



Energy Harvesting Committee (EHC) Minutes 9th May 2022

Attendees	Apologies/Non attendees	
John Horzepa, PSMA Joe Horzepa, PSMA Lorandt Foelkel, Wurth Gabriel Barrientos, Nowi Cato Fagermo, NeoCortec GUEST Norm Elias, Norm Elias Model/Sim Sebastian Bader, MIUN Sergiy Tykhonov, FRABA Technologies Francesco Carobolante, IoTissimo Brian Zahnstecher, PowerRox Mike Hayes, Tyndall	Roberto la Rosa, ST Robert Andosca, Inviza Health Marcus Taylor, IsoLode/Inviza Cem Som, Wurth Maeve Duffy, NUIG John Flannery, Tyndall (GUEST) Paul Dhillon, Xidas Sourabh Dhillon, Xidas Scott Thielman, Product Creation Studio Andreas Beckes, FRABA Dusan Vuckovic, Ikea Mike Donnelly, Mentor/Siemens Johan Pederson, Sigma Design Katherine Kim, UNIST Anthony Laviano, NRAIT Henrik Zessin, Fraunhofer IIS Justin Knott, FCI Jae-Do Park, Univ of Colorado Denver Nathan Jackson, Univ of New Mexico Warren Wambsganss, Astronics Jeffrey Jouper, Astronics Christian Pennisi, Jennova (GUEST) Sri Kasichainula, Nimbus (GUEST) Denis Pasero, Ilika George Slama, Wurth Michalis Kiziroglou, Imperial College London <i>Doug Osterhout, Google</i>	Wensi Wang, BJUT Peter Zou, Huawei Ajinder Singh, TI Aaron Stein, Dartmouth Kevin Parmenter, TSC Guoqing Liu, Huawei (HiSilicon) Jochen Koszescha, Infineon Laili Wang, Xi'an Jiatong University <i>David Newell, ex NUIG in transition</i> Dan Stieler, PowerFilm Sam Jones, PowerFilm Jamil Khan, Univ of Newcastle (AUS) Baoxing Chen, Analog Devices Steve Reuter, Jennova (GUEST) Toby Best, FRABA Mike Wingard, Amphenol Lisa Horzepa, PSMA Jim Stevens, FRABA Steve Savulak, Collins Aerospace Mohamed Jatlaoui, Murata Gary Johnson, Ilika Peter Spies, Fraunhofer IIS Thomas Becker, Thobecore Dinesh Kithany, Wired & Wireless Ningning Wang, Hangzhou DU Fred Weber, Future Tech WW

(Co-chairs in bold font)

Next meeting:- Wed 15th June 10am Central, Mike to chair, Brian to type.

Agenda

1. **Welcome any new members/guests.**
2. **EnerHarv 2022 planning.**
3. **APEC 2022 planning**
4. **List of active EH companies**
5. **PTR and technology opportunities**
6. **Media activities**
7. **'Treasure Chest' at end of the minutes.**

1. Welcome new members

Welcome Cato Fagermo, NeoCortec

Do a scrub of EHC members – Mike & Brian. Only retain those who respond that they are happy to stay on the list.

2. EnerHarv 2022 Ref www.enerharv.com and [Energy Harvesting Forum | Power Sources Manufacturers Association \(psma.com\)](http://Energy Harvesting Forum | Power Sources Manufacturers Association (psma.com))

- Final EWC meeting held Fri 6th May, all residual actions moved here
- Link to presentations & photos imminent
- Looking like a small surplus ~\$6K (18%)
- BZ Will circulate survey results (29 respondents) – generally very positive, perhaps cut back to 1 panel session?
- MH&BZ will write PSMA feature late May (20th) and H2P feature for June publication
- Steve & Brian will submit finance report in June (in time for board meeting June 17)
- Will make dormant and get plans going for EnerHarv 2024 after APEC2023 – put out RFQ (hosts) – likely to be Europe. Germany (cluster), Ireland, Sweden?

- Some new PSMA members as a result ☺

3. APEC 2023 Set for March 19th-23rd 2023 in Orlando, FL.

PSMA Energy Harvesting Industry Session being considered, go for a 7 slot session for now (Tues/Wed)

- Suggestions (presenters, topics, trends, applications) welcome!!!
- Will include demo session as previously (+ 6 formal PPTs)
- Will do a brainstorm in the next couple of months
- Lobbying begins end Aug

4. PTR and technology opportunities

- PTR committee looking for webinar material from Sept onwards – any volunteers or suggestions?
- Norm looking for suggestions on suitable applications whereby simulation would prove to be a valuable tool, e.g. piezo devices. Please contact him off-line to discuss, will present at a future meeting.

