

Batteryless Always-On Wireless Sensing for Full-Stack IoT Insights-as-a-Service

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1. Problem

The value of proliferating vast numbers of sensors into a revolutionary, ubiquitous IoT is clear, but a world of pervasive sensing simply cannot run on batteries. Even imagining 10-year battery lifetimes for sensor devices, a trillion-sensor world would require 274 million battery replacements per day. That level of maintenance is logistically and financially prohibitive. True ubiquitous sensing requires devices that can live off ambient energy, but today's electronics hardware consumes too much power to operate continuously from harvestable power budgets across most applications.

<https://www.psicick.com/battery-problem/>

2. Technical Approach and its Novelty

PsiKick's custom ICs integrate energy harvesting / power management, sub-microWatt radios, sensing, and always-on computation to enable continuous monitoring without batteries. This hardware, coupled with new networking solutions to a full-stack system solution, provides unique access to new data streams from huge numbers of previously un-monitored assets and environments. www.psicick.com

3. Results

PsiKick's first products monitor industrial systems, like steam distribution and rotating machinery, offering its customers continuous insights into each and every component of interest in the plant, unhindered by the scaling limitations imposed by battery-powered or wired alternatives.

4. Significance for tinyML Community

We are excited to hear about tinyML solutions that could combine with our own edge computing, operating continuously on our batteryless hardware right at the sensor. We want to brainstorm how accessing new data streams could expand the applicability of tinyML and create opportunities for new compositions of multivariate data driven insights at a new level of scale.

5. Reflect and highlight TinyML aspects of the work

- Batteryless, always-on, always-in-communication hardware
- General purpose MCU + custom HW acceleration
- Adaptive power management from harvested energy
- Analytics partitioned from the sensor up through the cloud
- Preparation and curation of labeled data from new data streams