle of translating laboratory inventions to real-world products.

- Materials Engineering Research Facility (MERF) which is capable of coating electrodes and fabricating commercial-grade 18650 cylindrical cells and multi-electrodes stacked pouch cells.

- Post-Test Facility (PTF) which is dedicated for conducting post-test diagnostic studies to identify performance and life-limiting phenomena for different battery technologies. This new facility is closely linked to Argonne’s independent battery test facility.

- A new high-rate electrochemical and thermal testing system was recently developed to open tested cells and SEM, XRD, STM and TEM are used to characterize materials and morphology.

Focus area 2: Electrochemical Energy Storage

- Aubourn University developed a quasi-three dimensional electromechanical, thermal and mechanical stress model (Full Order Model) for Lithium polymer battery that is validated for 1C-5C charging and discharging within a temperature range from 0-40C. Based on this complex model, a Polymer battery that is validated for 1C-5C charging and discharging within a temperature range from 0-40C. Based on this complex model, a

- Reduced order model (ROM) which is capable of capturing electrical and electrochemical commercial-grade 18650 cylindrical cells and multi-electrodes stacked pouch cells.

- Argonne has a range of modeling expertise for electromechanical energy storage.

- Cell-Level “between the current collectors” material models that account for the appropriate physical driving forces using concentrated solution theory.

- Macroscopic battery performance and cost models (www.cse.anl.gov/batpac) that quantify materials breakdown and cost for battery packs designed for a set power and energy.

- Atomistic modeling capabilities to calculate material properties at the atomic scale.

- Argonne is an internationally recognized center for battery R&D focusing on all aspects of the battery but with a particular focus on materials development.

- Argonne is an internationally recognized center for battery R&D focusing on all aspects of the battery but with a particular focus on materials development.

- Argonne is a recognized leader in the integration of wind energy and solar PV into the electric power grid.

- Argonne’s independent battery test facility.

- Post-Test Facility (PTF) which is dedicated for conducting post-test diagnostic studies to identify performance and life-limiting phenomena for different battery technologies. This new facility is closely linked to Argonne’s independent battery test facility.

- Cell Fabrication Facility (CFF) which is capable of coating electrodes and fabricating commercial-grade 18650 cylindrical cells and multi-electrode stacked pouch cells.

- Materials Engineering Research Facility (MERF) which is capable of scaling up newly developed anode, cathode, and electrolyte materials.

- Argonne has a range of modeling expertise for electromechanical energy storage.

- Cell-Level “between the current collectors” material models that account for the appropriate physical driving forces using concentrated solution theory.

- Macroscopic battery performance and cost models (www.cse.anl.gov/batpac) that quantify materials breakdown and cost for battery packs designed for a set power and energy.

- Atomistic modeling capabilities to calculate material properties at the atomic scale.
Beckett Energy Systems, a Division of RW Beckett Corporation

Brad Moore
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Private Corporation – Systems Integrator, Manufacturer
Grid-scale energy storage, Power Electronics
Beckett Energy Systems is a manufacturer and integrator of the best available technologies to offer solutions for the emerging markets of energy storage, renewable energy integration and micro grids. Our products include 1 kWh Li-ion battery modules, multi kWh battery packs, and fully integrated, modular distributed energy storage systems of 25 kW – 100 kW with storage capacity of 1 – 4 hours.

Bendors LLC, Eastern Michigan University and Thin Red Line Aerospace, Inc.

Benedic Jester
Eastern Michigan University, Romanski Hall 260, Ypsilanti, MI 48197
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734-487-1299
University and corporations
Energy generation and storage without batteries
Collaboration between Eastern Michigan University’s renewable energy futurist technology and a high-tech Thin Red Line Aerospace, Inc. who are leaders in deep sea energy storage systems.

Black & Veatch Corporation

Anto Scupham
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ScuphamSK@bv.com
913-458-7959
Engineering, Procurement, Construction
Balance of plant design, interconnection engineering, SCADA, construction management, renewable energy integration
Black & Veatch is experienced in design and construction of substations and power plants. We apply our knowledge of these power systems to provide engineering and optimization of energy storage systems for developers and utilities. We also provide strategic planning support for utilities to determine how to integrate energy storage and renewables into their system planning.

Blyomy Energy Systems

Jonathan Murray
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508.281.8288
Consulting
Energy Storage Systems – control, monitoring, and test
Bloomy Energy Systems provides monitoring, control, and test products for the energy storage and automotive industries. We focus on quality and reliability to meet the requirements for energy storage solutions. As a business unit of Bloomy Controls, Inc., our extensive experience in test systems, data acquisition, control, and embedded systems reduce the risk and cost of developing high performance energy storage systems.

C&C TECHNOLOGIES, LLC.

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302 476 2559
SMALL BUSINESS
ON EARTH TRANSPORT VEHICLES

CALCE (Center for Advanced Life Cycle Engineering), University of Maryland

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(301) 405-5278
University
Battery and systems reliability, battery safety, prognostics and systems health management, power electronics
CALCE is a world leader in physics of failure reliability assessment, prognostics and health management of electronic systems. CALCE consists of over 100 faculty, staff and students engaged in leading-edge research with customers that range from military and avionics, to automotive, medical and consumer electronics.

Battery reliability and health management work at CALCE includes the development of failure mechanisms specific for energy storage, damage accumulation techniques, remaining useful life estimation including advanced SOC and SOH analysis, system health monitoring based on prognostics, and rapid charging, cell balancing, and system performance enhancement for health management technologies. CALCE has extensive accelerated testing and failure analysis laboratory that includes materials and chemical characterization, electrical stress analysis, thermal shock, temperature-humidity cycling, HAST, HALT, vibration and shock, high-voltage simulation, high-temperature storage, and various testing.

California Center for Sustainable Energy

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619-244-5295
Non-profit sustainable energy organization
Clean transportation, EV battery/Solar applications and energy storage
Advanced vehicle technology, demonstrations, Electric Vehicles and EV charging market development, renewable energy storage
Technical analysis, research, program management/administration, market development applications
Camgian Microsystems
David R Lamb
Camgian Microsystems
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617-680-3800 ext 102
388-800-0000
Embedded sensor systems for engineering
innovative solutions.

CanmetENERGY, Natural Resources Canada
Kari Ramussen
CanmetENERGY, Natural Resources Canada
691-752-2942
Energy Research Laboratory, Canadian Federal Government
Energy technology research and development
Energy, technology research and development
Clean Energy Technology Center for the Evaluation of Resources Canada
CanmetENERGY is the Canadian leader in clean energy research and technology development. Our unique facilities in Devon, Alberta, Ottawa, Toronto and Vancouver, Quebec study storage, energy storage, and energy technology for Buildings and Communities, Fuel Cell Research, Bio-Energy, Renewables, Industrial Processes, Oil Sands, and Transportation.

