Warsaw University of Technology, Faculty of Electrical Engineering, Institute of Control and Industrial Electronics

Research activities

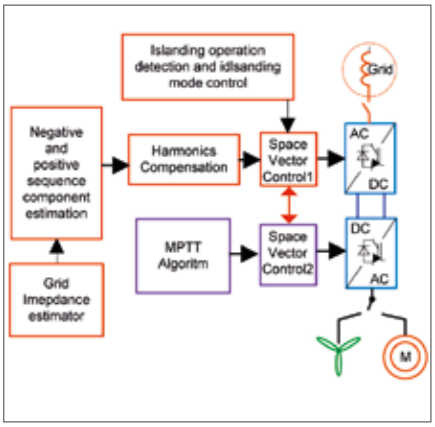
- Control of multilevel converters - active filters, rectifiers, inverters
- Converters topologies
- Power generation based on renewable energies, PV, wind turbines, ocean waves
- Adjustable speed generation autonomous and grid connected
- Autonomous Double Fed Induction Generators (ADFIG –DFIG)
- Control of microgrids
- Control of multiphase machines
- Operation of converters at distorted and unbalanced grid
- DSP and FPGA systems
- Silicon carbide devices and converters
- Reactive power compensators
- Reactive power compensation of cage induction generators
- Intelligent building control
- Artificial neural network based control of repetitive process
- ECO vehicle technologies
- Energy storage based on batteries and supercapaciotrs
- Personal Rapid Transit
- Contactless energy transfer
- Multi-oscillatory LQ regulators for a 3-phase 4-wire inverter with an L3nC output filter

Test set of generation 60 KVA system including DFIG, induction and synchronous generator driven by Diesel Engine

- Sensorless control of permanent magnet axial flux machine
- Converter control of compensation induction generator reactive power

Scientific and industrial projects:

- Single-phase 5.5kW high efficiency and transformerless DC/AC converters for PV panels
- Investigation of simplified topology for three-level NPC AC/DC/AC converter for wind turbines
- Low speed small wind turbine with energy storage module for distributed generation
- Transformerless four-leg three-level converter for renewable energy systems
- Development of AC/DC converters resistant to grid disturbances in disperse grid 5-400 kVA
- Global maximum power point searching algorithms for photovoltaic power plant connected to grid through five-level ANPC converter
- High Power Impulse Magnetron Sputtering feeders for application in semiconductor, medical and solar industry
- Application of bidirectional AC-DC-AC converter (45kW-200kW) with back-spin control for high pressure pumping stations
- Application of three-level npc bidirectional AC-DC-AC converter 800kW operating at wide range variation of grid voltage
- Smart microgrid - renewable energy sources for uninterruptible and high efficiency power supply in local grid
- Fault tolerant control algorithms of Multi-phase Energy Generation System
- Predictive control of four-legs three-level Flying Capacitors Converter for Shunt Active Power Filter
- Development of multi-objective optimization procedures for modern AC-DC converters in particular for renewable/ distributed energy systems
- Intelligent controller of 60 kVA generation system with induction generator



Power conversion systems