

# Speckled Sensors for Glasshouses

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# Energy Neutral Platform

- Platform designed to investigate capability of energy neutral Specknets.
- Hardware:
  - 16 bit MCU.
  - 2.4 GHz Radio Transceiver
  - Lithium Polymer Battery.
  - Photovoltaic Panel.



# Glasshouses

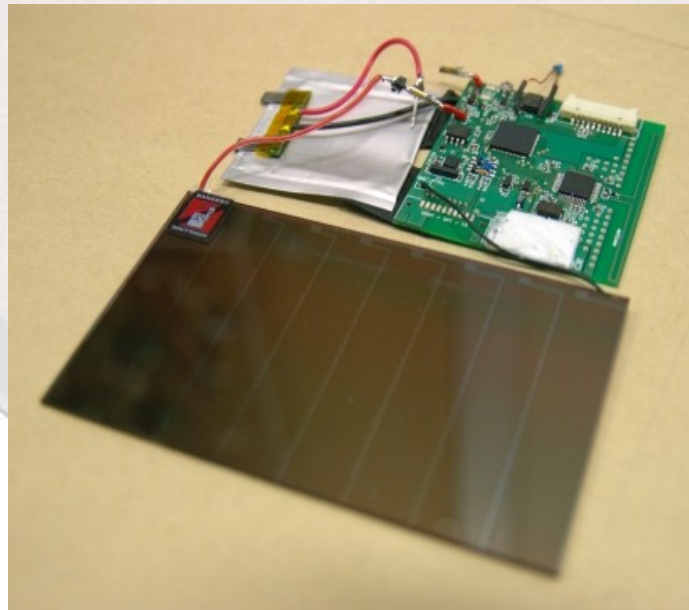
- Scottish Agricultural College Glasshouses
  - A test bed for garden centres.
  - Develop suitable software for users of the system.
  - Potential for integration with existing systems to add automated control.
  - A new environment for energy neutral investigation.

# Glasshouses Sensing Requirements

- Sensing requirements for monitoring plant stress.
  - Ambient temperature and humidity.
  - Incident light intensity.
  - Soil Temperature and water content.
  - 'Leaf Wetness'
    - A relative measure of the wetness on a plants leaves.
- All required quantities can be measured using COTS hardware.

# Migrating the platform

- Energy Neutral Platform designed for investigations with indoor solar.
  - No casings, no user interfacing software.
  - Custom device software for MAC / Network testing.



# Design Developments

- Selection and Integration with sensors.
  - High Accuracy Temperature and Humidity.
    - Sensirion SHT 15.
  - Soil Probe(s)
    - Decagon EC.
  - Artificial Leaf.
    - Decagon / Campbell Scientific.
- Analysis of power requirements.
  - 10 - 15 minute sensing frequency can be maintained.
- Casing and Waterproofing.



# Software Developments

- Plants have varied needs, so devices may have different operational requirements and need configurable software components.
  - Alarm system for dangerous conditions.
    - Sensing frequency and priorities.
  - Selectable logging of all measured data.
  - Power management to keep the network alive.
- PC software for control and data storage.
  - Scalable distributed system.
  - Access anywhere.

# Questions?

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