Carnegie Mellon University
Sushil K. Adibhatla
Carnegie Mellon University
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425 WEST UNIVERSITY PARKWAY, Battery Safety, Grid-scale energy storage, and Testing, Validation & Evaluation

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Carnegie Mellon University
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洁净能源技术中心

Carnegie Mellon University
Vernon Cole
Energy Research Laboratory, Canadian Federal Government
Energy technology research and development
Energy, technology research and development
Clean Energy Technology Center for the Evaluation of Resources Canada
CanmetENERGY is the Canadian leader in clean energy research and technology development. Our unique facilities in Devon, Alberta, Ottawa, Toronto and Vancouver, Quebec study storage, energy storage, and energy technology for Buildings and Communities, Fuel Cell Research, Bio-Energy, Renewables, Industrial Processes, Oil Sands, and Transportation.

Center for Electrochemical Engineering Research (CSEER), Ohio University
Paul Green Brinks
Ohio State University
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洁净能源技术中心

CFD Research Corporation
Valdes, C.
CFD Research Corporation
501-785-7743
501-785-7743
Computational Fluid Dynamics (CFD) and related disciplines.

CILCO
David Boyd
CILCO
571-425-3045
POWER GENERATOR

CILCO
David Boyd
CILCO
571-425-3045
POWER GENERATOR

CILCO
David Boyd
CILCO
571-425-3045
POWER GENERATOR
Clever ECOolutions / Green Fleet Solution

Corvus Energy Ltd.

Curtis Instruments Inc.

Dow Kokam LLC

Dr. Douglas L. Schulz

EaglePicher Technologies, LLC

Earl Energy, LLC

CleanTech Institute, Inc.
**EC Power**
Christian Shaffer
EC Power is a leading provider of battery and fuel cell solutions for vehicle electrification, renewable energy storage, and power grid management.

**ECOnalty, North America**
Tara Goldstein
ECOnalty (EC) is a leading provider of battery remanufacturing, adaptive hybrid power systems, and energy storage solutions.

**Eetrex Incorporated**
Robert Stuhler
Eetrex Incorporated, in partnership with Methode Electronics, develops efficient high voltage power electronics, power distribution, and battery storage systems.

**Element Energy Corp**
Eric Marcell
Element Energy has deep expertise in electromagnetic, power electronics, digital electronics, control systems, and software.

**EMFIV, Incorporated**
Charlie Scolari
EMFIV is a new battery company. We are seasoned battery engineers. We established EMFIV to offer new products and services beyond present capabilities.

**Exponent, Inc.**
Quinn Horn, Ph.D., P.E.
Exponent is an engineering consulting firm dedicated to failure analysis and failure prevention.

**FastCAP Systems Inc.**
Muhammad Nawaz
FastCAP Systems Inc. is located in a 17,000 sq. ft. state of the art research and small-scale manufacturing facility in Boston's Innovation District.

**Feilhull LLC**
Michaela Voravongs
Feilhull LLC is a leading manufacturer of custom battery modules for military, medical, and large-scale storage applications.

**Fulk Systems, Inc.**
Samantha Brand
Fulk Systems, Inc. specializes in developing and manufacturing advanced battery management systems for the transportation, telecommunications, data centers, and military markets. ECOtality’s expertise in battery manufacturing, electrical safety, electrical vehicle charging, battery safety, controls and power electronics as part of our product portfolio.

**Grid Scale Energy Storage**
Kathryn Miles
Grid Scale Energy Storage specializes in engineering and customization of high performance ultracapacitors, as well as power electronics design and fabrication for energy storage systems and DC interfaces.
Dr. Alex Huang  
Future Renewable Electric Energy Delivery and Management (FREEDM) Systems Center  
North Carolina State University  
Campus Box 7571  
Raleigh, NC 27695-7571  
aqhuang@ncsu.edu  
919-513-4176  

FREEDM Systems Center has extensive experience in the development of energy storage systems for vehicles and the grid. FREEDM has developed scalable vehicle charging architecture systems with our utility partners and are also directly involved in high efficiency wireless charging systems. The center's expertise also includes development of power electronic systems and advanced algorithms for battery system modulation, controls for energy storage integration to microgrids, battery management systems, and also high efficiency converters for vehicle to grid operations.

Gannon Motors and Controls, LLC  
Chris Mi  
615 E. Main Street West, Canton, MI 48020  
mi3032@gmail.com  
(734) 765-8321  

Gannon Motor and Controls, LLC is specialized in battery management system, in particularly they have developed proprietary management, monitoring, balancing and protection system for lifeline batteries for electric and plug hybrid electric vehicle application.

GigMedia  
Louis J. Skriba  
188 E. Bluewater Ln.  
Vernon Hills, Illinois 60061-1220  
director@gigmedia.com  
779-456-7812  

Wind-to-hydrogen-powered vehicles.  

The persistent mass market acceptance failure of electric vehicles is directly related to the strategic misdirection that the “vehicle” concept for the 21st century must be that of the 20th century automobile, with all its petroleum derived performance prejudices. The right 21st century “vehicle” needing electric power is a quiet, personal Vertical Take Off & Landing aircraft operating under UAV/autonomous navigation.

The failure to widely adopt renewable energy solutions is directly related to the lack of energy storage solutions to deal with diurnal and seasonal variations of environmental sources. Battery cost, distributed, non-grid connected storage. The right renewable energy system that will serve for centuries is based on wind-to-hydrogen storage.

The failure to develop “energy storage” to meet the capacity, safety and most importantly cost requirements for “transmission” is directly related to the assumption that a chemical battery is the only option. The right “energy carrier” (aka storage) technology, must be cryogenically cooled hydrogen generated locally, coupled with wind turbines.

The failure of the Hydrogen fuel-cell powered car strategy is directly related to the overly simplistic idea that hydrogen must be profitably sold at “gas stations.” The survivable hydrogen/fuel-cell based energy system must generate its own hydrogen, locally and cheaply from environmental inputs.

