

APEC 2021

Virtual Conference + Exposition

June 14-17, 2021



Industry Session #12: Energy Harvesting

Demo Session

Presented By –

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Energy Harvesting Development Kits

- **Lorandt Fölkel, Würth Elektronik eiSos**

- Multi Source, Multi Sensor “Gleanergy Kit”
- ARM Cortex M3 Core with 2.4GHz Sensor Node
- Energy Harvesters
 - TEG(incl.), Solar (incl.), Piezo (not incl.), Inductive (not incl.)
- Energy Storage
 - Capacitive: MLCC Bank, Supercap
 - Battery: Li-pol Rechargeable Batt., Li Batt
- USB Communication with Kit
- Shield Board For Sensors
- E-ink Display

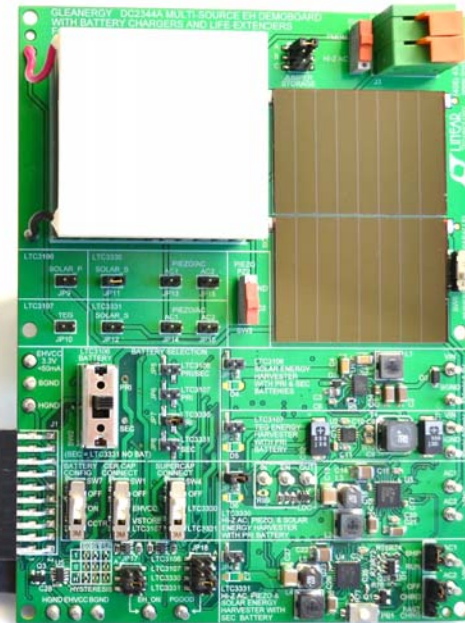


IMAGE CREDIT: Würth Elektronik eiSos GmbH

OTS Window Sensor

- **Lorandt Fölkel, Würth Elektronik eiSos**

- EnOcean Protocol at 868 Mhz for Europe
- 10 mW EIRP Range up to 30 m
- Compatible with Smart Home systems Which Use EnOcean Technology

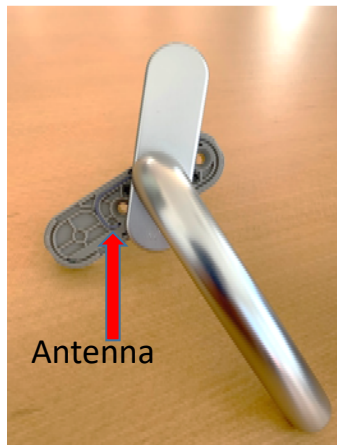


IMAGE CREDIT: Würth Elektronik eiSos

IMAGE CREDIT: www.hoppe.com

Shower Temp Monitor

- **Brian Zahnstecher, PowerRox**

- Basic Dynamo for EH Power
- Simple Application
- Simple Device
- Kids Adjust Their Own Temp
 - No more burns!



Self Generating Power Supply
Water flow power generation technology



WATER POWER GENERATOR
MEASURING WATER TEMPERATURE ACCURATELY
Energy-saving and green, no need for batteries.
High-precision temperature sensor accurate to $\pm 1^\circ\text{F}$

IMAGES CREDIT: www.kaufland.de / www.amazon.com

Indoor PV Aircon Monitoring

- **Lorandt Fölkel, Würth Elektronik eiSos**

- ZigBee Communications with TI CC1310 MCU
- Indoor Solar PV Powered
- Backup Re-chargeable Batt. as Option
- Sensors for RH%, Temp, Pressure, Light LUX
- E-ink Display at Receiver Demo Board

