PROJECT TOPICS; 2007-11

This is a list of projects completed by current staff. Some projects were conducted several times or different projects were conducted under the one topic. They illustrate the project topics over this period.

ACADEMIC STAFF PROJECTS

**Dr A.Abu Saida**
- A new algorithm to detect internal faults within a transformer
- Application of FACTS on improving power system performance
- FPGA implementation of neural networks for pattern recognition
- Power system stability with distributed generation
- Image processing to detect internal faults in a power transformer
- Power Transformer fault detection based on image processing
- A novel algorithm for detecting internal transformer faults
- Harmonics effect on relay performance.
- Simulation and measurement of three-phase transformers characteristics subject to voltage sag
- A new approach to recognising faults in power transformers using frequency analysis
- Condition monitoring of power transformers
- High frequency transformer model based on distributed parameters
- Cost study for a power system utility
- Power control by using a tap changer
- Effect of sulphur on transformer solid insulation simulated under accelerated aging conditions
- Impact of a load model on power transfer capability of an OLTC
- Electrical distribution network design for a shopping complex in Kuala Lumpur
- Application of static phase shifter units in HVDC systems.
- Enhancing power transfer capability using adaptive on line transformer tap changer settings.

**Dr K-S Chan**
- Optical burst switching
- MAC for a mobile adhoc network
- Providing improved packet transmission through a power line communication medium
- QoS routing in a mobile ad-hoc network (MANET)

**Prof. K.Chung**
- FoIP (Fax over IP) interphasing
- Wireless distance detector
- IQ compensation in dual branch receivers.
- An FPGA implementation of a frequency offset estimation scheme for a DVB-T receiver.
- FPGA implementation of a channel equalisation scheme using an FPGA
- Remote surveillance camera with motion detection
**Dr H. Eren**
Wireless control in mining applications
Efficiency improvement of electrical machines.
Wireless sensor network for intelligent lighting using Zigbee communications protocol
Robot control by using a PLC and Citect SCADA through a Zigbee network
Labview in an automated production line
Monitoring machine health of domestic appliances
Wireless communication for a sensor network
Wireless monitoring of structures
Wireless electric motor condition monitoring
Wireless human condition monitoring using wi-fi or Zigbee
Wireless electric motor condition monitoring
Wireless network for a PLC
Development of peer to peer communication for an instrumentation system
Remote tracking algorithm using low-cost satellite GPS
Computerised GPS error control

**Dr R. Howard**
Jitter modelling
Low-noise balanced microphone pre-amplifier

**Dr Y H Leung**
Image encryption
Design and implementation of signal processing algorithms in DSP processors
Design of variable fraction delay filters
Noise in industrial data networks
Speech processing with arrays.
Development of a signal processing experiment based on a DSP evaluation module
Robustness of a novel steerable microphone array
Implementation of an adaptive noise canceller
Analysis of the summe method.
Implementation of an adaptive delay estimator
Implementation of an advanced signal processing algorithm in a Virtex II pro FPGA
Implementation of fractional delay filters
Adaptive noise canceller
Design and implementation of an adaptive equaliser
Implementation of an adaptive noise canceller using an an FPGA
Analysis of different implementations of an FFT in an FPGA
Application of signal processing in a communications system
Implementation of an adaptive FIR filter via an FPGA
Implementation of an adaptive signal processing algorithm in an FPGA
Wireless data acquisition of EOG signals
Prof. S. Islam
Detection of high impedance faults in a distribution system
An investigation into the performance of over-current and distance protection schemes on radial distribution systems containing distributed generation
A probabilistic voltage profile in the presence of embedded wind generation
Demand side management in a smart grid
Condition assessment of steel sleeved reinforced timber poles
Distributed protection
A probabilistic voltage profile in the presence of embedded wind generation
Analysis of emissions and fuel consumption of power generation systems under varied load
Reliability evaluation of a distributed generation system
Study of the effects of LFT and EPR on a gas pipeline with respect to a 132 kV line
Transformer insulation and heating
Loss reduction in power distribution systems
Determining the protection adequacy of an islanded distributed generation system
Demand side management of non-essential loads
Harmonic analysis of an industrial power distribution network
Optimising automatic reactor and capacitor switching (ARCS) schedules
Continuity of generation of a distributed generation islanded power system following an emergency
Short-term load forecasting in the Sultanate of Oman
Stability analysis of a power system
A protection system for an industrial plant.
Harmonic Diversity Factor
Network congestion management and pricing of transmission
Analysis, modelling and simulation of the Kalgoolie nickel smelter power systems
Feasibility of HV distribution direct to the consumer's point of supply in urban and suburban areas.
Experimental model to determine transformer hotspot temperature
Artificial Neuron Network load flow analysis
Effect of harmonics on the optical characteristics of a differential relay.
Distributed generation protection