The above radical and irreverent energy philosophy is the main capability of our strategic planning, marketing, and product development consulting efforts to help industry and science to embrace that which is already, and will continue to be, cost effective for massive numbers of end users without massive government and corporate subsidies. Rather, our approach is to use tomorrow’s social networking communications in a peer to peer manner to drive massive investment. Rather, our approach is to use tomorrow’s social networking communications to provide massive investment (peer to peer) support and entrepreneurship investment (see consortia partnerships and intellectual property sharing) as well as the promotion of “distributed manufacturing.” Only a radical, irreverent and unconvention investment strategy that acts like a “hydrogen” that gives the independent end user the “grid” (hydrogen or electric) but which meets its own energy carrier in the same charging infrastructure that is begun to help APRA-E choose as its highest immediate priority.
<table>
<thead>
<tr>
<th>Company</th>
<th>Contact Information</th>
<th>Address</th>
<th>Email</th>
<th>Phone</th>
<th>Industry/Products</th>
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<tbody>
<tr>
<td>Green Charge Networks</td>
<td>Kristen Cleven</td>
<td>5406 Bolsa Avenue, Huntington Beach, CA 92649</td>
<td><a href="mailto:kcleven@greenchargenet.com">kcleven@greenchargenet.com</a></td>
<td></td>
<td>smart grid technology company, battery management, load control technology, smart grid controls.</td>
</tr>
<tr>
<td>HRL Laboratories LLC</td>
<td>Dr. Shuoqin Wang; Dr. Ping Li</td>
<td>3011 Malibu Canyon Road, Malibu, CA 90265</td>
<td><a href="mailto:swang@hrl.com">swang@hrl.com</a>; <a href="mailto:pliu@hrl.com">pliu@hrl.com</a></td>
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<td>research and development, large business (GM and Boeing as LLC members)</td>
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<td>energy storage systems for automotive, aviation, and aerospace applications</td>
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<td>1) Life testing, analysis and modeling of lithium-ion electrodes: testing, aging, diagnosis, and semi-empirical modeling. 2) Online battery state estimation model development, programming, and validation on a hardware-in-the-loop system. 3) Development of novel sensor-based solutions to facilitate battery analysis and control systems to manipulate battery parameter profiles and in-situ reference electrode development. 4) Non-electrical battery sensor development.</td>
</tr>
<tr>
<td>HRL Laboratories, LLC</td>
<td>Kyung-ah Son</td>
<td>HRL Laboratories</td>
<td><a href="mailto:kson@hrl.com">kson@hrl.com</a></td>
<td></td>
<td>Micro/Nano Sensors and Electronics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3011 Malibu Canyon Road</td>
<td></td>
<td></td>
<td>Development of novel sensors and electronics for harsh environments, Development of solid-state chemical and physical sensors for a proof-of-concept study. Design, fabrication, characterization, and packaging of solid-state sensors and microelectronics. Design and fabrication of multi-integrated systems of sensors and electronics.</td>
</tr>
<tr>
<td>Ideal Power Converters</td>
<td>Paul Bundschuh</td>
<td>N/A</td>
<td><a href="mailto:Paul.Bundschuh@IdealPowerConverters.com">Paul.Bundschuh@IdealPowerConverters.com</a></td>
<td></td>
<td>Small Business Bi-directional battery converters, bi-directional electric vehicle charging infrastructure</td>
</tr>
</tbody>
</table>
Impact Technologies – A Sikorsky Innovations Company

Carl Palmer
300 Canal View Boulevard, Rochester, NY 14623
carl.palmer@impact-tek.com
585-424-1990 x116
Large Business

Prognostics, diagnostics, sensors, controls, safety, logistics

Carl Palmer leads a team of experts in various fields including battery management and control, safety, logistics, diagnostics, and sensors. Impact Technologies is a subsidiary of Sikorsky Innovations, a global technology leader in aerospace systems.

Indiana University

Professor Jian Xie, PhD
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Indiana University is a public state-owned university with more than 30,000 students. The Richard G. Lugar Center for Renewable Energy is an energy research consortium with integrated research and development programs ranging from battery management and diagnostic systems, battery protection systems, materials, to energy storage/conversion systems (for both batteries and fuel cells). The Center consists of a multi-disciplinary faculty team from mechanical engineering, electrical and computer engineering, and bioelectrochemical engineering in the Purdue School of Engineering and Schools of Science, and Medicine, and Public Health.

Currently, there are more than 7 faculty members, 3 research staff, and 10 graduate students involved in battery-related research. Their research areas include electrode materials, separators, new battery chemistries, battery design and battery management and protection systems. In particular, battery management system and battery protection systems are two major focusing areas for research and development. The team has received more than $20 million grants from federal government, state government, and industry in energy-related research. The research capabilities include:

- Characterization of battery cells, modules and packs for their behavior under different operating conditions and profiles, using different techniques (chemical, electrochemical, electric, and mechanical) including the use of synchrotron high energy x-ray diffraction for in situ monitoring of Li ion battery cells.
- Understanding of the battery failure mechanisms (through study of the battery behavior, materials investigation, and in situ characterization of battery cell under operations).
- Development of management, control, and protection systems for energy storage systems in electric vehicles (EVs) and hybrid electric vehicles (HEVs) based on the characterization of the behavior of battery cells, modules and packs and the understanding of the failure mechanisms. Battery pack management systems have been developed for EVs and HEVs and currently tested on HEV platforms. A unique battery protection system has been designed for end-of-life batteries.
- Fabrication of battery cells in coin cell and pouch cell configurations.
- Development of all-solid-state lithium ion battery.
- Development of high energy density battery materials (>1000 Wh/kg)

Indy Power Systems, LLC

Steve Tolen
7702 Moller Rd. Indianapolis, IN 46268
Steve@IndyPowerSystems.com
(317) 370.0559
Private LLC incorporated in Indiana in 2007

Indy Power Systems has a patented energy management and control system (System) that can optimize the flow of energy between any number of different sources and/or loads regardless of voltage. The System can be used in a variety of applications, including: transportation, renewable energy, and storage. The System is designed to work with any type of energy source, including solar, wind, and storage devices. It can be used in a variety of applications, including: transportation, renewable energy, and storage.
**Integrity Industrial Ink Jet Integration, LLC**

Dr. Rich Baker  
16 Airpark Road, West Lebanon, NH 03784 USA  
richbaker@integrityintegration.com  
+1 (603) 298 8300 ext 115

- 2-year old start-up, ~10 people – R&D and Systems Integration.
- Precision depositing of materials using inkjet. Ink jet processes and fluid formulation development; drop control processes; photonic sintering of nano metals onto low melting plastic substrate.
- Industrial ink jet experts; process development; print system design and fabrication; chemistry; program management.

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**International water SAVER ENVIRONMENTAL SERVICES (IWSES )**

Dr. JALAL UD DIN QURESHI  
1000 Farrah ln , Suite 934 , Stafford  TX 77477  
iwses@live.com  
832-217-6837

- DBA Research on water & energy Projects
- Recognition of International Water Saver Environmental Services (IWSES) as AMPED Partner

The International Water Saver Environmental Services (IWSES), a joint partnership Firm, was established in 2010 with the primary aim to promote scientific and technological innovations in the country to help in sustainable development. IWSES areas of interest include Renewable Energy, water resources, environment, and Agriculture. The Firm has offices in Houston, Texas, USA.

The Firm has been registered with the DBA, Houston, Texas, USA. The Firm has built formal partnership with M/s 3TM International and informal partnership with M/s Alt-Energy Tech Inc., both based in Houston, Texas USA for undertaking projects in the water and energy sector.

The key services the Firm can provide include:

1. Design, construction and supervision of civil engineering works related with small dams, canals, watercourses, surface irrigation works including trickle and the full range of high efficiency irrigation systems including sprinkler, drip, center pivot, solar powered water filtration and wastewater treatment plants.
2. Groundwater resource identification, exploration and development including the design and installation of tubewells and deep boreholes.
3. Geological, geophysical, hydrological, soil, topographic, and socio-economic surveys and investigations.
4. Technical studies in the field of water resources, Renewable energy, environment, and agriculture including project planning and feasibility studies.
5. Design and installation of solar and other Renewable energy systems for domestic and emergency use purposes.

