



Energy Harvesting Committee (EHC) Minutes 9th Oct 2023

Attendees	Apologies/Non attendees	
John Horzepa, PSMA Prateek Asthana, Tyndall Juan Carlos Rodriguez, ADI Roberto la Rosa, ST Cristina Rusu, RISE Jean Michel Bidault, ITEN Maeve Duffy, Univ. of Galway Norm Elias, Norm Elias Model/Sim Hani Kanaan, Dracula Tech Brian Zahnstecher, PowerRox Mike Hayes, Tyndall	Matthias Kirn, WTO Soumyajyoti Maji, Univ of Galway Joe Horzepa, PSMA Sebastian Bader, MIUN Toshi Yamamoto, Nichicon Thomas Becker, Thobecore Torben Dankwort, Fraunhofer ISIT Pallawi Joshi, Juniper Networks Dan Stieler's, PowerFilm Francesco Carobolante, IoTissimo John Fiske, Armor James Rohan, Tyndall Ed Spence, TMIG (guest) Justin Henspeter, IBM Eric Swenson, IBM Pulugurtha Markondeya Raj, (Dr. Raj), FIU Sergiy Tykhonov, FRABA Baoxing Chen, Analog Devices Dinesh Kithany, Wired & Wireless Cem Som, Wurth John Flannery, Tyndall Andreas Beckes, FRABA Dusan Vuckovic, Zvertech Lorandt Foelkel, Wurth	Lisa Horzepa, PSMA Peter Spies, Fraunhofer IIS Denis Pasero, Ilika George Slama, Wurth Renee Yawger, EPC 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 Ningning Wang, Hangzhou DU

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

Next meeting:- **Thu 16th Nov 9 am Central** Brian to chair, Mike to type.

Agenda

1. Welcome any new members/guests.
2. EnerHarv 2024. **Request for Proposals – TAKE 2**
3. **APEC 2024 – IS speaker recruiting**
4. Industry Event Watch & List of EH companies
5. Media activities
6. Norm/Gabriel Collaboration Update
7. 'Treasure Chest' at end of the minutes.

1. Welcome new members

Hani Kanaan.

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
- Will be EUROPE based, probably May or July.
 - **Italian:-** Championed by Roberto —ADI and NXP willing to participate, sponsorship TBD. Roberto reached out to ADI about supporting and will coordinate with Baoxing Chen.
Roberto & Mike in contact with POLITICO (Torino) & Univ. of Perugia (legacy hosting experience, known good resources/hotels/etc.) as potential hosts. They are both part of IUNET Italian consortium of universities so can work together with one of them as physical host. Both preparing bids (combination of the outline budget and filling out the questionnaire) and will support each other regardless of outcome. Perugia will give 2 options, 1 in May & 1 co-locating with their annual summer school (typ. 2nd wk July) as May will not work for most students. **Perugia submitted bids for both May (originally preferred) or July (co-lo with summer school) options, POLITICO submitted bid for May...currently being evaluated by EWC (TARGET CLOSURE BY THU, 10/12).**
 - **Austrian/German consortium:-** Thomas can pull together a bid at short notice if Italy bids fall through.
 - **UK:-** Alex can pull together a UK bid if Italy bids through.
 - **OTHERS – U of Valencia:** Victor Martinez... no response to date, removed from list.

- 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...extended for new bidders and targeting mid Sept to collect bids. Final awardee of RFP contingent on BoD approval of special project mid Oct. **BZ/MH ASSEMBLING SPECIAL PROJECT PROPOSAL TO SUBMIT TO BoD ON 10/13/23.**
- Typ. 2.5-3 day event. Will need 4 day venue access.
- 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).

