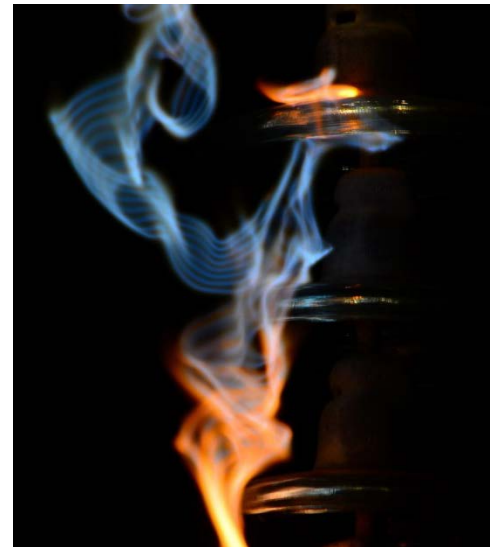




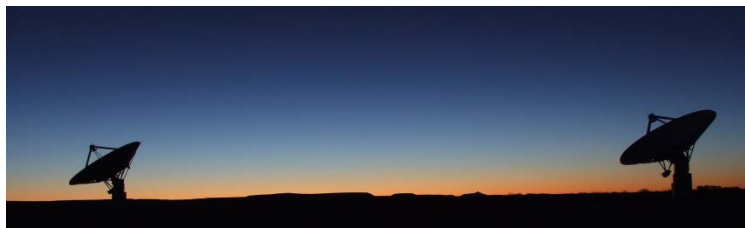
ELECTRICAL &  
ELECTRONIC  
ENGINEERING



# Research Overview

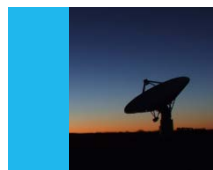


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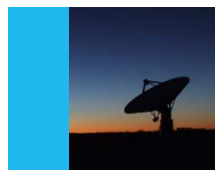
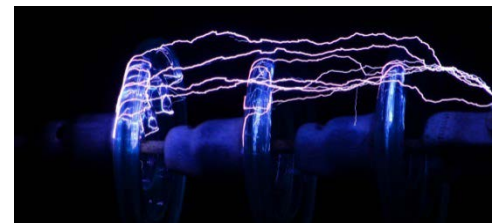
# In this presentation

- E&E Research – what is *your* field of interest?
  - *Electrical Energy Systems*
  - *Electronics & Electromagnetics*
  - *Telecommunications and Informatics*
  - *Computers & Control Systems*
- Interesting Projects
- More information



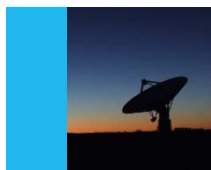
# *Electrical Energy Systems*

- Electrical Machines & Drives
- Power Electronics
- Power Systems
- High Voltage
- → Renewable Energy: PV, Wind, Storage
- → Smart grids, micro grids
- → Traction – EVs, locomotives



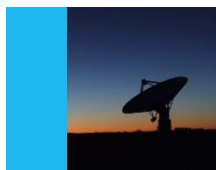
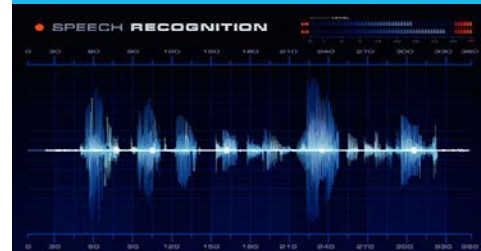
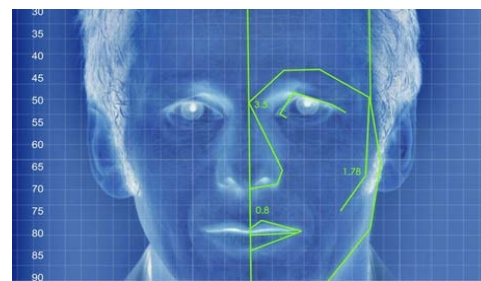
# *Electronics & Electromagnetics*

- Computational Electromagnetics
- Electromagnetic Compatibility
- Microwave Active & Passive Systems
- High Frequency Antennas
- SKA-related research
- Superconducting Devices & Sensors



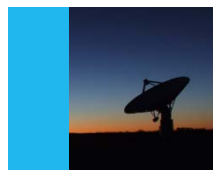
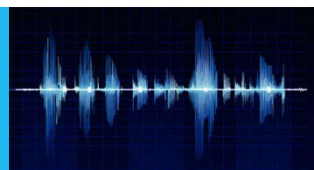
# Telecom and Informatics

