Energy Harvesting SIG: what have I been up to then?

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The Future. Faster

As a network partner of Innovate UK, KTN combines expertise in all sectors with the ability to cross boundaries

Connecting with KTN can lead to potential collaborations, horizon-expanding events and innovation insights relevant to your needs

Value create

£1 grant
> 12.5 multiplier
> £50 project value
at 5 years

Connecting people to drive innovation

— Find expertise
 — Find markets
  — Find finance

Innovation in Practice

(SIMPLIFIED VERSION)

Activities and projects

From roadmaps to steering groups
from influencing government policy
to special interest groups,
our activities and projects
evolve constantly
to reflect industry needs

Aims and Objectives of a SIG

- Build a UK community
  to bring together challenge
  holders & solution providers

- Map UK community

- Disseminate Case Studies

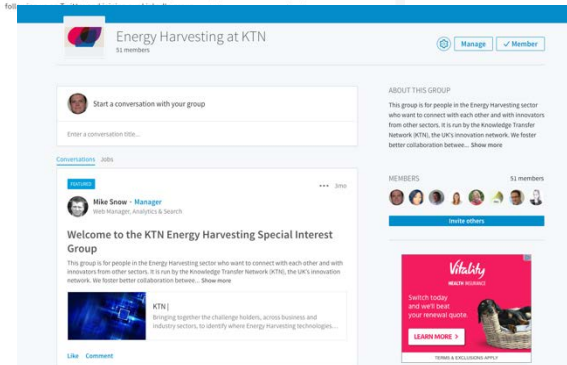- Workshops to identify solutions
  and convene the community

Energy Harvesting SIG

The Energy Harvesting SIG builds on the work of the previous group, which sought to accelerate commercialisation of various technologies, and this time help bring together a community in the UK of solution providers of energy harvesting powered technology, with challenge owners across multiple sectors, including Healthcare, Transport, Infrastructure, Manufacturing, Built Environment and IoT.

The SIG will produce a series of workshops, looking at the individual sectors and add to the existing knowledge base and identify appropriate new business opportunities.

Challenge holders and solution providers

Ran 3 workshops, each one revolved around 4 parts;

Scene setting

Challenges in the user space

Workshop 1 – Thinking about the challenges, or one from people on your table, how would you address them, and go blue sky

Workshop 2 – What do you need to realise that new solution you theorised in the first session?

Manufacturing

workshop 1

Indoor tracker, of people and/or Bots.

State monitoring of supplies/stock – where they should be or not?

Condition monitoring of machinery and moving parts.

Manufacturing
workshop 2

Low power bi-directional comms.

Better efficiency of PE.

Hybrid system of supercap/battery/harvester.

Human motion harvest – non intrusive.

Acoustics harvest.

Edge processing, or higher data transmission rate?

Standardisation of harvest and power management?

Disposable nodes for location?

Better optimization/tunability to allow a universal vibration harvester.

Optimisation of current systems through software.

Better interconnects and printed electronics.

Andy Murray update.

Context monitoring – you monitor the condition and understanding the context, can then optimize the system.

Better Nav in non GPS environments.

Zero maintenance/fit and forget.

Location points integrated into new factories/buildings to allow seamless nav – but unsure how to power.

Better energy density in/from storage…from a new wonder material that isn't so scarce.

Components better able to handle extreme environs, such as high temps.

Systems integration and community collaboration.

Flexible and conformable storage and generation.

EVs & CAV

workshop 1

In car systems for passenger comfort, lack of confidence in EH for critical systems.

New wireless systems, not just power but comms, to reduce loom weight.

Wireless Electrical Activation Tyres (W.E.A.T).

Structural Information Skin (S.I.S).

Active chasis for motion harvest, combined with dynamic hydraulics.

Road side fan blades to capture air flow and feed into grid for active vehicle charging.

EVs & CAV

workshop 2

TEGs to work with lower heat from electric motor v's current ICE.

Acoustic harvest.

Low loss capacitors.

New lower power comms, maybe BT improvements.

Power distribution.

Better integration of harvest into car system.

Better data management.
Tyre rubber that generates electricity.
Power and data storage, solid state?
Voltage step up.
Large Area Electronics.
Perovskite development – coating for car windows and surfaces.
100mW (constant power), in a 2x3x5cm packet (example from table), and it needs to be safe, and cheap – OK then…

Future Cities

workshop 1

Building and infrastructure health monitoring.

Delivery drone re-changing stations.

Thermo-electric smart glass for buildings.

Pollution and air quality monitors.

Drone systems to monitor critical infrastructure.

Future Cities
workshop 2

Airflow harvest for HVAC locations and corridors.

FM sensor for occupancy, not disposable.

In most situations, solutions need to be cheaper than a 10 year battery.

Software optimization and better sleep mode options.

Better integration of sensing sources into BMS for better intel and optimized use, opens more opps for EH.

EM Harvest from cabling.

WEEE regulations.

Harvest from mechanical door closers.

Fast low power comms.

Edge processing – can it be powered?

Lower leakage storage.

Easier integration, units to power things without complexity – systems integration or single product.

Small and perfectly formed – but at what cost?

Exemplar use cases with clear RoI.

So what does it all mean?

grand themes?

Scalability – harvesters need to be small to be more accepted.

Integration – need to be easy to add to a sensor/system.

Comms – can we get better comms options at lower power and maintain range?

Storage – most use-cases need battery or super-cap, these are currently limiting adoption and utilization, need shapeable storage etc.

Power – some uses will never be right, but higher power will speed adoption.

Proof – it's in the pudding, people need to be shown more!

UK sector – what and where

and why

The EH SIG was a continuation of a previous collaborative group, set up to encourage commercialisation of EH tech from the research base.

The 'new' SIG had a goal of helping exploit and promote the industrial capability developed from the previous programme. Part of that involved re surveying the community and establishing the sectors size and any growth, in research and industry.

cont...

So we contacted all of the research groups contacted in the 2013 report, and conducted web based research and discussed developments with academically inclined EH groups in the UK.

We also looked at companies that existed previously, ones that attended KTN and other groups events and did some ~~old fashioned~~ traditional research.

The numbers

45 Universities

- occupying the time of 455 staff

65 companies/industrial facing organisations

Distributed all across the UK

Types of company function?

Energy harvesting components - Intrinsiq Materials

Energy harvesting sub-systems and devices - Trameto

Energy harvesting solutions - Passive Eye

Energy harvesting design, consultancy, R&D and development services - Plextek

What can they do?

Asset tracking

Condition monitoring

Environmental monitoring

Power for wearables

Monitor infrastructure

Monitor vehicles

How do they do it?

Thermal Energy Generation

Piezo Electrics

OPV and PV - with increased efficiency compared to standard silicon

RF Harvest

Kinetic movement/motion (non PE)

Vibration harvest (non PE)

What does this all mean then?

The sector has grown, both research and industry.

Strength in components and materials.

We could do more at device production level.

Need to maintain increasing the visibility of EH capability and attract more users and new use cases.

Where do I find out more?

how much is it?

where's my copy?

https://bit.ly/2H9WotM

Links

Website - https://ktn-uk.co.uk/interests/energy-harvesting

Linked In group - https://www.linkedin.com/groups/13527522

Thank you

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