

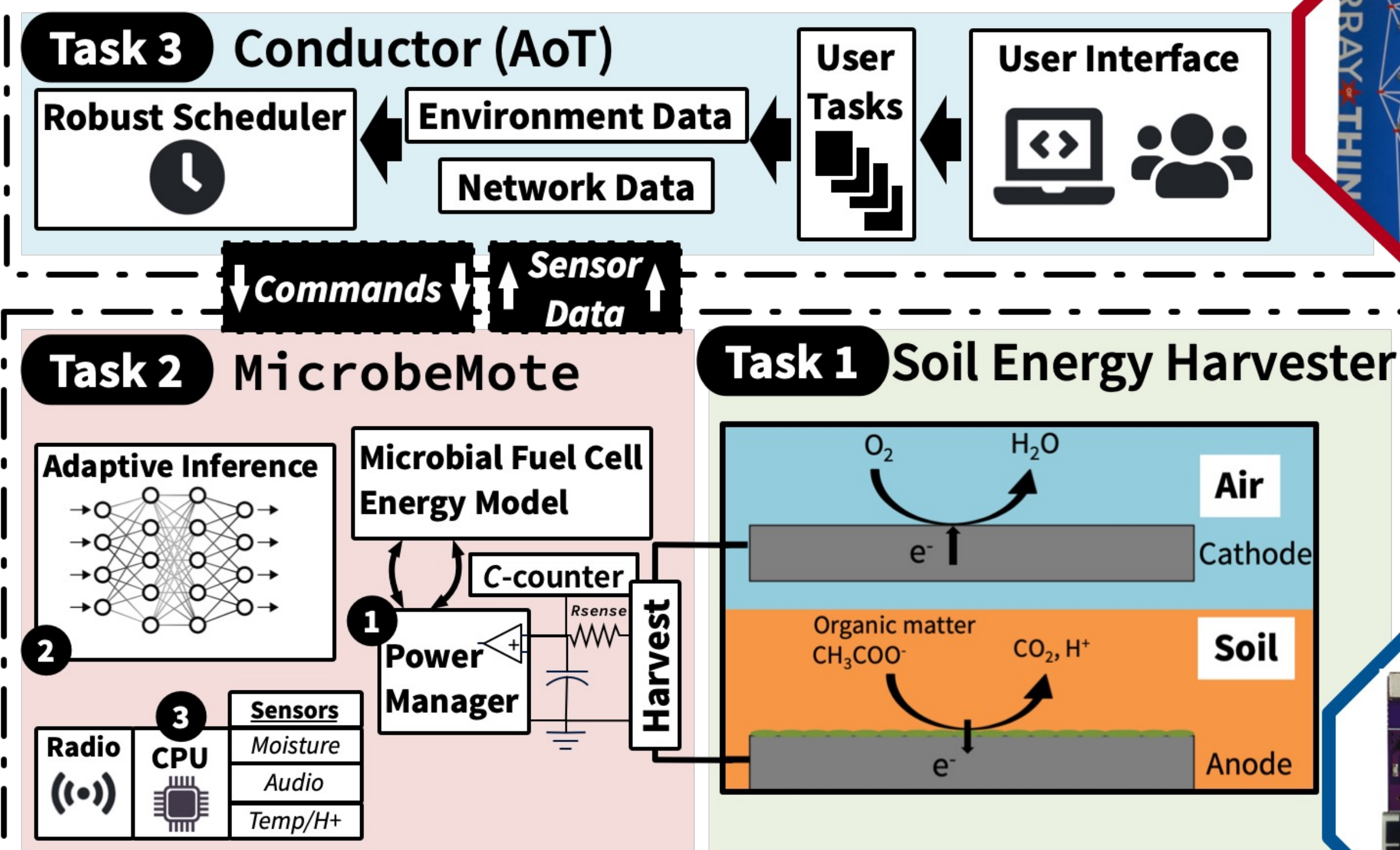
# Batteryless Sensors Enabling Smart Green Infrastructure