- EHC being designated a 7 slot session (6 presentations + 1 demo session) on Wed (post meeting update). Congrats to everyone for their efforts! **Target 7-8 presenters for six slots and 1-2 backup in case of confirmed speaker having to drop.**
- There will be a 4 slot Emerging applications session (Thurs) – we have offered to give an EH presentation if so invited. Awaiting feedback from Ada. **Based on current need, this session is fully-subscribed without EHC contributing a talk so will save for our own session and supporting Pkg Comm IS.**
- **EHC CALL TO ACTION TO START SOLICITING SPEAKERS(6)/DEMOS!**
 - Tyndall will provide one of each
 - Francesco, how about the IEEE HIR??? **Shifting this content to Pkg Comm IS support.**
 - Note we may not get so many EU offers due to proximity to EnerHarv.
 - Hani notes many opportunities for topics/demos from Dracula though likely conflicts being close to CES this year.
 - BZ notes PowerFilm had good, recent blog on light transmittance research.
 - MH notes Jennifer Halston of GATech (via colleague work at UU) interesting work (also pinged for EnerHarv).
 - Can hit main US academic clusters (UCSD, UCB, Northwestern, GATech, FIU, etc.).
 - Juan-Carlos confirms intent to attend APEC and can facilitate session, but not sure about direct content contribution.
 - MH will follow up with Jane's "successor/colleague" to determine new name for ADI TEG work.
 - Maeve suggests a scrub of former speaker lists/archives for inspiration, would like to attend APEC.
 - Cristina not planning to attend APEC, but can ask around RISE.
 - Roberto says ST not planning to attend APEC, saving for other events.
 - Jean-Michel does not have much familiarity with APEC, ITEN unlikely to support '24 (light US support structure), but can look into for future years.
 - MH can reach out to Nathan Jackson to solicit interest.
 - BZ can reach out to Ed Spence to solicit interest.
 - Cristina mentions consideration from Peter Woias of Univ of Freiburg (originally contact of Jane C./Thomas B. from EnerHarv '18).
 - Maeve notes this talk on solid state batteries from TDK at PwrSoc that may be worth following up with the speakers on: CeraCharge™ – World's First Rechargeable Solid-State SMD Battery Hiroshi SatoTDK, Japan.
- Committee will select speakers
- Will get official notification ~ 9th Oct (& we need to confirm acceptance). **Pending...**
- **Mike & Brian will put together some target dates for nominations, abstracts, list of confirmed speakers, 1st draft of slides, list of demos, etc.**
- Schedule/Key Milestones:
 - **10/9/23** = APEC notification of official acceptance/slotting **RECEIVED**
 - **11/10/23** = target for confirming all six speakers
 - **12/8/23** = PPT DRAFT due to EHC (**not APEC**)
 - **12/15/23** = PPT draft feedback deadline
 - **1/9/24** = PPT **FINAL due to EHC (not APEC)**
 - **1/12/24** = PPT FINAL feedback deadline
 - **1/19/24** = APEC hard deadline for camera-ready PPT upload (to get into proceedings)
 - **2/27/24 OR 2/28/24** = Industry Session will be on one of these two days

4. 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) ... will start in 2024. More details to follow late 2023.
 - **Next update target Nov '23.**
- **Company ecosystem** (*review quarterly, next due Nov-ish '23*)

- **BZ CONTINUES TO UPDATE AS INFO TRICKLES IN. BZ WILL ADD SOME COMP CONTRIBUTORS TO HIR CONTENT.**

5. MEDIA ACTIVITIES

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

- IEEE HIR 2023. HIR = heterogeneous integration roadmap, packaging and system integration focus
 - Effort led by Francesco Carobolante. Possible APEC presentation?
 - Final draft candidate 8/8/23. **BZ/MH WILL SHARE LINK WITH TEAM WHEN PUBLISHED.**
https://eps.ieee.org/images/files/HIR_2021/ch10_power.pdf
- Toshi Yamamoto, Nichicon – LTO Battery Tech. Possibly leverage material related to Sensors Converge (already has ~50% of required content)? Upgrade & share overview with team by next meeting (Oct?). **BZ WILL PING ABOUT STATUS FOR THIS AND APEC.**
- Lorandt Foelkel, Würth – EH Tech Update. **LORANDT SHARED PREVIOUS DIGIKEY WEBINAR FOR REFERENCE.** Mike & Brian feel it is good but needs higher % of new material – under review.
- Prateek Asthana, Tyndall. **MH SHARED PREVIEW PPT** (attached to Aug minutes). **Slot of 19th Oct agreed, expect advertising >2 weeks in advance.** **Scheduled, currently promoting, please register/attend/support!**
https://us06web.zoom.us/webinar/register/7116965113111/WN_ylzcEq36QD-I7b9I15Hlw
- Leverage Ranajit Sai presentation for 2024 (he has already lined up to give a magnetics PTR)
- Ed considering and will revert
- Any other topics?

(b) Conferences/workshops

- Lorandt will be at IEEE EMC conference, let him know if interested..... <https://emc2023.org/> Good event, ~50 attendees, talked to lots of folks, not sure of any new PSMA interest.
- PSMA PwrSoC (<https://www.pdma.com/index.php/conferences/PwrSoC>), September 27 thru 29, 2023, Hannover, Germany **EHC CALL TO ACTION: ANYONE GOING/INVOLVED PLS KEEP EYE OUT FOR SPEAKERS/TOPICS TO LEVERAGE.** Done, will seek overview from team/attendee.
- CAFE (<https://2023.ieee-cafe.org/>), September 25 thru 27, 2023, Torino, Italy (Roberto will have presence)
 - Output of IEEE Transactions on Agrifood electronics (TAFE), (EiC: Danilo De Marchi). **Roberto reports good conference (~80 attendees), particularly good feedback on self-powered apps/WSNs in agro. Some good speaker prospects to leverage for our efforts.**

(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

6. Norm/Gabriel Collaboration Update

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.
- Würth 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.”

7B. 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).

7C. 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 Oct 2023.