



Energy Harvesting Committee (EHC) Minutes 12th July 2023

Attendees	Apologies/Non attendees	
John Horzepa, PSMA Roberto la Rosa, ST Joe Horzepa, PSMA Pallawi Joshi, Juniper Networks Dan Stieler's assistant, PowerFilm Prateek Asthana, Tyndall Norm Elias, Norm Elias Model/Sim Soumyajyoti Maji, Univ of Galway Matthias Kirn, WTO Brian Zahnstecher, PowerRox Mike Hayes, Tyndall	Maeve Duffy, Univ. of Galway Francesco Carobolante, IoTissimo Lorandt Foelkel, Wurth John Fiske, Armor James Rohan, Tyndall Ed Spence, TMIG (guest) Justin Henspeter, IBM Eric Swenson, IBM Pulugurtha Markondeya Raj, (Dr. Raj), FIU Gabriel Barrientos, Nowi Sergiy Tykhonov, FRABA Torben Dankwort, Fraunhofer ISIT Baoxing Chen, Analog Devices Dinesh Kithany, Wired & Wireless Jean Michel Bidault, ITEN Cem Som, Wurth John Flannery, Tyndall Andreas Beckes, FRABA Dusan Vuckovic, TBD Sebastian Bader, MIUN Ningning Wang, Hangzhou DU	Lisa Horzepa, PSMA Peter Spies, Fraunhofer IIS Denis Pasero, Ilika George Slama, Wurth Renee Yawger, EPC Ronald DeGraaf, NAWA Technologies David Tang, Netbit Michalis Kiziroglou, Imperial College London Steve Savulak, Collins Aerospace Gary Johnson, Ilika Toby Best, FRABA Johan Pederson, Ignion Nathan Jackson, Univ of New Mexico Mike Donnelly, Mentor/Siemens Christian Pennisi, Jennova TBD, Wisepower Thomas Becker, Thobecore Toshi Yamamoto, Nichicon Juan Carlos Rodriguez, ADI

(Co-chairs in bold font) (New/First-time members indicated in GREEN)

Next meeting:- **Wed 9th Aug 10 am Central** Mike to chair, Brian to type.

Agenda

1. Welcome any new members/guests.
2. EnerHarv 2024. **Request for Proposals process**
3. **APEC 2024 – IS planning**
4. **PTR and technology opportunities... HIR (heterogeneous integration roadmap)**
5. **Industry Event Watch & List of EH companies**
6. **Media activities – Tyndall webinar for Aug, Toshi for Sept?**
7. **Norm/Gabriel Collaboration Update**
8. **'Treasure Chest' at end of the minutes.**

1. Welcome new members

Welcome Pallawi, Juniper, ex Cisco, identified EH as attractive technology

Welcome Soumyajyoti ('Soumya'), Univ.of Galway, medical electronics, low power low noise bioelectronic ccts. Self powered wearables using TEG, lower power learning algorithms.

2. EnerHarv 2024 planning Ref www.enerharv.com and [Energy Harvesting Forum | Power Sources Manufacturers Association \(psma.com\)](http://Energy Harvesting Forum | Power Sources Manufacturers Association (psma.com))

- **SEPARATE** Workshop committee created & meetings underway – please let us know who is interested. Most of EnerHarv 22 EWC interested. LAST CALL FOR EWC!!!
- Will be EUROPE based, probably May-June At this point looking likely to be in either UK or Italy.
 - German consortium:- seems no good support for venues/logistics so likely skipping Germany.
 - Italian:- Roberto talking with Palermo or Catania (both on Sicily...no charge for venue usage) Need a top tier university partner.
 - **Bid being prepared and submitted next week. Proposing Palermo. Univ. will provide venue and host dinner. Genoa will also participate and possibly Torino. ST, ADI & NXP likely industry partners. Try to avoid clash with IEEE ISCAS which is 19-22 May in Singapore, will expand the doodle poll for a SHORT WINDOW (but may still go with planned window).**
<https://ieee-cas.org/event/symposium/2024-ieee-international-symposium-circuits-and-systems>
 - **UK – considering a last minute bid. In any case EHN (Energy harvesting network) will support us.**

- Will be submitting a proposal to PSMA board. Then will be an RFP process. Target down selection of RFP process and recommendation for BoD special project form by end-May and open call till 16th June – 14th July ... **final few days**. Final awardee of RFP contingent on BoD approval of special project mid Aug.
- Typ. 2.5-3 day event. Will need 4 day venue access.
- Allow for more breaks – Lorandt feedback.
- Maeve notes we should be cognizant of academic calendars when picking a target date for the event. John also notes APEC '24 is a little earlier (Feb 25-29, 2024, Long Beach, CA, USA) than normal.

