

Solar Oracle Walkman: Identity Amid Noise, DIY Green Proofs and Agentic Music With Dye Sensitized Solar Cell

Shih Wei Chieh

National Yang Ming Chiao Tung University (NYCU)

Abstract

Solar Oracle Walkman explores material identity, energy provenance, and decomposed authorship through handmade dye-sensitized solar cells (DSSCs). It asks how energy infrastructures might distribute computational access and authorship-related rights among humans, materials, and autonomous agents.

The project starts with a small, mobile I–V curve tester and handmade solar cells. Measuring each cell across a sixteen-resistor ladder, I investigate whether electrical differences arising from its handmade semiconductor structure can become a recognizable identity. These differences also shape a music-generating interface—a playful entry into energy and authorship.

To explore whether distributed, microwatt-scale generation could participate in I-REC(E) energy certification, I contacted the Green Certificate Company. Its encouraging preliminary feedback indicates that capacity alone does not exclude registration; formal review, metering, and independent verification remain necessary.

Treating DSSCs as potential physically unclonable functions (PUFs) combines generation and identity evidence. The proposed architecture would bind source identity to independently metered production, enabling aggregated green proofs and community-defined resource allocation. My recent exploration of synaptic-like behavior in DSSCs motivates tests of paired-pulse facilitation (PPF) and depression (PPD), exploring whether history-dependent responses can strengthen enrollment.

Here, machine learning translates DSSC responses into identity representations, making the apparatus more than an energy-measuring instrument: it becomes an experimental model of sensing and recognition. Like neural models of vision, it raises a philosophical question: how do variable physical signals become stable representations of objects? What the system recognizes as the same entity is therefore both an engineering decision and a question in the philosophy of perception.

By bringing this project to GOSH, I invite people to discuss why energy infrastructure design extends beyond hardware. Identity criteria shape resource access, permissions, and accountability, linking energy attribution to norms governing autonomous agents' behaviour. Metaphysical questions must therefore participate in infrastructure engineering, not remain external philosophical concerns.