I. Murray
Music scanner for people with low vision
Text to speech and LCD interface to Braille typewriter
Braille translation in Mac OSX

Dr D. Myers
Fingerprint analysis
UML to SystemC conversion
An SMS software module for an MHP-compliant digital TV receiver
Electronic vermin control system
A/Prof. M Masoum
Steady state modelling of doubly fed induction generation wind turbines for load flow calculations
The design, simulation and prototyping of a reliable battery management and charging system
Experimental study of digitally controllable 1kw three phase sinusoidal inverter
Harmonic model of a plug-in electric vehicle (PVE) charger for smart grid applications.
Analysis on transformer inrush current discrimination and the ultra-saturation phenomenon
Power Smoothing of an induction generator for wind power
Power flow control of power systems with embedded FACTS devices.
Comparison of maximum power strategies in wind turbines
Modelling and simulation of doubly fed induction generators (DFIG) to provide power system support
Reactive power dispatch and voltage control in a practical utility scaled power system
Voltage sag compensation approaches
Park Model of an induction machine including harmonics.
Impact of shading on the performance of photovoltaic cells.
Smooth starting of a wound rotor induction motor
Design of a rotor resistance starter for an induction machine.
Direct torque control of interior permanent magnet synchronous motor drives
Calculation and design of power factor correction with harmonic filtering for a copper SXEW Process plant.
Design and implementation of a solar water pump using MFFT
A variable speed constant frequency drive for aerospace applications
Ride through compensation of industrial drives subjected to voltage sags
Analysis and simulation of static synchronous compensators (STATCOM)
Analysis and implementation of a power converter for electric automobile applications.
Design and construction of a three phase harmonic generator

C. Maynard
Microcontroller improvements for a reverse cycle air-conditioner
SCADA security (Trust systems)
Expandible sensor array for data acquisition and control of a diesel engine
Self-configuring sensor network
An in-dash multimedia and diagnostics car computer
Scheduling process for wineries.
Open source "Mindtrail"
Optimisation of winery processing schedules using an evolutionary algorithm
Team maker software
A base Forth Language and open firmware to be used on the 68HC12 and ARM
Design of an IP camera
CUB Braille
Dr C. Ortega-Sanchez

Car park SCADA system
FPGA-based thin client
LED Billboard
Autonomous blimp
Neural networks for pattern recognition
Navigation and mapping in autonomous robotics
Remote control of a small robot using an iPhone.
Touch screen piano
Autonomous parking.
User-friendly smart-home infrastructure
Signal processing using CPLDs
An embedded system for barcode reading applications
Hand-made animation using a touchscreen
Control of mechanical devices using iPods and FPGAs
Graphical interface for LED animation
Remote control of a robotic platform using an iPhone
Design, implementation and test of a LiPo battery charger
An electronic retina
A programmable billboard using FPGAs
Cellular automata demonstration system
Development of a simulation platform to aid in the evaluation of algorithms
for multi-robot swarm systems.
FPGA clusters for image processing
Control of small motors using an embedded system
Development of a modular autonomous robotic platform for educational use.
Wireless sensor networks
Environment detecting art
Control of small motors using an embedded system
Extrinsic evaluable hardware using FPGAs
Wireless robot
Generation of DFTM tones using an FPGA
Control of small motors using an embedded system
Simple computer assembler and assembler
Extrinsic evolvable hardware
Barcode reader using a microcontroller
Embedded system using FPGAs
Communication protocol for ad-hoc wireless sensor networks
VGA monitor and keyboard controller using FPGAs
Analogue signal laboratory using FPGAs and a PC
Efficient implementation of digital audio processing algorithms using FPGAs
Implementation of a DTMF receiver using sliding Goertzel filters
Embedded system using FPGAs
Design infrastructure of a simple autonomous robot using a microcontroller
A household utility monitoring system
Wireless General Purpose Display
Communication protocol for ad-hoc wireless sensor networks
Speed measurement using infrared sensors
Dr S. Rajakaruna