3. APEC 2024 - PSMA Energy Harvesting Industry Session

APEC '24 will be early next year (<https://apec-conf.org/>, Feb 25-29, 2024, Long Beach, CA).

- PSMA designated min of 10 slots (2 x Tues, 4 x Wed, 4 x Thurs) and can make advance proposal of who should present when, subject to APEC IS approval. Strategy currently being evaluated by PSMA leadership, awaiting guidance from org level. **PSMA leadership dedicated session being held 13th July**.
- Emerging tech session welcome but will be treated the same as other proposals – please note EHC is willing to participate (in addition to having our own dedicated session) in this but will not lead such an activity. Ada Cheng leading effort as Co-chair for an Emerging Tech session, seeking Co-chair and/or speakers. **NOTE:** from EHC perspective, any supporting activities for this IS will be INDEPENDENT of a proposal for an EH-focused IS.
- Time to think about session proposal (<https://apec-conf.org/industry-session-resources-2024/>) topic/submission (8/11/23 proposal deadline). **MIKE & BRIAN TO WRITE ABSTRACT**. **Expect to get a decent slot and should work on this basis.**

4. PTR and technology opportunities

- IEEE HIR 2023. HIR = heterogeneous integration roadmap, packaging and system integration focus
 - Review content from previous edition and identify opportunities for updates/expansion in this update (e.g. chips act). Effort led by Francesco Carobolante.
 - **7/12/23 = latest draft reviewed, expect to complete by end July**
 - IEEE PEM Mag. Feature – draft submitted to IEEE with Mike, Brian and Daniela Iacopino (Tyndall) as co-authors. **Completed**
 - **Our IEEE PEM paper 'Industrial Adoption of Energy Harvesting: Challenges and Opportunities' (doi.org/10.1109/mpel.2023.3271199) is now online – led by Thomas & Michalis – well done!**

5. Industry Event Watch & List of EH companies

- **Event tracker**
 - Revisit/update the list of good industry events for tracking. **ENABLES** turned into EU proposals for new research infrastructure (feasibility study) projects RISEnergy (retrofit EH powered WSN), Infrachip (Si on chip) ...proposals accepted 07/12 – will start in 2024. More details to follow late 2023.
 - **Next update target Sept '23.**
- **Company ecosystem (review quarterly, next due Sept-ish '23)**
 - **BZ CONTINUES TO UPDATE AS INFO TRICKLES IN. BZ WILL ADD SOME COMP CONTRIBUTORS TO HIR CONTENT.**

6. MEDIA ACTIVITIES

(a) Webinars/ PTR? **PERPETUAL OPEN CALL TO EHC FOR WEBINAR SUGGESTIONS.**

- Toshi Yamamoto, Nichicon – LTO Battery Tech. Possibly leverage material related to Sensors Converge? July onwards. Expecting to have an overview to share with team by next meeting (Aug?).
- Lorandt Foelkel, Würth – EH Tech Update. Working on it. Should have a new Digikey webinar ready by April. **Aug/Sep possible slot? Any update?**
- Mike Hayes/Prateek Asthana, Tyndall - either eSiP/testbed or condition monitoring value proposition? July/August. **Review latest eSiP/testbed efforts to drive presentation topic and turn into a talk proposal (i.e. – title, short abstract, speaker bio). Team to decide if best suited for PTR or "regular" webinar. PRATEEK HAS PREPARED PTR WEBINAR PROPOSAL and reviewed with Mike, will circulate next week. Will review at next (Aug) meeting.**
- Leverage Ranajit Sai presentation from magnetics workshop? – Mike will chat with him offline. **Allow until Sept due to Ranajit workload.**
- Ed considering and will revert.
- Any other topics?

(b) Conferences/workshops

- BZ ran workshop at Sensors Converge (<https://www.sensorsconverge.com/>) June 20, 2023, in Santa Clara, CA (i.e. – Silicon Valley) Tyndall and Nichicon, Fraunhofer ISIT, Powerfilm (MPPT) participated. Got some new Enerharv & EHC members! Well done!
- Lorandt will be at IEEE EMC conference, let him know if interested..... <https://emc2023.org/>

(c) Publications

- 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?
- New suggestions
Hoping to mine upcoming events (APEC, EnABLES, APEX, EnerHarv, etc.)

(d) Virtual conferences, articles, etc.

- Suggestions please

TREASURE CHEST

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

8A. 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:- write ½ page strawman for student engagement mechanism **NEED A CHAMPION TO LEAD EFFORT FOR COMM**

“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).

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,
13th June 2023.