CHPB-44-2019: Long-Lasting, Low-Cost Volatile Organic Compound (VOC) Sensors for Interior Monitoring

Objective:

- Develop long-lasting, low-cost VOC sensors for the high-fidelity detection of xylene (i.e. an aromatic hydrocarbon), ethanol (i.e. an alcohol), and formaldehyde (i.e. an aldehyde).

Problem

- There are few cost-effective commercial VOC sensors capable of continuously monitoring indoor environments despite the negative impact of VOCs on public health.

Expected Results:

- A field-ready prototype sensing system capable of integrating with a residential or commercial IoT testbed.
- Clear, benchmarked sensor performance metrics.

Approach and Research Tasks:

1. Design and synthesize carbon nanotube-polymer composites that respond to the VOCs of interest.
2. Develop and fabricate VOC-sensitive organic field effect transistors and resonant mass sensors.
3. Integrate the OFET and mass sensor platforms into a single device, and evaluate both selectivity and sensitivity.
4. Benchmark pertinent performance metrics against other VOC sensor technologies.

Schedule

Tasks	Q1	Q2	Q3	Q4
Task 1	■	■		
Task 2		■	■	
Task 3			■	■
Task 4				■

PIs: *Jeff Rhoads, Bryan Boudouris, George Chiu, and Jim Braun*

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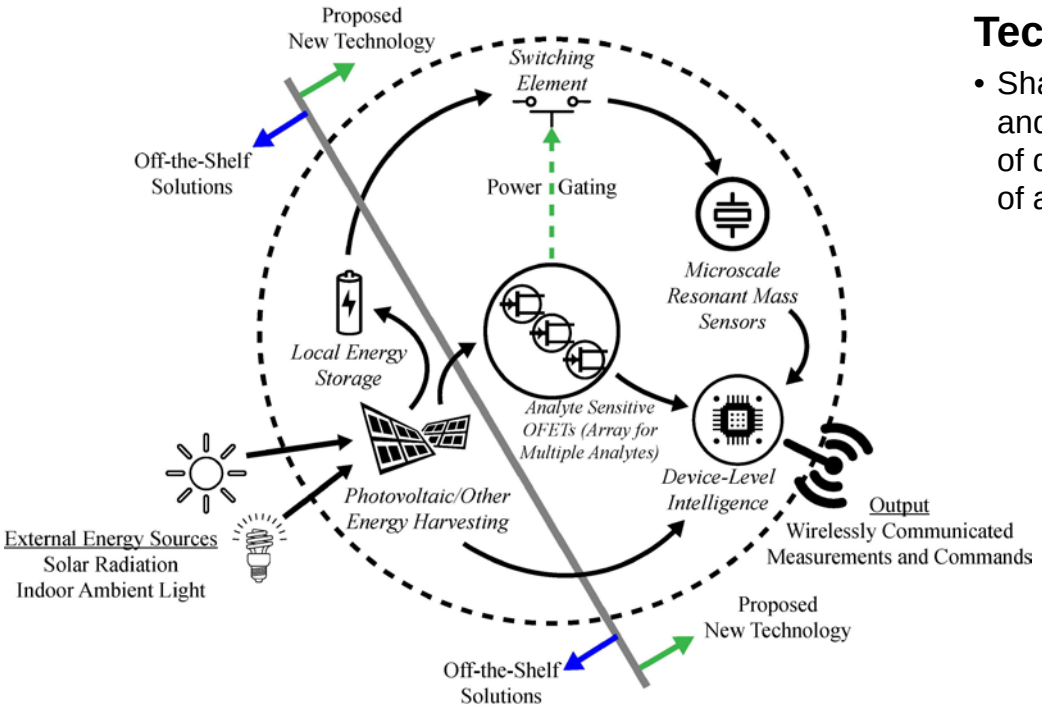

Technical Strategy:

- Shamelessly leverage an ~$1.7M investment by ARPA-E and Purdue University to achieve a research pace and scale of development not traditionally possible within the confines of a CHPB project.

Technology to Market Strategy:

- Focus on “quick wins” to develop a technology that can progress to market in <36 months.

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