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**Johnson Controls - Power Solutions**

Tobias Falz

- Batteries for Energy Storage

---

**KEMET Electronics Corporation**

Rayna Handelman  
Raynahandelman@kemet.com  
Office (954) 766-2819  Cell (248) 677 1738

- Business Energy Storage systems, BMS, and system integration

---

**KnGrid, LLC**

Stephen G. Davis  
26602 Dapple Grey Drive  
Laguna Hills, CA 92653-5710  
sdavis@kngrid.com  
(858) 357-8790

- Developing intelligent vehicle charging/settlements platform to enable:  
  - Regulation Market Participation  
  - Seamless Roaming  
  - Developing Duty Cycles for "Second-Life" vehicle batteries:  
    - Containerized Storage Systems capable of hosting 40 EV used EV batteries with one master controller  
    - Battery-backed DC Fast-charging EV’s  
    - Oscillation Damping  

---

**Laserlith Corporation**

Cassindy Chao  
4775 Technology Circle, Suite 3, Grand Forks ND 58203  
Cassindy@laserlith.com  
701-772-1513

- Sensors  
- Laserlith develops various MEMS Sensors including low-loss RF relays and switches – enabling lower power and weight while maintaining high performance.

---

**Lawrence Livermore National Laboratory**

A.J. Simon  
Mail Stop L-103; 7000 East Avenue;  
Livermore, CA 94550  
simon19@llnl.gov  
925-422-9862

- FFRDC  
  - grid integration, battery storage, fundamental electrochemistry, high-performance computing, modeling and simulation  
  - Located about 40 miles East of San Francisco, CA, Lawrence Livermore National Lab (LLNL) delivers science and technology in the national interest in the areas of Defense & Global Security, Energy, Engineering, High-Performance Computing, The National Ignition Facility, Photon Sciences and Neutrino Physics & Life Sciences. The Energy and Environmental Security Program at LLNL advances our nation’s security through its production, development, and deployment of cleaner, safer, and sustainable energy resources and technology, while understanding and reducing their environmental impacts.
Lehigh University

Dr Karl Norian
Electrical and Computer Engineering Department, 19 Memorial Drive West, 5531
ECE241
khn0@lehigh.edu
610-758-4082

Battery measurements for efficient operation, safety, and health implications

Lockheed Martin MS2

Steven Sinsabaugh
1210 Massillon Road, Akron OH 44313
steven.sinsabaugh@lmco.com
(330) 796-6107

Energy storage for efficient manufacturing, driving down costs

LogiCoul Solutions

Larry LaFranchi
Advanced Technology & Manufacturing Center, UMass Dartmouth, 151 Martine Street, Fall River, MA 02723
larry@logicoul.com
617-539-9285

Energy Charging Systems

Los Alamos National Laboratory

Eric L. Brosha
Box 1663, MS D429
Los Alamos New Mexico 87545
brosha@lanl.gov
505-665-4008

Sensors and applications to safety (Non-invasive, Post-failure) and Prognostics

Machflow Energy, Inc.

Sergei Ivanov
Machflow Energy
950 Main St.
Worcester MA 01610
sivanov@machflow.com
508-793-7759

Power Electronics and Instrumentation for the Environment

Massachusetts Institute of Technology

Richard D. Braatz
77 Massachusetts Avenue, 66-372, Cambridge, MA 02139
braatz@mit.edu
617-253-3112

Sensors; Controls; Robust Control; Diagnostics; Prognostics; Process Systems Engineering; Electrochemical Systems

Mavizen

TBA
N/A
a@mavizen.com
(+447803241478

Electric Motorsport

Energy Management Systems

Mavizen founded a worldwide movement for electric motorcycle motorsport, the TTXGP. Now in its 4th season, racing has expanded to four regions including a vibrant US scene. 2012 world final will be in Daytona. The TTXGP has been a R&D platform that has expanded beyond motorcycles to cars and now grid. http://www.wired.com/autopia/2011/10/car-buyers-benefit-as-ev-racing-goes-from-two-wheels-to-four/

We are the worldwide distributors for motorcycle motorsport for A123 Systems Inc. We are focused on the total solution around energy management, containment, safety, logistics, and integration. We service customers around the world with energy systems.

Our vision is to be the world's leading "refinery" for electrical energy for mobile and fixed systems.
MEMC Electronic Materials, Inc./SunEdison
Dr. Babu Chalamala, MEMC Fellow
501 Pearl Drive, St. Peters, MO 63376
bchalamala@memc.com
636-474-5486; 646-675-7162

Manufacturing and Renewables Deployment: Silicon wafers and PV modules manufacturing, engineering, construction and deployment of grid-scale PV systems including energy storage, R&D in flow batteries

MEMC, based in St. Peters, Missouri, is a global leader in the manufacture and sale of silicon wafers and related products to the semiconductor and solar industries. Through its SunEdison subsidiary, MEMC is also a major developer of solar power projects and is a leading solar energy services provider. Our expertise is in the development of engineering, construction and deployment of grid-scale PV systems. Over the last two years, SunEdison installed over 460 MW of solar energy capacity at 540 operational sites. With a growing pipeline of PV projects, we have extensive experience in technologies for robust control of energy storage including advanced monitoring, power electronics, sensors, and control systems.

Michigan Technological University
Dr. Bo Chen
Department of Mechanical Engineering–Engineering Mechanics
1400 Townsend Drive
Houghton, Michigan 49931-1295
bochen@mtu.edu
(906) 487-3537

University electric and hybrid vehicles, battery management, and embedded controls

University activities include:
- Real-time battery health monitoring
- Battery modeling on SOC and SOH
- Fatigue/micro-/macro-damage and aging diagnostic and prognostic algorithms
- Sensor technologies for real-time monitoring systems
- Unbreakable battery state estimation and model predictive control strategies
- Advanced individual control system development and testing facilities, including various industry standard ECUs, development software, and dedicated lab in power electronics/semiconductors

Motiv Power Systems, Inc.
Jim Castelaz
1165 Chess Drive, Suite E, Foster City, CA 94404
jim@motivps.com
650-458-4829

Motiv develops an electric Powertrain Control System for heavy vehicles. Our power electronics, software, and controls enable the easy, safe, and flexible integration of many different battery pack types and sizes into conventional truck chassis in a plug-and-play architecture. Motiv’s expertise lies in power electronics for batteries and electric powertrains, controls therefor, motors controls, embedded real-time safety-critical software, advanced data telemetry, and ruggedized mechanical design and integration.

MPR Associates, Inc.
Ryan Downs
320 King Street, Alexandria VA
rdowns@mpr.com
(703) 519-0200

Medium-Sized Engineering Firm
Battery Safety
Sensors, Controls and Power Electronics
System & Component Engineering
Reliability Engineering

MPR Associates is a global design and engineering firm providing a full range of engineering services to the energy, defense, national security and health & life sciences industries. MPR works alongside small businesses, manufacturers, power plants, utilities and regulatory organizations to implement new technologies, evaluate operational concepts, and ensure adherence to industry accepted standards. MPR's range of services can be tailored to the specific needs of a project or a customer. MPR often fills the capability gap within teams and strives to ensure success of the overall team's goals.