## Exploring Soil Powered CPS as a Foundation of the Smart City

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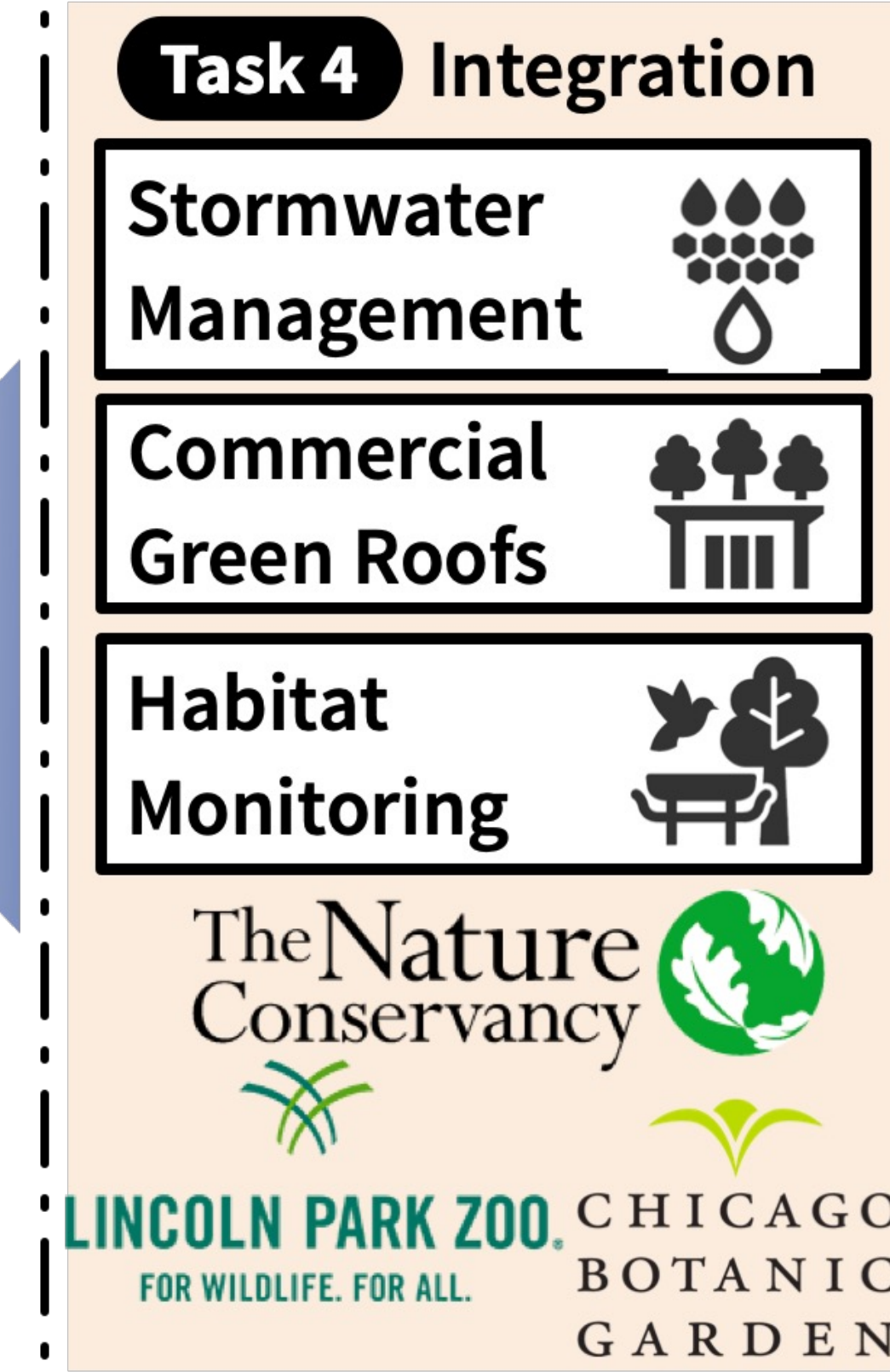
smartmicrobes.info

### Smart Green Infrastructure



MicrobeMote: a soil powered smart device.

### Applications and Partners



### Our Approach

- 1) Augmenting GI with battery-free smart devices.
- 2) Powered by energy harvested directly from soil, which gather data, infer, actuate, and collaborate.
- 3) Decade long lifetime due to removing batteries.
- 4) Build Microbial Fuel Cells which generate energy or disinfectant.

### Challenges

- 1) Deploying smart devices in GI is challenging because of the *scale* and need for **long-term** deployment, meaning battery powered or expensive plugged-in devices are infeasible.
- 2) Need robust **inference**, **communication**, and **coordination** on ultra-constrained computing platforms despite frequent **power failures** and dynamic **energy** availability.

### Science

Exploring novel runtime systems which are resilient to power failures and use harvested energy efficiently.

Investigating task orchestration from a central high-power node to a swarm of constrained intermittent nodes.

Developing inference capability for extreme low power.

### Impacts

Working with conservation orgs to enable **stormwater** management, **urban** wildlife surveillance, **green** roofs. Exploring smart **farming** deployments.

