



PSMA International Energy Harvesting Workshop • April 5-7, 2022 • Raleigh, NC, USA



EnerHarv 2022 Workshop Demo Session:

ELEVATOR PITCH INTROS

Tuesday, April 5, 2022



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EnerHarv 2022 Workshop Demo Session:

Miniaturised Sensors with solid state batteries

Presented By –

Denis PASERO, Product Manager

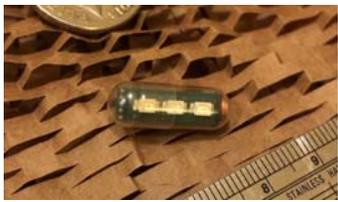
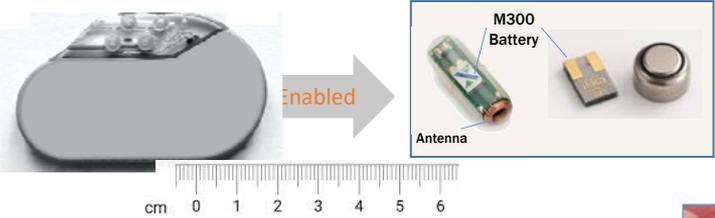
Ilika Technologies

Denis.pasero@ilika.com

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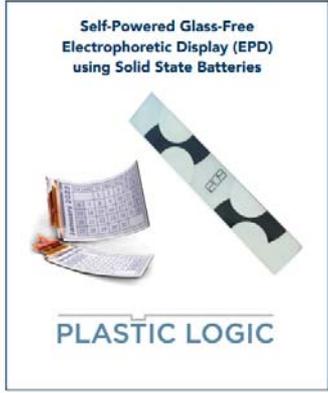
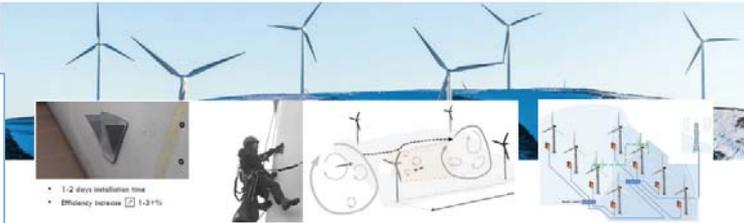
Demo Overview

MEDTECH



Industrial IOT

WindTAK Sp. z o.o.
 Smart Vortex Generator for Perpetual Remote Monitoring of Wind Turbine Blades





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EnerHarv 2022 Workshop Demo Session:

Wiegand-Effect-Powered Wireless IT Sensor Node

Presented By –
Christian Fell
UBITO, Fraba Group

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Wiegand-Effect-Powered Wireless IT Sensor Node