An integrated PV-thermal system with high energy efficiency.
Comparing different boosting schemes for a Z-inverter in grid connection of a wind-driven SEIG
The mitigation of dust deposits on solar PV arrays
Modelling and Performance assessment of large-scale photovoltaic plants in rural Australia.
Minimisation of DC link current and power losses in an improved Z-source inverter.
Demand side management applied to commercial and industrial practices
Design of a pumped hydro energy storage system for a rural power supply system
Design and implementation of an integrated solar module for power generation and water heating.
Design of a solar photo-voltaic system for Curtin IT services
Design of a controller for the Z-inverter in a grid-connection of a wind-driven, self-excited induction generator
Controlling of a two-source inverter in a grid connection of renewable energy sources
Design of the electrical sub-systems of a fuel cell vehicle
Design of a protective device for welding machines to minimise electrocution.
Design and simulation of an integrated PV micro-hydro system
Prediction of the performance of a variable-speed self-excited induction generator
Modelling and analysis of the energy supply system of a fuel-cell plug-in electric vehicle
Control of a Z-source DC-DC converter with an ultracapacitor bank in a vehicle application
Design of a single phase Z-source inverter
Improving energy efficiency of a RAC Roadside Assistance Vehicle
Design of a fuel cell-based submarine power system
Design and the control of the energy supply system of an electric vehicle supplied by fuel cell and ultracapacitors
Control and design of DC grids for offshore wind farms
Improvement of grid power quality using fuel cell distributed generators
Design of a Z-source inverter controlled fuel cell - wind hybrid power supply
Control of a 3 phase induction motor supplied by a PEM fuelcell stack in an electric vehicle
Design of a reactive power controller for a self-excited induction generator driven by a wind turbine
Design of a single axis tracking system for a PV array
Maximum power point tracking of a field connected PV array using a Z-source inverter.
Control of a Z-source inverter in a solar water pumping application
Sizing of the battery bank of a stand-alone self-excited induction generator driven by a wind turbine.
Design of a solar power system for a building
Control of wind turbine driven induction generators using Z-source inverters
Design of a capacitor switched self-excited induction generator for wind powered applications.
Series active power filter analysis with renewable source
Control of the output power of a proton-exchange membrane fuel cell
Design of a voltage-boosting inverter for fuel cell applications

Dr W-Y Yan
Display and control of a graffitti robot.
Stability analysis of a decentralised networked control system

Dr Yue Rong
Channel equalisation for underwater acoustic communication
Quantum cryptography and steganography

Prof. S Nordholm
Beamsteering microphone array.
Robust SNR tracking for speech enhancement
Applying ICA to blindly separate a mixture of sources for speaker recognition
FPGA evaluation and implementation of a speech enhancement algorithm
Investigation of a multi-decision, sub-band, voice activity detector
Blind source separation of speech mixtures

Dr Dilen Jayaweera
Distribution network performance assessment with a re-configuration option
Distribution system reliability assessment with Monte-Markov models
Protection relay-based adaptive algorithm for active power networks
Short circuit calculations in an active distribution network
Optimal utilisation of distributed generation in active power networks
Designing a smart mini-grid
Determination of DG location and capacity in a distribution network
Hybrid criteria for mini-grid system design
Reliability assessment of a distribution networks with hybrid operations of wind and PV.
Protection coordination in a micro-grid
Security constrained interconnection of power plants in a distribution network
Optimal dispatch of a DG in a micro-grid
Cost-based placement of DGs
State estimation of active distribution networks
Generic distribution network design
Optimal placement of DAs in distribution networks
Impact of distributed generators on distance protection
Prof. Peter Wolfs

Arcing fault detection in rural distribution lines.
A matrix converter for low distribution system regulation
Insulation coordination tool for high voltage distribution lines
Integrated volt-VAR control on the South-West interconnected system.
PV saturation; impacts of high PV penetration on LV networks
Insulation coordination tool
Optimum charging/discharging pattern for battery energy storage in a grid-connected PV system
An investigation into the use of statcoms to provide custom power to weak radial distribution networks.
Simulation Model for frequency responsive PWM inverter
Solar array models incorporating partial shading effects.
Load demand control of an electric car battery charger based on grid frequency
Assessment of back-up feeder protection on the South-west interconnected system
Smart meter home area energy network demonstration/testbed facility.
Impact of charging electric vehicles and plug-in hybrid electric vehicles on power grid frequency and voltage fluctuations
PV in Smart grid for electricity distribution in Western Australia