MPR has significant experience with, and is currently involved in, developing technology and products related to battery safety systems. Past performances include:
- Safety characterization via lab and module level testing, development of casualty detection, containment and mitigation technologies, and design/build/qualification of casualty mitigation (safety) products.
- Performance includes cell, module, system and stack testing, as well as the development of new technologies and product development.

In technology and product development, MPR applies its unique First Principles Development Process to consistently deliver innovative solutions from initial concepts to detailed designs for manufacturing. This process focuses on addressing risks early in the design process, leveraging manufacturers and contractors in the initial development stages, and conducting the reliability/maintainability analysis during the design process. MPR Development Processes ensure a smooth transition from idea to product while maintaining the vision of cost-effective solutions for our customers and business goals throughout all the development stages.
National Renewable Energy Laboratory (NREL)

15013 Denver West Parkway, Mail Room 1633, Golden, CO 80401-3305

E-mail: schwartzj@ncsu.edu; smithr@navy.mil; pesaran@nrel.gov

Awards/Technical Development and Development Center

NREL (formerly known as the National Renewable Energy Laboratory) has unique expertise in battery thermal management, battery system simulation, and multi-physics modeling, electrochemistry, power electronics, battery control and charge strategies, battery safety, electrochemical grid integration, and renewable grid connected energy storage. NREL is the lead federal laboratory for DOE Office of Vehicle Technologies programs in Computer-Aided Engineering of Batteries (CAEBAT). The electrochemical power source capabilities at the West Bethesda site range from basic electrochemistry research to performance and safety, and include up to 445V and 530A is possible at the West Bethesda site. Abusive test capabilities include short circuit, overcharge, high temperature, high voltage, fault current limiters, and other superconducting magnet based systems. We have unique expertise in the stability and protection of superconducting magnets that are essential for superconducting magnet energy storage, particularly those that integrate compression-based thermal management systems.

Naval Surface Warfare Center Carderock Division - West Bethesda

301-227-5820

Naval Research and Development

Office of Vehicle Technologies program in Computer-Aided Engineering of Batteries (CAEBAT). The electrochemical power source capabilities at the West Bethesda site range from basic electrochemistry research to performance and safety, and include up to 445V and 530A is possible at the West Bethesda site. Abusive test capabilities include short circuit, overcharge, high temperature, high voltage, fault current limiters, and other superconducting magnet based systems. We have unique expertise in the stability and protection of superconducting magnets that are essential for superconducting magnet energy storage, particularly those that integrate compression-based thermal management systems.

North Carolina State University, Department of Materials Science & Engineering

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Ohio State University

Dr. Marcello Canova
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614-247-2556

University

Advanced Battery Technologies and Applications:
- Systems Level Battery Applications: Electric Transportation Systems, Stationary Energy Storage
- Battery Aging Testing and Characterization
- Chemical, Electrochemical, and Physical Characterization and Modeling
- Electrochemical, Thermal, and Structural Characterization
- Battery Materials Characterization
- Battery Prognostics and Diagnostics
- Battery Materials Characterization

Ohio State University is a leading research organization in the area of advanced battery technologies and energy storage systems. As one of the largest universities in the United States, OSU has the advantage of being able to support vast multidisciplinary initiatives to explore and research the multi-faceted areas of advanced battery systems and associated applications. To this end, OSU took the initiative and formed an advanced battery group, comprised of five different scientific and engineering disciplines, numerous facilities equipped with testing and analytical equipment, and more than 50 researchers and research support staff dedicated to the advancement of battery technologies. With the collaboration of so many disciplines, OSU facilitates the entire spectrum of battery research including research at the materials level to system applications that utilize battery technologies such as electric transportation.

Taking a directed research approach of electrochemical energy storage devices and systems enables researchers at OSU and its industry partners to conduct system, subsystem, component, and materials-level research focused on life, performance, aging, and damage characterization on multiple layers of batteries enabling the commercialization of new, innovative approaches and designs to battery technology.

Ohio State University supports numerous testing facilities dedicated to battery testing and demonstration: Battery Aging Laboratory, Battery Thermal Characterization Laboratory, Material Characterization Laboratories such as Coin Cell Fabrication Calorimeters, Electron Optics Facility, Atomic Force Microscopy Labs, and System applications such as a Class 8 battery-electric truck (100kWp, 600mg, 40-150 mile range, PHEVs (EcoCAR), and the Buckeye Bullet (world’s fastest electric vehicle).

Ohio State University

Prof. Junmin Wang
201 W. 19th Ave., Columbus OH 43210
wang.1381@osu.edu
614-247-5755

University

Modeling, sensing, and control methodologies and applications to electric vehicle estimation, fault diagnosis, and control; electric vehicle energy management and control; real-time electric vehicle operational energy efficiency optimization.

Over $1M projects on electric vehicle modeling, fault diagnosis, estimation, and control funded by Office of Naval Research, National Science Foundation, and others. Numerous publications on electric vehicle modeling, fault diagnosis, fault-tolerant control, energy management, and energy efficient control.

Ohio State University

Gregory T. Smedley, Ph.D.
One-Cycle Control, Inc.
12 Mauchly, Bldg P, Irvine, CA 92618
gsmedley@onecyclecontrol.com
949-727-0107 x01
C-Corporation

Power Electronics & Battery System Integration for on-grid & off-grid

One-Cycle Control, Inc. is a C-Corporation comprised of world-renowned experts in Power Electronics (control, topology, Magnetics) and has technology from Caltech and UC Irvine Power Electronics Lab.

Government Contracts: DOD, DOE, CEC, CIEE.

Awards: 2010 SBIR Army Achievement Award

3-Phase Converters: 10x smaller & 5x lighter than typical offerings; 40kW ~ 60 lbs & ~1.2 cu. ft.

Combinable, Modular, Scalable, Rackable, Adaptable

Bi-Directional, 4-Quadrant, High-Efficiency 3-Phase Power Conversion with 100 microsecond rail-to-rail.

Experienced in system integration for Wind, Micro-Hydro, Off-Grid Energy Storage, Off-Grid Energy Storage, Mobile Power, alternative energy, advanced transportation, grid stabilization, power quality, satellite frequency, “wild power”, etc.

RHQ, design prototypes, & satellite production with 95% domestic supply chain.

UL-Approved products on the market.

www.onecyclecontrol.com
PB Energy Storage Services, Inc.

Liangliang Hu

94304

luh6@panacis.com

2017-09-20 22:47:24

Engineering and Commissioning

CAES-scale Energy Storage

PB Energy Storage Services, Inc. is wholly owned subsidiary of Parsons Brinckerhoff (PB). PB provides full suite of design, construction and implementation of the technology for wind farms and wind farms integrated with wind and other renewable energy systems. PB takes a lead role in market development and competitive analysis. PB has developed a battery manufacturing, battery testing, grid-scale energy storage, battery health management, battery safety, and battery electronics. PB has also provided the turbomachinery and balance of plant engineering expertise in the development of several recent CAES development projects. PB is directly involved with the development of other CAES concepts, which promise to provide new cost-effective configurations that can be integrated into existing CHP systems. PB has also developed storage systems with complete local and remote management capabilities. Our systems deliver a reduced total cost of ownership that is unsurpassed in the industry today. For more information, please visit panacis.com.