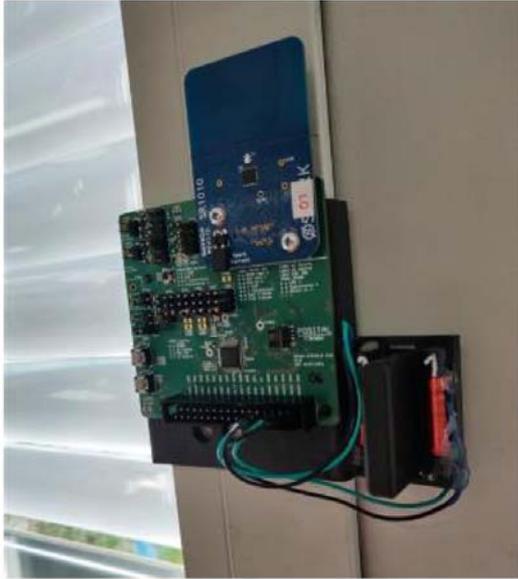


Fig. 1 – Transmitting unit

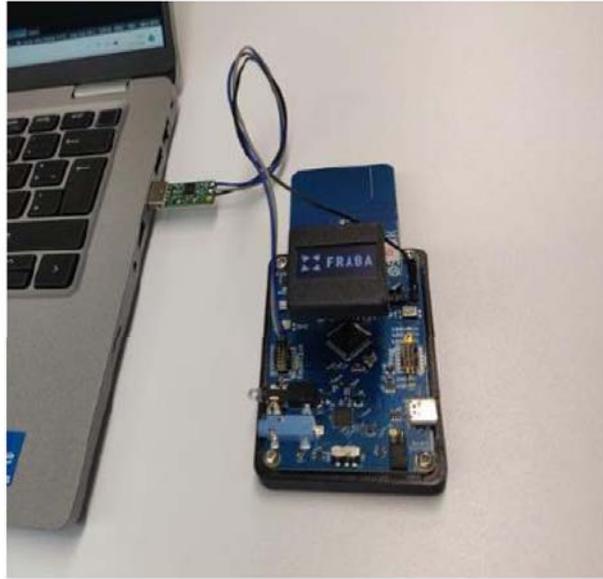


Fig. 2 – Receiving unit

Presented By
Christian Fell
UBITO, Fraba Group



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EnerHarv 2022 Workshop Demo Session:

Electromagnetic Push-Button Energy Harvesting System Suitable Power for Smart Home Applications

Presented By –

Lorandt Foelkel, M.ENG

customer

Lorandt.Foelkel@we-online.de

Tuesday, April 5, 2022

Demo Overview

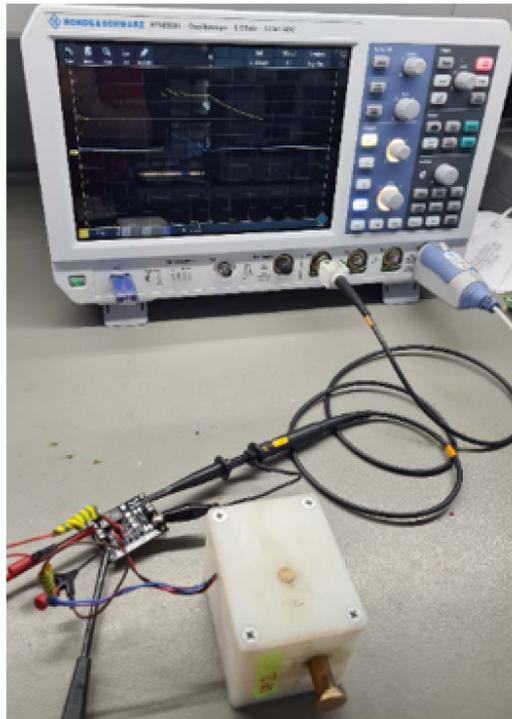


Figure 1: Energy harvester with Matrix PMS

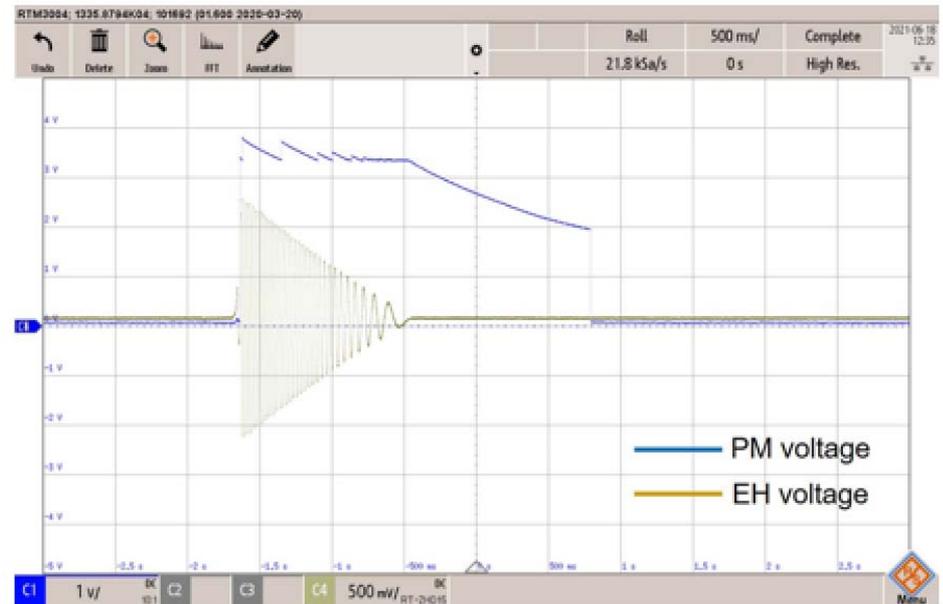


Figure 2: Output power of energy harvester systems



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EnerHarv 2022 Workshop Demo Session:

Energy Harvesting to Go kit

Presented By –

Lorandt Foelkel, M.ENG

Würth Elektronik eiSos

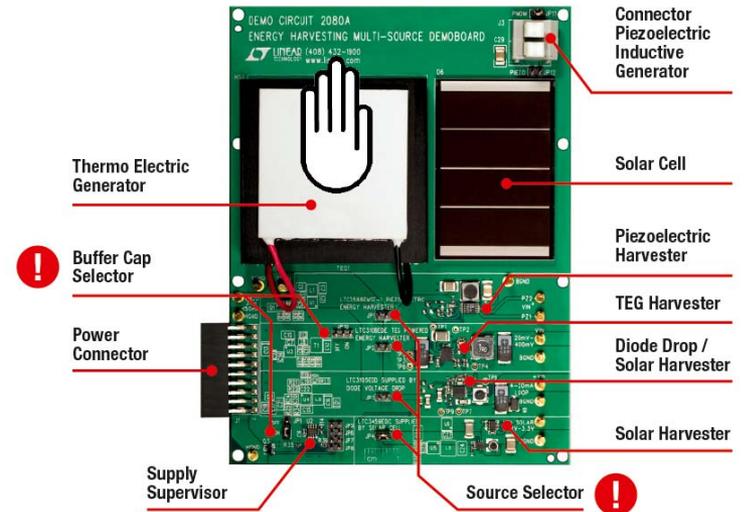
Lorandt.Foelkel@we-online.de

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Demo Overview

The “Energy Harvesting Solution To Go” provides the following benefits:

- Complete solution for harvesting energy, energy management and storage
- Easy transfer of this solution to your design
- Evaluation of the highest efficient components in the market
- Collaboration with Analog Device and Silicon Laboratories
- Harvesting source:
 - Solar
 - TEG
 - Piezo or Inductive
 - Diode voltage drop





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EnerHarv 2022 Workshop Demo Session:

enOcean Light switch

Presented By –

Lorandt Foelkel, M.ENG

customer

Lorandt.Foelkel@we-online.de

Tuesday, April 5, 2022

Demo Overview

Light switch - flexible in use

A light switch is to be installed in a new location or an additional light switch is to be installed.

With the wireless light switch you have solved the problem very quickly.
No structural measures are necessary for laying the cables.

The radio light switch is placed anywhere and sends a signal to a radio receiver, in the desired lamp or to the radio multiple socket.

Thanks to IQ fy-EnOcean technology, this light switch is battery-free and therefore maintenance-free

www.enocean.com

www.igfy.de





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EnerHarv 2022 Workshop Demo Session:

enOcean Multi Sensor

Presented By –

Lorandt Foelkel, M.ENG

customer

Lorandt.Foelkel@we-online.de

Tuesday, April 5, 2022

Demo Overview

Radio mini multi-sensor pure white glossy 44 x 44 x 16 mm. With integrated solar cell and battery CR1632 (not included). Smart home sensor.

This **multi-sensor** has **temperature, humidity, lighting, acceleration** and **magnetic contact** sensors integrated in one housing.

It sends all data via EnOcean radio to the Eltako wireless building.

The integrated solar cell generates the required energy from the ambient light indoors. This energy is stored internally so that the multi-sensor can also work for several days without light.

The multi-sensor has an NFC interface, with which it can be configured using an NFC reader, a smartphone or a tablet.

www.enocean.com

www.eltako.de





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EnerHarv 2022 Workshop Demo Session:

enOcean switch demo kit

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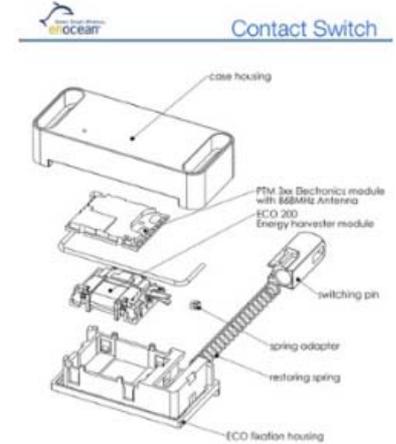
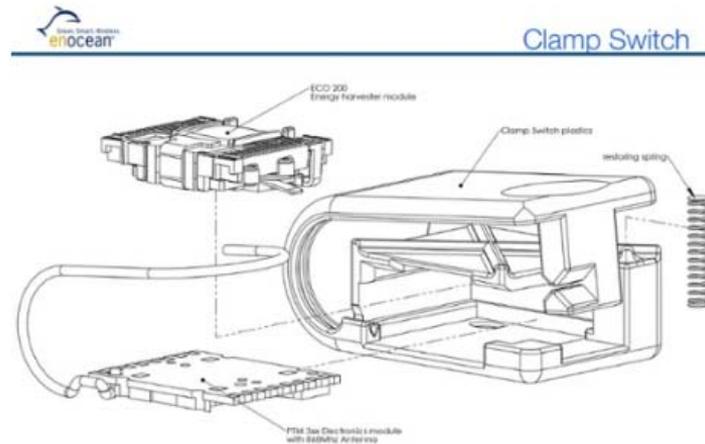
Lorandt.Foelkel@we-online.de

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Demo Overview

Demo development kit for enOcean switch

The transmitter module PTM 535Z in 2.4 GHz (IEEE 802.15.4), combined with the energy converter ECO 200, has a smaller design than the PTM 215ZE. This makes it suitable for tailor-made switches for applications in the consumer sector, in industry or other fields of the Internet of Things. 3D data available with the technical data sheet makes it easier to develop prototypes of different housings. Radio channel and security mode can be defined via the configuration interface.





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EnerHarv 2022 Workshop Demo Session:

Indoor Air Conditioning Monitoring

Presented By –

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Demo Overview

Demo development kit using TI core2530

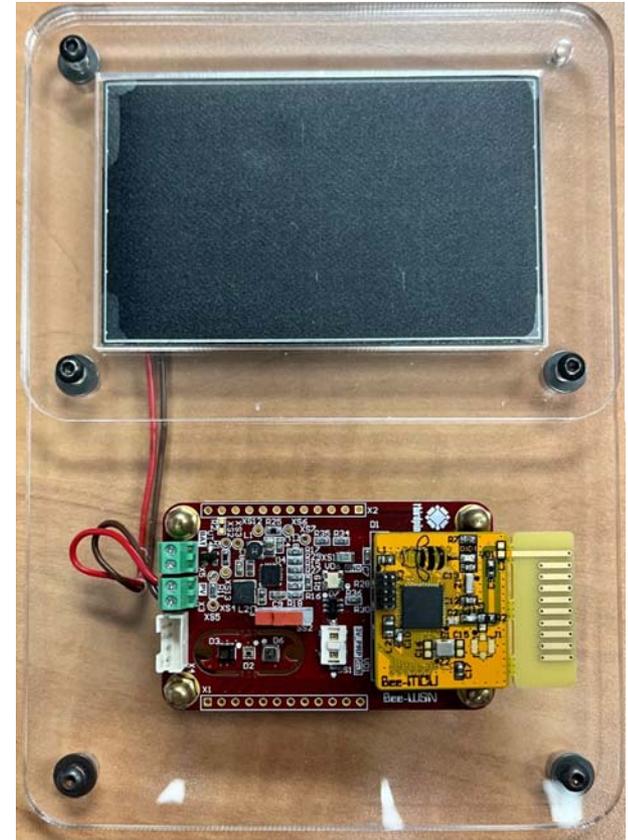
ZigBee RF Protocol 2,4GHz

Indoor light solar PV cell

Li-Ion rechargeable coin

Sensor for:

- Temperature °C
- Humidity RH%
- Air Pressure hPa
- Concentration of CO2 %
- Light intensity LUX
- Algorithm for “good air”





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EnerHarv 2022 Workshop Demo Session:

Shower water temperature display

Presented By –

Lorandt Foelkel, M.ENG

customer

Lorandt.Foelkel@we-online.de

Tuesday, April 5, 2022

Demo Overview

Shower water temperature display no battery
Using water flow as motion harvesting
Can be found on Amazon / Aliexpress / Walmart / eBay

Measures Water Temperature Accurately

Energy-saving and green, no need for battery. High-precision temperature sensor, there is only $\pm 1^\circ\text{F}$ error





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EnerHarv 2022 Workshop Demo Session:

Window handle with wireless transmitter

Presented By –

Lorandt Foelkel, M.ENG

customer

Lorandt.Foelkel@we-online.de

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Demo Overview

- Battery-free communication thanks to EnOcean technology 868MHZ
- Simple integration into your Smart Home/Smart Buildingsystem
- High transmission safety
- Low electromagnetic disturbance
- Two handle shapes to choose from: HOPPE New York and Tokyo lines
- HOPPE brand quality

www.hoppe.com





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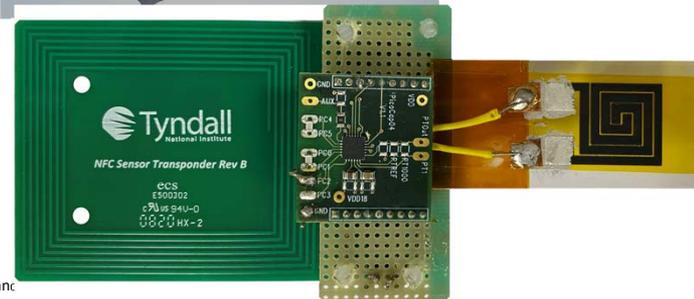
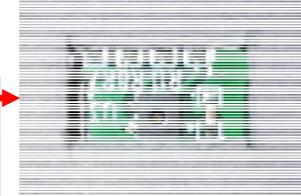
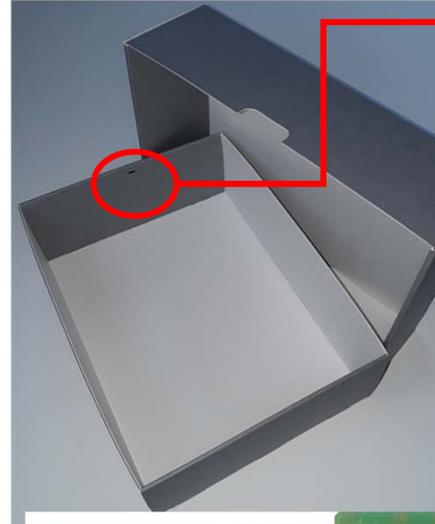
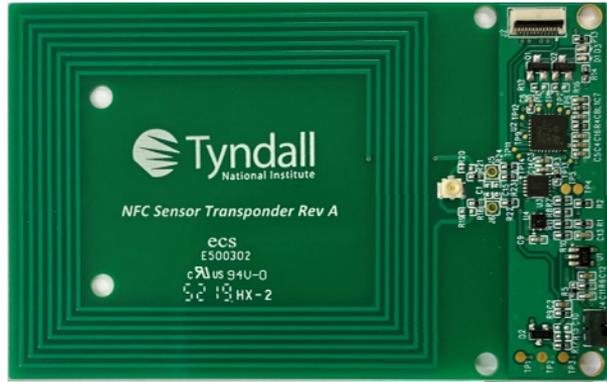
EnerHarv 2022 Workshop Demo Session:

NFC Sensing for Cultural Heritage Monitoring

Presented By –
Brendan O’Flynn
Tyndall National Institute

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NFC SENSOR for Cultural Heritage Monitoring



"This project has received funding from the European Union's Horizon 2020 research and inn



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EnerHarv 2022 Workshop:

Intrinsically Self-powered, Battery-free, and Sensor-free Ambient Light Control System

Presented By: Roberto La Rosa

STMicroelectronics

Ultra low power applications Team Manager

roberto.larosa@st.com



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Demo Overview

Highlights

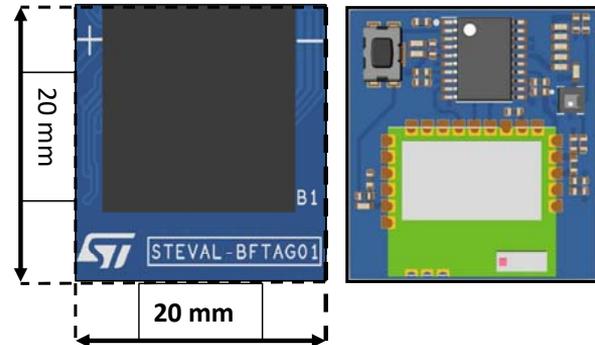
- Energy Autonomous and Battery-Free device
- Sensor-Free light monitor
- Sensor-Free vibrations monitor

Features

- Small form factor
- Bluetooth Low Energy (BLE) connectivity
- Low cost solution
- Digital Read Out