5. Industry Event Watch & List of EH companies

- **Event tracker**
 - Revisit/update the list of good industry events for tracking.
 - Francesco recommends www.iwpc.org as resource.
 - EnABLES event tracker no longer in operation – hopefully can resurrect for EnABLES2.
- **Company ecosystem**
 - DENIS MADE INITIAL DRAFT + significant update – reviewed 11/16. **Needs more input from others to be sustainable.** Need improved process (e.g. google docs) for funneling info to Denis, enabling easier, more efficient, regular updates. Further simplify almost there, needs support from our EHC and kept light and easy to maintain. Define limited, common set of FOMs for each category to limit/normalize capture. **BZ HAS REACHED OUT TO DENIS OFFLINE TO SUPPORT**. Being cleaned up.....will circulate next version by June meeting.
 - **NORM TO SUGGEST SOME RESOURCES IN MODELING/SIM (INC. NEW "MODEL/SIM" TAB TO TRACKER) FOR POWER IOT ECOSYSTEM.** Norm provided lots of good thoughts/inputs on 1/11/22, latest inputs received 05/09 - figuring out how to integrate, **WILL REACH OUT TO NORM AS APPROPRIATE.**

6. MEDIA ACTIVITIES

(a) Webinars

- Cem & Dinesh willing to do WPT/IIoT webinar(s), could also in time lead to book publications. Note we differentiate between WPT & EH – could be webinar in itself, e.g. what works well where? **Work on simple talk proposal. Discussing separate versus combined (Cem + Dinesh) presentation. Need to cultivate off-line now that we have time to focus on it.**

(b) Publications

- IEEE now looking for feature article on our white paper – lead edits (Thomas, Michalis, Bahareh, Maeve) created a small team.
 1. Still awaiting feedback from PELS mag (submitted end March)
- Also looking at cross-promotions for IPC – industrial automation, Industry 4.0, smart mobility, etc.
- Any material you want to re-cycle.... once not too much of a sales pitch?
- Several EHC members participating in sensor converge 6/27/22, San Jose, CA. BZ organizing. <https://www.sensorsconverge.com/> Visitors welcome to see demos at the back of the room – **contact BZ directly.**
- New suggestions
Hoping to mine upcoming events (APEC, EnABLES, APEX, EnerHarv, etc.)
- Post-EnerHarv '22 event recap articles: PSMA draft due 5/20, H2P draft due end-May

(c) Virtual conferences, articles, etc.

Suggestions please

TREASURE CHEST

Approach these items one at a time in future meetings as people raise them.

7A. Sponsorship of a program where students build demonstrators.

- Lorandt has a budget to supply kits
- Help with education links – Qualcomm ‘High Tech High’. Francesco will follow up.
- Green story. International dimension. Technology and applications dimensions.
- Wurth running design challenge.
- Keep simple, easy to use
- Competition or roadshow?
- PSMA has money to support.
- Action:- Catherine and Mike met at EnerHarv & discussed, she will write ½ page strawman for student engagement mechanism. Mike will ping again. **NEED A CHAMPION TO LEAD EFFORT FOR COMM** **Maeve willing to help but does not have bandwidth to lead.**

“Here are Katherine’s thoughts on the competition:

There are two main styles of the competition that could be developed:

1. Engineering-Style Competition

- planning committee chooses specific EH devices that can be used and the target load
- planning committee also specifies energy input conditions (lighting setup, vibrational input, etc) for testing
- specifications are announced and teams would develop the power converter solution based on the specification
- teams can submit videos and/or reports on their team and proposed idea
- final teams are selected and they test their prototypes on site at an event competition (could be a conference)
- judging is based on technical criteria measured during the test (size, weight, efficiency, etc.)
- implementation is the most important aspect for this style of competition
- over different years, the specification and scenarios would focus on different technologies with the same basic format
- more similar to the International Future Energy Challenge run by PELS

2. Design-Style Competition

- planning committee could choose a theme based on a technology or application (e.g. smart homes, wearables, building monitoring, etc.)
- planning committee may want to specify some constraints or scenarios for the competition
- teams come up with complete EH design ideas (transducers, circuitry, load) and develop a prototype
- teams can submit videos and/or reports on their team and proposed idea
- final teams are selected and they present and demonstrate their prototypes on site at an event competition (could be a conference)
- judging is based on mostly qualitative and some quantitative judging criteria (so balanced judge selection will be important)
- this style of competition is more focused on the idea and design, but implementation is also important

There should probably be some discussion on which style the committee would like to see. The engineering-style requires a lot of prep work before even announcing the competition, while the design-style is more work for the judging and evaluation. I could see either being good for students. I hope someone can take these basics ideas and further development them into a competition.”

8B. Updated Goals

- Open to suggestions.
- We should try to forge links with other groups/sessions, e.g. capacitor, magnetics, packaging. – addressing this via “Tiger Team” effort within PSMA (multiple focused initiatives with small teams from various committees).

- **BZ INITIATIVE:** working on feasibility for an official, IEEE Future Directions initiative on Energy Harvesting (a 1-6yr process)
 - JOE notes PSMA would be happy to support such an initiative, **BZ to figure out if/how**
 - BZ has obtained process detail (<https://cmt.ee.org/futuredirections/fd-opportunities/>), **BZ to pitch initial proposal to PELS TC6 at ECCE on 10/1/19... WILL SHARE FINAL PPT WITH TEAM**

8C. Forward-looking Thoughts

- Software? Packaging/industrial design? Modelling? Hackathon?
- Incorporate some kind of student competition as part of EnerHarv (Best Student Demo/Poster) or otherwise.

**Mike Hayes & Brian Zahnstecher,
9th May 2022.**