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PCTEST ENGINEERING LABORATORY INC.

JAESIK CHUNG Ph.D.
6660-B Dobbin Road Columbia, MD, 21045
anto@pctestlab.com or info@pctestlab.com
410-290-6490 / 410-290-6652

Battery Safety and Reliability, Battery Risk Assessment, Cell Manufacturing Process and site Audit and Consulting
- 1) Li ion battery safety and reliability analysis.
- 2) Battery safety Certification: Cell manufacturing Site audit/ Cell /Battery pack/ Charging System/ Host system/ System base safety evaluations
- 3) DO160 Certification: Transatlantic Flights
- Cell and Battery abuse test and approval test
- Aerospace application Battery evaluation
- Military application battery testing
- 4) Research for battery degradation and safety mechanism
- Forensic Analysis
- Field test: analysis and Recall issue support
- Diagnostics: Prognostics: Analysis project
- Battery Thermal management

People Power Company

John Teeter - Chief Scientist
620 Lowell, Palo Alto, CA
john.teeter@peoplepowerco.com
208-875-2269

Post DoE SBIR Phase 2 Commercial

People Power is advancing the state of the art in DC microgrid control systems as well as energy and resource management systems and information technologies. People Power is supporting the open source development of key interoperability elements within the microgrid control domain, including the emerging Energy Interop and ASHREA FSGIM standards. Our particular expertise in highly scalable, cloud-based, information systems and network management platforms position us as well for contributions in transformative control infrastructures for management of distributed energy resources.

PowerHub Systems

Glenn Skutt, Ph.D.
1700 Kraft Dr. Suite 1325, Blacksburg, VA 24060
gskutt@pwrhub.com
540-443-9214 x4271

PowerHub is a Virginia based design and manufacturing company concentrating on community energy storage (CES) and other grid-tied storage solutions. PowerHub has delivered 320 units that are used by the utility for grid firming and load shaving of distribution circuits (unintended) tool in high penetration solar PV environments. PowerHub’s expertise is in power electronics, embedded system design, control programming, communications, and the integration of emerging standards for the operation and integration of distributed energy resources and microgrids. Our CES products are based on a NAVA-4 quadrupole power conversion and lithium-ion battery packs of various sizes from 20kWh to 160kWh.
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Contact Name</th>
<th>Address</th>
<th>Phone</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qnovo Corporation</td>
<td>Dania Ghantous</td>
<td>39655 Eureka Drive, Newark, CA 94560</td>
<td>510.592.7728</td>
<td>Sense and Control Systems for Lithium-Ion Batteries</td>
</tr>
<tr>
<td>Quallion</td>
<td>Alex Fay</td>
<td>12744 San Fernando Rd, Sylmar, CA 91342</td>
<td>818 833 2029</td>
<td>Battery manufacturing, battery safety, sensors, controls, power electronics</td>
</tr>
<tr>
<td>Quantum Fuel Systems Technologies Worldwide Inc.</td>
<td>Dr. Neel Sirosh</td>
<td>17872 Cartwright Road, Irvine, CA 92614</td>
<td>949 399 4698</td>
<td>Electric Vehicles, power electronics</td>
</tr>
</tbody>
</table>

Princeton Power Systems (PPS) is a New Jersey based manufacturer of advanced power conversion electronics for the renewable energy industry. PPS electronics are ideal for solar, wind, and energy storage systems. For more information, please visit www.princetonpower.com

Qnovo has developed unique advanced control systems based on adaptive charging of lithium-ion batteries. The Qnovo algorithm measures in real-time the key parameters that impact degradation within the cell. This approach then applies these measurements using a physical model for determining the best charging approach. The algorithm takes into account practically any variable such as manufacturing variations, temperature and self-discharge. Qnovo built its own custom test infrastructure to test the unique diagnostic and adaptive control requirements. Each test channel uses an ARM processor with high-speed A/D sampling and real-time feedback control at the cell. The Qnovo team combines expertise in battery materials, engineering and electrochemistry, as well as electronics engineering and mixed-signal design.

Quallion manufactures lithium-ion active materials, cells and batteries, including BMS design, for medical, military, aerospace and transportation applications.

Quantum Fuel Systems Technologies Worldwide, Inc. is a fully integrated alternative energy company, a leader in the development and production of advanced propulsion systems, energy storage technologies, and alternative fuel vehicles. Quantum’s wholly owned subsidiary, Schneider Power Inc., and affiliate, Schneider Power Systems, manufacture energy conversion systems, power electronics, and components for vehicles and other transportation and non-transportation uses. Quantum’s portfolio of technologies includes advanced controls, hybrid electric vehicle systems, renewable hydrogen and fuel cell systems, and engines in fuel technology that make fuel efficient, low-emission hybrid, plug-in hybrid, fuel cell, and electric vehicles. Quantum’s powertrain engineering, systems integration, vehicle manufacturing, and assembly capabilities provide fast-to-market solutions to support the production of hybrid and plug-in hybrid, hydrogen powered hybrid, fuel cell, and electric vehicles, as well as modular, transportable hydrogen refueling stations. Quantum’s customer base includes automobile OEMs, electric utilities, fleets, aerospace industry, military and other government entities, and other strategic alliance partners.
Robert Bosch LLC

Dr. Nalin Chaturvedi
Johannes Christensen, Dr. Aleksandar Kojic

4005 Miranda Avenue, Palo Alto, CA 94086

nalin.chaturvedi@us.bosch.com, johannes.christensen@us.bosch.com, aleksandar.kojic@us.bosch.com

(650) 320-2967, (650) 320-2927, (650) 320-2920

Large Business

Energy storage systems for automotive and grid applications

1) Battery management systems, online battery state and parameter estimation development, optimal utilization strategies, and hardware-in-the-loop validation. 2) Physical and empirical modeling, testing, characterization, of lithium ion batteries, aging mechanisms modeling & diagnosis. 3) Laboratory cell design for analysis and high-frequency electrochemical measurements.

Rutgers University - MSE Department

Dunbar P. Birnie, III

Department of Materials Science and Engineering
Rutgers - The State University of New Jersey
607 Taylor Road, Piscataway, NJ 08854-8065

dunbar.birnie@rutgers.edu

(848) 445-5605

University

grid-connected rechargeable batteries

Recent work has included effort aimed at:

1) V2G -- vehicle batteries as connections to grid storage -- also connection to renewable power:
2) Stationary grid storage: My recent emphasis has been on sodium battery systems. I'm interested in processing and microstructure development as well as crystallography of the electrode. Here is a recent paper:
   Dunbar P. Birnie III, "On the Structural Integrity of the Spinellite Block in the \( \beta \) Sodium, (DOI:10.1107/S0108768112002649)
3) Grid/Building energy balancing: This work was supported last year as part of a Rutgers team effort involved in the DOE GPIC HUB out of Philly. We were working on solar/building retrofit designs and energy optimization. Current work is aimed at understanding the magnitude of storage that would be optimum for building energy capture and local utilization. We are keen to model larger-scale grid energy usage and have some vehicle/storage modeling underway, but still not submitted for publication.

