Introduction
This poster provides an overview of my IoT research interests, and hence the past and present IoT-related activities in my research team.

Energy-Directed Computing
Energy harvesting sources are typically highly variable and unpredictable. Typically requires complex and bulky circuitry.

Energy-driven computing rethinks the design of IoT systems and applications to run directly from the harvesting source.

Transient/Intermittent Computing
Approaches to allow applications to execute across power interruptions, while maximising forward progress. Does this by saving volatile state to NVM before power outage.

- When to save the state?
- Reducing snapshot size
- CPU, sensors, radio...
- Application case studies
- Development tools

Run-Time Power Management
Energy-driven systems are power constrained (contrasting with battery-powered systems, which are energy constrained).

Running directly from the EH source, the computational load needs to adapt to the varying available power, e.g. by changing CPU frequency, enabled cores, activity, etc.

This has implications on the efficiency of the system which we can manage in software, i.e. software-based maximum power-point tracking.

Energy-Aware Networking

Opportunistic Direct Interconnection
Opportunistic Direct Interconnection enables IoT networks to identify neighbouring networks after deployment and connect directly with them, without relying on their internet gateways.

This can allow them to:
- Share data to improve context awareness or data collection;
- Utilise another network’s resources, e.g. internet connectivity, compute;
- Share tasks, e.g. routing or processing, and hence effectively ‘trade’ energy.

We have explored this through both simulation and practical experimentation.

We are also exploring how to negotiate between co-located networks, to trade resources.

Networking for Energy-Driven Systems
The properties of energy-driven systems provide challenges to networking, where available power is constantly changing, and the network should appropriately adapt and respond in order to operate efficiently and effectively.

We have explored this through both simulation and practical experimentation.

Energy-Efficient Sensing
Adaptive algorithms and machine learning to improve the energy-efficiency of IoT end-devices through better context-awareness.

Find Out More
For more information about the research, including publications, downloadable code, and videos, visit www.transient.ecs.soton.ac.uk