Project profile

BattMan

Battery management with solar powered devices

Batteries and battery-management systems are essential support elements for all types of solar-powered equipment. As such, they can be employed in a variety of markets and applications – from future electric vehicles to street lighting. Their main purpose and toughest challenge is to provide reliable long-term service to the equipment they support. Solar-powered, off-grid street lighting has been identified as a demanding application in need of an upgrade. The ENIAC JU project BattMan will therefore develop and validate a new approach in a challenging solar-powered off-grid lighting system.

Sub Programme

- Nanoelectronics for energy efficiency
- Nanoelectronics for automotive and transport

Batteries and battery-management systems are a well-established part of our daily lives. These energy-storage systems are widely employed in such applications as mobile phones, laptop computers and electric vehicles. They are also instrumental in providing new solutions for solar-powered X-ray systems for rural markets or in load balancing for smart grids.

Further development of improved batteries and battery-management systems will allow for use in harsh environments with enhanced performance. Furthermore, the integration of battery systems with renewable energy generation, such as that produced by photovoltaic (PV) panels and solar cells, will allow for the development of stand-alone applications. These new applications will be able to operate where an electricity grid is not available or simply to avoid further burden on a heavily-loaded electricity grid.

Optimised performance

The main objective of the ENIAC JU project BattMan is to design and develop battery-pack systems to manage the power feed from PV panels efficiently and deliver optimised, reliable, low-cost and predictable performance. This will require:

- Improved battery chemistry and battery packs for predictable, reliable, safe and long life operating stability;
- Improved battery-management systems to meet specifications including state-of-health and state-of-charge reporting, cell balancing and temperature stabilisation;
- Enhanced efficiency of the overall energy chain in the system, including maximisation of system performance both for the application requirements and battery life;
- System integration of electronics with PV panels, PV optimisation and the application of systems to allow support for the smart grid over the Internet; and
- System and prototype designs for the

demonstrator of the solar-powered off-grid street lighting application.

The knowledge gained within this project – especially for the battery-management system, energy-management system and generic system designs – will be used to support a variety of applications.

Wealth of experience

Project partners have world-class, state-of-the-art experience in relevant domains. They include battery suppliers, battery-management systems developers, PV-panel producers, prototype manufacturers, lighting systems manufacturers and university research partners.

Their vast range of skills will be focused on the development of solar-power-charged battery packs which will form part of a scalable concept for off-grid and on-grid applications.

The concept can be applied to electric mobility, integrating lighting, fast charging stations, solar panels, distributed storage units and communications capabilities which also form part of the smart grid and the network of energy applications.

The battery technologies and management systems developed will also meet the needs of the next generation of electric vehicles with charging stations and solar panels installed on car roofs.

Range of applications

The overall concept is to develop the underlying technology for generic, efficient battery-powered and managed applications that are charged by renewable solar energy. An outdoor, solar-powered off-grid street lighting application will be developed to provide a focus for the project. It will be simulated, specified, designed, prototyped, demonstrated and validated in the project.

BattMan will have an impact on research for products such as electric vehicles, solar-powered X-ray systems for emerging markets, marine buoys or even automated electric crop-harvester vehicles. The objectives of the project are, therefore, to identify and characterise suitable batteries, develop electronics for battery management including maximisation of PV-collected power, algorithms for optimised energy management within the systems and methods for cost reduction.

This ENIAC JU project will contribute to energy efficiency in three ways through:

1. New component development – such as novel battery chemistries, electronics for battery-management systems and power management for renewable energies;
2. System optimisation and the integration of electronics with the batteries and photovoltaic cells; and
3. Validation of optimised, efficient battery-pack systems for outdoor use.

Energy efficiency

Partners:
- Austria Microsystems
- European Batteries
- InnoTech Solar
- Metatronics
- Philips Electronics Netherlands
- SINTEF
- Technical University of Eindhoven

Project co-ordinator:
- Eliav Haskal, Philips Electronics

Key project dates:
- Start: April 2012
- Finish: March 2015

Countries involved:
- Austria
- GermanyFinland
- The Netherlands
- Norway

Total budget:
- €5.77 million

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