Saft America, Inc., Space and Defense Division

Alex Bynum

209 Beaver Creek, Cockeysville, MD 21020 USA

Alex.Bynum@saftbatteries.com

410-568-2239

Large Business, for profit

Space and Defense, vehicles, grid energy storage, battery safety, controls

Lithium-ion and primary lithium: R&D, cell development, electronics development, software, battery design and battery manufacturing
Sail D. White Enterprises, Inc.

Veteran owned small business with R&D focus on military mobility; electric transportation
Intermittently driven flywheel/battery for on demand auxiliary burst of peak energy;
(This is rapidly "charged" and capable of On-the-Go supplemental power peak demand)

Electric Vehicles and Electric Vehicle charging and infrastructure improvements

Sandia National Laboratories


Federally Funded Research and Development Center (FFRDC)

Sandia National Laboratories

Sandia National Laboratories

N/A
<table>
<thead>
<tr>
<th>Company</th>
<th>Contact</th>
<th>Address</th>
<th>Phone</th>
<th>Email</th>
<th>Industry Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeo, Inc.</td>
<td>Peter Paris</td>
<td>402 9th Avenue South</td>
<td>510.782.7336</td>
<td><a href="mailto:pparis@seeo.com">pparis@seeo.com</a></td>
<td>Venture-backed solid-state battery company</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fargo, ND 58103</td>
<td></td>
<td></td>
<td>Battery manufacturing, battery safety, battery management and controls</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Engineering expertise in battery Management Hardware and software, Automotive Electronics Systems, and Battery Management. Core competencies in embedded control system design, safety and critical systems engineering, and power electronics control software. Specialists in development of advanced adaptive strategies to improve state-of-health determination and real-time battery models for state-of-charge estimation.</td>
</tr>
<tr>
<td>Sendyne Corp.</td>
<td>Ellen Gooch</td>
<td>250 West Broadway, 6th Floor, New York, NY 10813</td>
<td>+1 212 966 0600 ext. 223 / C +1 646 226 2990</td>
<td><a href="mailto:egooch@sendyne.com">egooch@sendyne.com</a></td>
<td>Business &lt; 500 Employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Energy Storage System Design and Control, Sensors/SVT Measurement, Battery and Battery System Modeling</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Energy electronics, energy storage system controls, and modeled development.</td>
</tr>
<tr>
<td>Sequentric Energy Systems, LLC</td>
<td>Daniel Flohr</td>
<td>2840 South College Rd #210</td>
<td>704 817 2080</td>
<td><a href="mailto:dflohr@sequentric.com">dflohr@sequentric.com</a></td>
<td>Software, Hardware Services Provider</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wilmington, NC</td>
<td></td>
<td></td>
<td>Real-Time network management of facility loads for demand response, supply/demand balancing, variability management and energy storage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sequentric has been supplying IP network based software and hardware solutions which allow, through real-time monitoring and dispatch control of multiple energy consuming devices. We are involved in a number of renewable generation projects where time-shiftable loads (i.e., commercial refrigeration and process heating, water heating, high temperature thermal storage, battery charging etc) are dynamically manipulated to store energy and/or reduce demand.</td>
</tr>
</tbody>
</table>
**Southwest Research Institute**

**San Antonio, Texas**

- **Mission:** Research and development in energy storage, solar technology, renewable energy, and electric vehicle development.
- **Focus Areas:**
  1. Methods and techniques to control battery lifetime.
  2. Sensors and control for battery health monitoring.
  3. Design of compact power electronics for on-board power conversion.
  4. Grid-scale interfacing.
  5. Overall system health monitoring and integration with power electronics.

**Mission Statement:**

SWRI is one of the oldest and largest independent, not-for-profit, applied research and development organizations in the United States. Established in 1947, SWRI provides contract research and development services to industrial and government clients. SWRI consists of 11 technical divisions employing over 1,000 staff members that offer multi-disciplinary, pre-commercial services to assist in the areas of engineering and physical sciences. SWRI has research laboratory facilities located in over 1.1 million square feet in San Antonio, Texas; 2.4 million square feet in Austin, Texas; and 3.4 million square feet in Colorado Springs, Colorado. SWRI specializes in environmental stress testing, electronic reliability testing, environmental testing, and non-destructive testing and evaluation to complement our extensive prototype and production testing facilities. SWRI currently manages the Energy Storage Systems Evaluation and Safety Consortium (ESSC) to study advanced technologies in power management systems. SWRI is also involved in proving the benefits of electric vehicle battery testing and safety applications.

**Key Contacts:**

- **Dr. Vivek Mehrotra**
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- **Joseph Willix**
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  - Phone: 805-430-3267
- **Dr. Kevin Young**
  - Email: ky@swgenergy.com
  - Phone: 805-430-3267

**Mission:**

TSI’s primary research facilities are in Santa Barbara, California, and Princeton, New Jersey. Together these facilities include over 1.1 million square feet of office and laboratory space.

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- **Dr. Joe C. Mitchem**
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**Mission:**

SRI International

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**Mission:**

**Renewable Energy**

- **Joseph Willix**
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<table>
<thead>
<tr>
<th>Company</th>
<th>Name</th>
<th>Contact Information</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas A&amp;M University</td>
<td>Partha P. Mukherjee</td>
<td>979-862-6498</td>
<td>Battery manufacturing, electric vehicles, battery safety, electric vehicle charging, grid-scale energy storage</td>
</tr>
<tr>
<td>Texas Instruments</td>
<td>Matthew Senesky</td>
<td>(408) 721-6289</td>
<td>Large company</td>
</tr>
<tr>
<td>TransLumen Technologies, LLC</td>
<td>Carol Sherman</td>
<td>(312) 268-8299</td>
<td>Development of the Graphical User Interface (GUI), Human Factors, HMI, visualization and smart grid initiatives using these capabilities</td>
</tr>
<tr>
<td>Transportation Power, Inc</td>
<td>James S. Burns, Ph.D.</td>
<td>(858) 248-4359</td>
<td>Electric vehicles, power electronics, grid-scale energy storage, electric vehicle charging, controls</td>
</tr>
<tr>
<td>United Technologies Research Center</td>
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</tbody>
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University

- Battery chemist, grid-scale energy storage; auxiliary vehicle charging, energy safety, sensors, controls, and power electronics
- Have been working on battery modeling and control in the context of both academic and industrial applications, with ongoing projects on battery modeling

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- Digital control of power converters, Adaptive power management and tuning for power amplifiers