Applications

- Ambient Light Monitoring
- Predictive Maintenance
- Asset Tracking



Demo Overview

Highlights

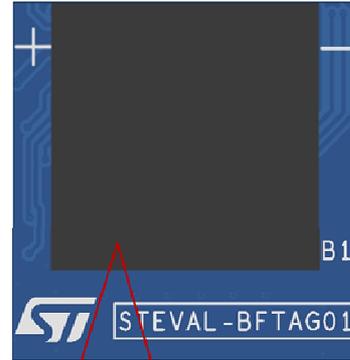
- Energy Autonomous and Battery-Free device
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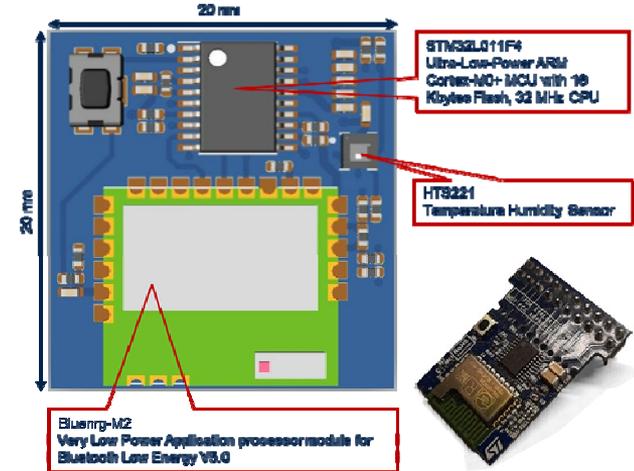
- Small form factor
- Bluetooth Low Energy (BLE) connectivity
- Low cost solution
- Digital Read Out

Applications

- Ambient Light Monitoring
- Predictive Maintenance
- Asset Tracking



Anomalous Silicon SolarCell
AM 1408-G by Panasonic



Bluetooth-M2
Very Low Power Application processor module for
Bluetooth Low Energy V5.0





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EnerHarv 2022 Workshop Demo Session:

Battery Characterization & Simulation System for Fast Prototyping

Presented By –

Brian Zahnstecher, Principal

PowerRox

bz@powerrox.com

Tuesday, April 5, 2022

Demo Overview

Arb Function Setup

#	Charge	Current	Time	Verification
1	1.000 V	1.000 A	0.001 s	<input type="checkbox"/>
2	1.588 V	1.000 A	0.001 s	<input checked="" type="checkbox"/>
3	1.951 V	1.000 A	0.001 s	<input checked="" type="checkbox"/>
4	1.951 V	1.000 A	0.001 s	<input checked="" type="checkbox"/>

Setup dynamic load test parameters to generate discharge curve raw data capture.

CH1

- Shows real-time discharging of actual battery UUT.
- Supplement with printout of Arb setting next to setup (see flyer examp).

R&S NGM202



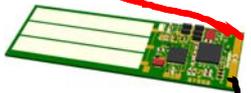
CH2

- Shows real-time use of generated battery model with IoT PCA UUT.
- Supplement with printout of battery model details and implementation next to setup (see flyer examp).

Rechargeable Battery



IoT PCA



LAPTOP TO SIDE

- Shows Spyder window (or ideally R&S GUI by that time).
- Can easily demonstrate conversion of raw data into battery model and curves right before their eyes!

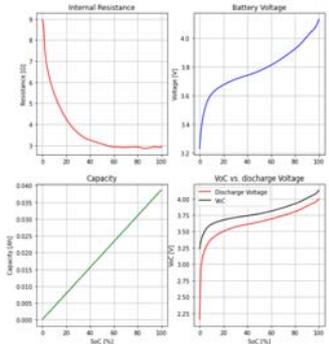


Battery Model

State of Charge (SOC)	Open Circuit Voltage (V)	Internal Resistance (Ω)
10 %	3.500 V	1.000 Ω
50 %	3.600 V	0.050 Ω
90 %	3.700 V	0.005 Ω
100 %	3.750 V	0.002 Ω

A model of your real battery is generated based on discharge curve generated.

Load into PS channel to simulate battery at any operating point.





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EnerHarv 2022 Workshop Demo Session:

Ultracap Hybrid Use Cases

Presented By –

Ronald de Graaf

NAWA Technologies

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Demo Overview

