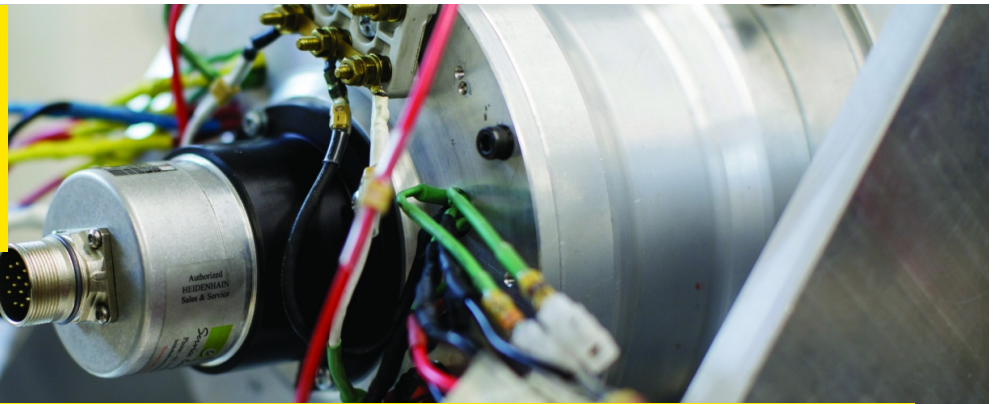




UNSW
SYDNEY



Design & Control of Permanent-Magnet Synchronous Machines

Design, optimisation and control of various permanent magnet synchronous machine (PMSM) geometries, delivering improved torque and power density, reduced cogging torque, and extended constant power operating range.

Competitive advantage

- Expertise in highly efficient, low cogging torque, wide constant power speed range permanent magnet synchronous motors, generators and their advanced drive systems
- Development of the first sensorless control and fractional-slot concentrated wound IPM machines
- Expertise in enhanced control techniques, including direct torque and flux control, mechanical sensorless control and model predictive control
- Expertise in PMSMs for application in renewable energy systems
- Expertise in the design, optimization, manufacture and testing of IPM machines with V and other shaped magnets embedded in the rotor, as well as fractional-slot concentrate wound (tooth-coil) PM machines that demonstrate very high torque and power density and deep filed weakening range

Impact

- More efficient motors and generators

Successful applications

- Development of fractional-slot IPM machines
- PWM based sensorless control
- High-speed IPM machines

Capabilities and facilities

- Finite-element packages such as Magsoft and Ansys, with optimisation tools that have been developed in-house
- Two and three-level inverters, several machine drive set-ups complete with shaft position sensors, torque sensors, highly dynamic loads
- Four-quadrant dynamometer, simulation platforms (Matlab-Simulink, PSIM), FPGA and DSP systems with high-performance signal acquisition, estimation and switch gate-drive interfaces

Our partners

- Wisconsin Electric Machines and Power Electronics Consortium (WEMPEC)
- CSIRO

More Information

Dr Rukmi Dutta

School of Electrical Engineering and Telecommunications

T: +61 (0) 2 9385 7884

E: rukmi.dutta@unsw.edu.au

UNSW Knowledge Exchange

knowledge.exchange@unsw.edu.au

www.capabilities.unsw.edu.au

+61 (2) 9385 5008