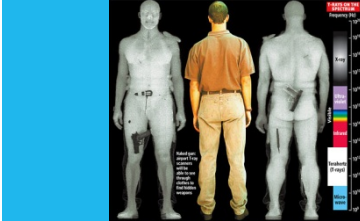
- Speech and Image Processing
- Machine Learning
- Communication Systems
- Adhoc and Wireless Mesh Networks
- Media Distribution
- Internet of Things & Distributed Systems
- Intelligent (Smart) Systems



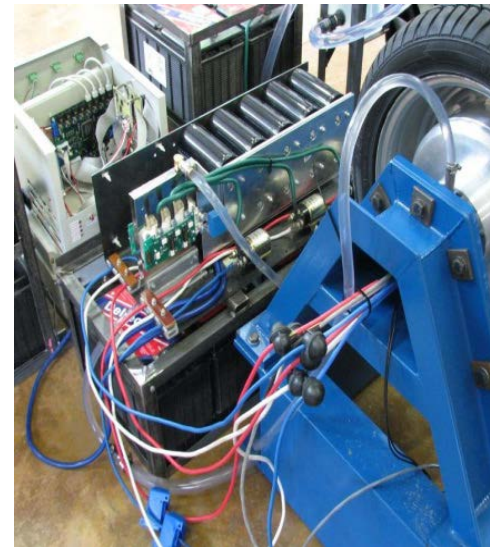
# Computers & Control

- Aeronautical Systems
- Autonomous Navigation
- Satellite Systems
- Underwater Systems
- General Control Systems
- Computer Systems
- Smart Metering





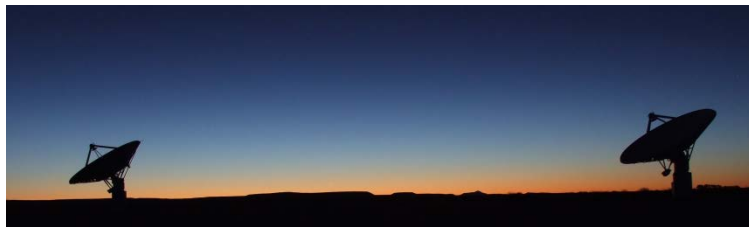
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ENGINEERING



Interesting  
projects

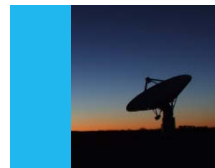


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# Electrical Energy

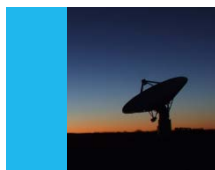
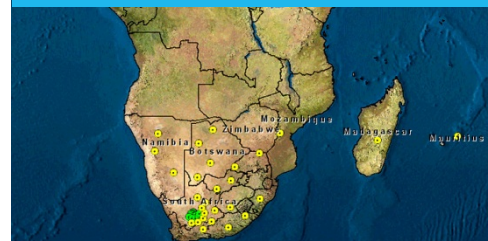
- DST/NRF Wind Energy Research Spoke
  - *Wind generator drive train technology*
  - *Grid compliance and integration*
  - *Storage technology*
- Scatec Solar Photovoltaic Systems Research
  - *Energy modelling & grid interaction*
  - *High efficiency thin film vs. S-ci modules*
  - *Inverter and storage technology*
- H2020
  - *Large geared cooling fans (Power stations/CSP)*





# Square Kilometre Array (SKA)

- SKA telescope will be the biggest radio astronomy project ever
  - *Proposed budget of US\$1 billion!*
  - *Captures 2D radio frequency images of galactic phenomena*
  - *Three hundred reflector antennas planned*
- One of two sites in the world in Karoo
- Supported by Stellenbosch E&E Dept:
  - *Electromagnetic Interference (EMI)*
  - *High frequency electronics*
  - *Electromagnetic modelling*
  - *High performance computing*