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- Power electronics, Controls
- Adaptive power Management systems, digital control and circuit design for power electronics
<table>
<thead>
<tr>
<th>Institution</th>
<th>Name</th>
<th>Department/Research Area</th>
<th>Contact Information</th>
<th>Research Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Colorado Boulder</td>
<td>Ronggui Yang</td>
<td>Department of Mechanical Engineering, 427 UCB, University of Colorado Boulder, CO 80309-0427</td>
<td>E-mail: <a href="mailto:Yang@colorado.edu">Yang@colorado.edu</a>, Tel: 303-492-3453, University, Boulder, CO 80309-0427</td>
<td>Battery manufacturing, Nanostructured materials, thermal management</td>
</tr>
<tr>
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<td>Se-Hee Lee</td>
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<td>Battery manufacturing, Nanostructured battery materials, thin film rechargeable lithium batteries</td>
</tr>
<tr>
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<td>Steven George</td>
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<td>E-mail: <a href="mailto:Steven.George@colorado.edu">Steven.George@colorado.edu</a>, Tel: 303-735-0411, University, Boulder, CO 80309-0427</td>
<td>Battery manufacturing, Atomic/Molecular Layer Deposition (ALD/MLD), surface chemistry, thin film growth</td>
</tr>
<tr>
<td>University of Hawaii at Manoa</td>
<td>Rex Yuan Law</td>
<td>Hawaii Natural Energy Institute, 1680 East-West Road, POST 109, Honolulu, HI 96822, USA</td>
<td>E-mail: <a href="mailto:law@hawaii.edu">law@hawaii.edu</a>, Tel: 808-956-2339, Cell: 808-428-4976, Public research institution, University, Battery testing, modeling, diagnostic and prognostic analysis and integration</td>
<td>More than 200 channels of battery testing capabilities, with testers from precision measurements to high power (60 kW (12 x 50 V-50A), 120 kW (470V, 500A). Modeling using COMSOL or MATLAB platform from electrochemical to electrical. Diagnostic and prognostic analysis using temporal SOC and SOH tracking to identify degradation mechanism and contributions. Field testing capabilities and experiences with vehicle fleets and large scale field demonstrations in the past 15 years.</td>
</tr>
<tr>
<td></td>
<td>Reza Ghorbani</td>
<td>Department of Mechanical Engineering, H300, 2540 Dole Street, University of Hawaii at Manoa, Honolulu, HI 96822</td>
<td>E-mail: <a href="mailto:rezag@hawaii.edu">rezag@hawaii.edu</a>, Tel: 808-956-2292, University, Electric vehicle charging, Battery safety, Controls</td>
<td>N/A</td>
</tr>
<tr>
<td>University of Maryland at College Park</td>
<td>Alireza Khaligh</td>
<td>2347 A.V. Williams Building, Electrical and Computer Engineering Department, University of Maryland, College Park, MD 20742</td>
<td>E-mail: <a href="mailto:Khaligh@ece.umd.edu">Khaligh@ece.umd.edu</a>, Tel: 301-405-8985, University, Power electronics, electric vehicles, power management, controls, energy storage, Energy storage systems for electric vehicle, plug-in hybrid electric vehicles, and vehicle-to-grid (V2G) applications</td>
<td>The power electronics laboratory is equipped with high-quality state-of-the-art instrumentation, test equipment, software, and computer-aided design tools. The Laboratory of Electronic Vehicles and Energy Storage (LEVES) provides access to a wide range of equipment, including power electronics, battery testing, and vehicle-to-grid applications.</td>
</tr>
<tr>
<td>University of Michigan-Dearborn</td>
<td>Chris Mi</td>
<td>4901 Evergreen Road, Dearborn, MI 48128</td>
<td>E-mail: <a href="mailto:chrismi@umich.edu">chrismi@umich.edu</a>, Tel: 734-821-555, University, Hydrogen fuel cell, Electric vehicle efficiency, Batteries, Energy storage</td>
<td>N/A</td>
</tr>
</tbody>
</table>
University of Nebraska–Lincoln

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Academia

Analysis of Health and Failure Modes of Battery Based Energy Storage  
Systems, Grid-scale energy storage, electric vehicle charging, battery safety, controls, and power electronics.  

Modeling and Control of Energy Storage  
Robust Control, Modeling, Sensing, and Control of Energy Storage  

Design and Control of Batteries  
Technologies for threshold identification, threshold modeling and simulation.  

Modeling, Design and Control of Batteries  
Power electronics, control, optimization, and their applications to electric vehicles and power grids.  

Modeling and Control of Energy Storage  
University of Nebraska–Lincoln  

Modeling and Control of Energy Storage  
University of North Carolina at Charlotte  

Modeling and Control of Energy Storage  
University of Southern California, Los Angeles, CA  

Modeling and Control of Energy Storage  
University of Utah  

Modeling and Control of Energy Storage  
Washington University in St. Louis  

University of Nebraska–Lincoln  

University of North Carolina at Charlotte  

University of Southern California, Los Angeles, CA  

University of Utah  

Washington University in St. Louis  

University of Nebraska–Lincoln  

University of North Carolina at Charlotte  

University of Southern California, Los Angeles, CA  

University of Utah  

Washington University in St. Louis  

University of Nebraska–Lincoln  

University of North Carolina at Charlotte  

University of Southern California, Los Angeles, CA  

University of Utah  

Washington University in St. Louis  

High fidelity – lower cost monitoring and control, systems design.  

Phase change mechanisms, energy, mass, momentum and charge transfer, degradation mechanisms.  

Physics based SOC and SOH algorithms based on model identification and model validation methods.  

Predictive modeling, stochastic modeling.  

Predictive modeling of capacity fade, stress behavior, thermal behavior, loss of active material  

Sensor-based microstructural scale modeling and control.  

Model validation and characterization of cells at different states of charge, cell temperature and scale-up  

Power electronics, hybrid simulation and control, state and health monitoring and control  

Battery management system based on electrochemical-thermal models  

Vehicle charging optimization, energy, mass, momentum, and charge transfer, degradation mechanisms.  

High fidelity – lower cost monitoring and control, systems design.  

Phase change mechanisms, energy, mass, momentum and charge transfer, degradation mechanisms.  

Physics based SOC and SOH algorithms based on model identification and model validation methods.  

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Predictive modeling, stochastic modeling.  

Predictive modeling of capacity fade, stress behavior, thermal behavior, loss of active material  

Sensor-based microstructural scale modeling and control.  

Model validation and characterization of cells at different states of charge, cell temperature and scale-up  

Power electronics, hybrid simulation and control, state and health monitoring and control  

Battery management system based on electrochemical-thermal models  

Phase change mechanisms, energy, mass, momentum, and charge transfer, degradation mechanisms.  

High fidelity – lower cost monitoring and control, systems design.  

Phase change mechanisms, energy, mass, momentum and charge transfer, degradation mechanisms.  

Physics based SOC and SOH algorithms based on model identification and model validation methods.  

Predictive modeling, stochastic modeling.  

Predictive modeling of capacity fade, stress behavior, thermal behavior, loss of active material  

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| Company | ZEM AS | Veritasveien 9, P.O.Box 153, 1624, Hovik, Norway | info@zemenergy.com | +1 415 992 6337 | Lithium Ion Batteries - Automotive and stationary applications | ZEM is involved in a number of European projects related to the lifetime assessment of Lithium Ion batteries. |