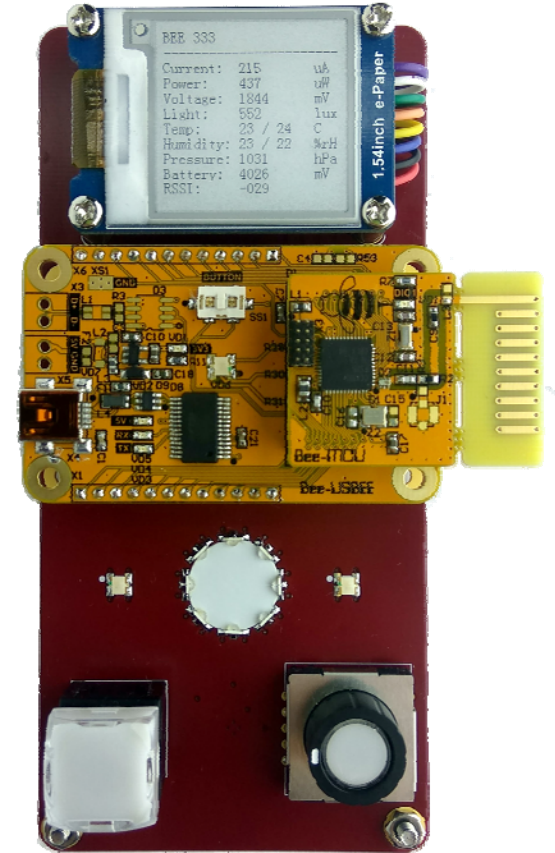
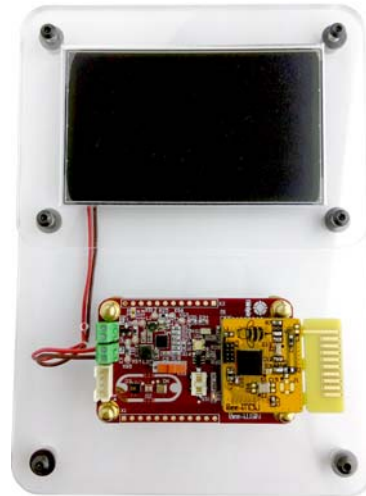
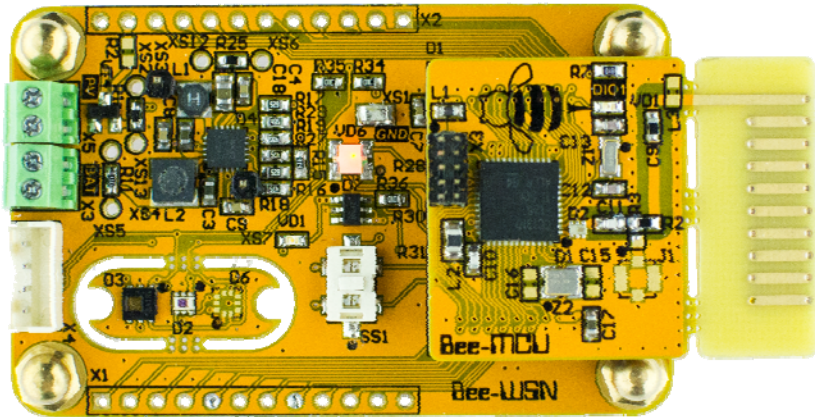


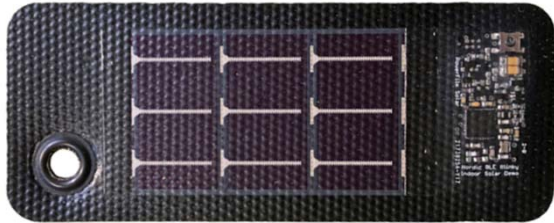
IMAGE CREDIT: Würth Elektronik eiSos

Indoor Flexible Waterproof Self-Powered WSN



• Dan Stieler, PowerFilm

- Nordic Semi nRF52832 BLE-Based, Low-Power Design with PowerFilm Solar Cells
- 200 lux Operation with 1 s BLE Connection Interval, 50 lux Beacon
- Flashing LED to Indicate Operation
- Extremely Durable: Thin, Flexible, 100% Waterproof, UV Stable
- Batteryless Over-the-Air FW Updates (SMT Caps for Storage Elements)
- Nordic nRF Blinky Mobile App



IMAGES CREDIT: All images courtesy of PowerFilm Solar, Inc.

Vibration Energy Harvesting From Machines

• Paul Dhillon, Xidas

- Power generated by small vibration energy harvesters from a quiet environmental chamber.
- Rechargeable, high-pulse battery continuously trickled-charged from this generator through an energy harvesting circuit.
- Demonstrating a continuous source of power for wireless sensors (providing 10+ year lifetime!).



Vibration Energy
Harvesting Generator

Rechargeable,
High-Pulse Battery

Energy Harvesting
Module (circuitry)

IMAGES CREDIT: All images courtesy of Xidas, Inc.

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Q & A

Thanks a lot for your time and attention!

Any questions and/or comments?

**Please join us for the live Q&A...
check the schedule!!!**