



SMART CITIES AND TRANSPORTATION

HEALTHY URBAN SYSTEMS

- Socioecological wellbeing
- Spacial justice
- Urban citizenship
- Heritage and cultural landscapes
- Shopping centre management
- Safe and sustainable housing and urban spaces
- Regulatory systems

SMART URBAN AND PUBLIC SPACES

- Smart grids
- Sensors
- Internet of Things
- Service delivery
- Waste collection optimisation
- ICT for sustainable development
- Information systems
- Data science
- Information architecture
- Knowledge management strategies
- Meta context of information

NEW-AGE BUILDING TECHNOLOGIES

- Alternative building materials
- Green buildings cost
- Resource efficiency
- Climate change adaptation
- Resilient and regenerative environments
- Biodiversity restoration
- Smart materials and processes
- Renewable energy systems
- Energy management in buildings
- Sustainability project management

SMART TRANSPORTATION

- Road and rail research
- Transportation infrastructure
- Geotechnical analysis
- Intelligent transportation
- Vehicle dynamics
- Autonomous and connected vehicles
- Transportation development and modelling



ENERGY

OPTIMISED ENERGY SUPPLY

- Systems engineering
- Modelling, optimisation and control
- Advanced materials
- Automation and control
- Smart materials and processing
- Life cycles of assets in power generation plants
- Reliability engineering
- Biochemical engineering, biotechnology and bioprocessing
- Performance management of power generation
- Supply and demand-side energy optimisation and management
- AI for condition monitoring
- ICT in energy management
- Assets and maintenance risk management

SUSTAINABLE ENERGY RESOURCES

- Clean energy
- Small-scale hydropower systems
- Resource efficiency in building
- Reducing water consumption for electrical power generation

The University of Pretoria's Faculty of Engineering, Built Environment and Information Technology (EBIT) is the only faculty at a South African higher education institution to house the unique combination of these disciplines in a single faculty. It is therefore in the ideal position to pursue an integrated research strategy to address the challenges of the Fourth Industrial Revolution (4IR).

EBIT RESEARCH CONTRIBUTIONS PER SCHOOL

- SCHOOL OF ENGINEERING
- SCHOOL FOR THE BUILT ENVIRONMENT
- SCHOOL OF INFORMATION TECHNOLOGY
- GRADUATE SCHOOL OF TECHNOLOGY MANAGEMENT (GSTM)

RESEARCH CONTRIBUTIONS:

www.up.ac.za/ebit – Postgraduate Studies

4IR



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA



BIG DATA SCIENCE, ICT AND TECHNOLOGY INNOVATION MANAGEMENT

ICT IN THE 4IR

- Machine learning
- Artificial intelligence (AI)
- AI for condition monitoring
- Virtual reality (VR) for mining
- VR visualisation of big data
- VR for user experience (UX) development

NOVEL TECHNOLOGY IMPLEMENTATIONS

- Learning processes
- Formal methods
- Software engineering
- Systems engineering
- Sensor and data fusion
- Performance management of power generation and distribution
- Machine health management
- Autonomous and connected vehicles
- Optimising innovation
- Risk management
- Project management

BIG DATA AND INFORMATION SYSTEMS

- Information systems
- Knowledge systems
- Data science
- Data analytics
- Intelligent logistics
- Enterprise engineering
- Supply chain modelling and optimisation
- Change management for mining
- Change management for gold and platinum
- Datasets analysis for active infrastructure
- Visual and micro-scale datasets for architecture
- Big databases for building cost and indices
- Lifecycle costing in construction

ICT AND ACCOUNTABILITY

- Cyber-security
- Digital forensics
- ICT for development
- Telecommunication technologies and infrastructure



WATER AND ENVIRONMENTAL ENGINEERING

SUSTAINABLE WATER PROCESSES

- Water utilisation
- Water reticulation networks
- Small-scale hydropower systems
- Mechanical infrastructure for the water industry
- AI for monitoring water infrastructure
- Biochemical engineering
- Bioprocessing

POSITIVE HUMAN-ENVIRONMENT INTERACTIONS

- Environmental engineering
- Clean energy
- Reducing emissions to the environment
- Reducing water consumption for electrical power generation
- Resource efficiency design
- Integrated microelectronic sensor systems for biomedical and environmental applications
- Environment behaviour studies
- Urban runoff

WATER MANAGEMENT AND OPTIMISATION

- Modelling, optimisation control
- Efficient processing into higher value products
- Reliability engineering
- Smart materials and processes
- Technology Innovation management
- Project governance

EBIT RESEARCH STRATEGY FOR THE 4IR

MINERALS AND MATERIALS BENEFICIATION

MINERALS AND MATERIALS VALUE CHAIN

- Materials beneficiation
- Minerals beneficiation
- Advanced materials and polymers
- Modelling, optimisation and control
- Efficient processing into higher level products
- Advanced processes
- Smart materials
- Geotechnical analysis for construction

MINING OPTIMISATION

- Systems engineering
- Laser cutting and microwave rock breaking technology
- Minimising noxious gases and dust creation
- Assets and maintenance risk management