# Mobile inter-animal communication network

- Protection

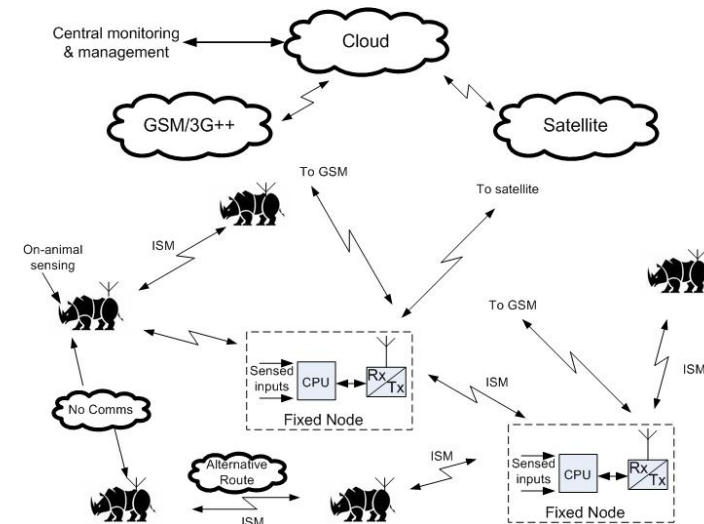
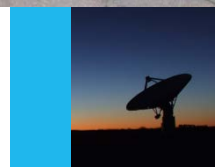
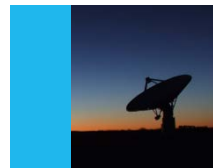


Fig1  
Rhinonet: Machine Learning Based Adhoc WSN



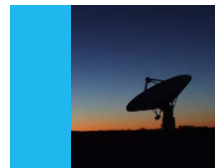
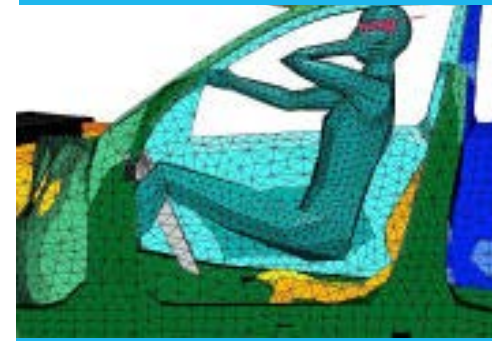
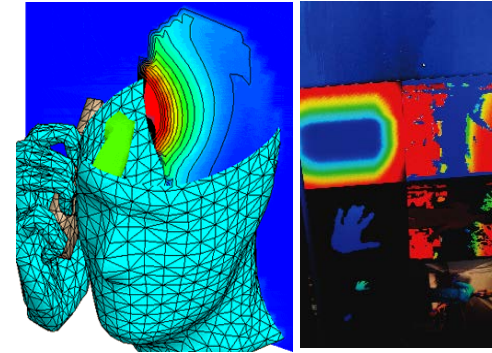
# Unmanned aerial vehicles

- Application of computer & control systems
- Involves automating all aircraft types
- Applications
  - *Power line inspection*
  - *Crop inspection & spraying*
  - *Surveillance & policing (eye in the sky)*
  - *Search & rescue*
- E&E operates a fleet of aircraft:
  - *Helicopters, fixed-wing, aerobatic, quadrotors, etc*



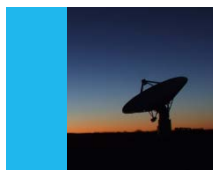
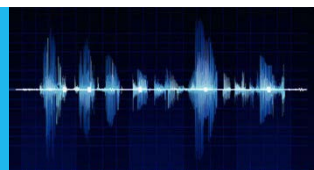
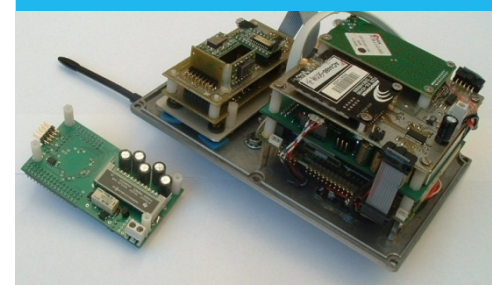
# Research Commercialisation

- InductEx
  - *superconductors & nano-electronics*
- CustosTech
  - *Novel Anti-Piracy approach using cryptocurrency*
- S-Plane Automation
  - *aerospace and defence company specialising in product supply and development of autonomous systems and related subsystems*
- BridgloT
  - *Intelligent Geyser/Water Metering*
- CubeSpace
  - *develops components for microsatellites*



# Strong industry ties

- The Square Kilometre Array:
  - with SKA SARCHI chair
- Airbus:
  - with collaboration projects in 3 different European countries
- MTN:
  - through MTN Mobile Intelligence Lab
- Eskom, Scatec, ABB
- H2020 industries



# More information

- Mobile-friendly website
  - [ee.sun.ac.za](http://ee.sun.ac.za)
- Facebook page
  - [goo.gl/njFIP](http://goo.gl/njFIP)
- Contact us!
  - *Dr Herman Engelbrecht*
  - *Postgraduate Coordinator*
  - *021-808-2139*
  - *hebrecht@sun.ac.za*

