29.   Active Power Filters for use in Power Systems with Distorted Waveforms: T.C. Green

The use of electronic power converters to cancel the distortion present in a power distribution system has been given a lot of research attention. There are several competing technologies. This project will use simulation in Matlab to compare the performance of the various control methods for a set of case studies.

30.   Dynamic Response of Inverter-Based Distributed Generation: T.C. Green

Traditional generators have dynamics dominated by their mechanical system (interia etc). Generators comprising a fuel cell and inverter have no moving parts and their dynamics are quite different. This project will model such a generator an examine operations such as de-synchronising and re-synchronising to a grid voltage to assess what are the important dynamic limitations of the system.

31.   Operation and control of micro-grids: T.C. Green

The increased use of small-scale renewable energy sources and combine-heat and power is challenging both the use of traditional power stations and the need for large scale transmission grids. The micro-grid is a local federation of generators and consumers. The issue is how to match supply and demand when supply from solar and wind sources is unpredictable. A Simulink/Matlab model will be used to explore operation of such a system and to develop the control ideas.

32,   On-line Optimised Operation of a MEMS Micro-Generator: T.C. Green

A very small scale power generator has been developed that uses an electrostatic device to generate a small amount of power from body movement. The device might be used to power so electronics embedded into clothing. The device is given an initial charge a low voltage and when the device is accelerated an inertial element moves through the electric filed and increases the voltage. For sinusoidal motion, the pre-charge voltage can be optimised to maximise the generated power. On non-sinusoidal motion (real arm movement for instance) we require an on-line adjustment of the pre-charge voltage. A simulation model of the system is available to study.