Satellite Development and Research at Stellenbosch University and the Cape Peninsula University of Technology

Introduction

Stellenbosch

CPUT

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Cape Peninsula University of Technology

F'SATI
French South African Institute of Technology

Jan-Hielke Le Roux

Ifriky Tadadjeu Sokeng

November 2014

Introduction

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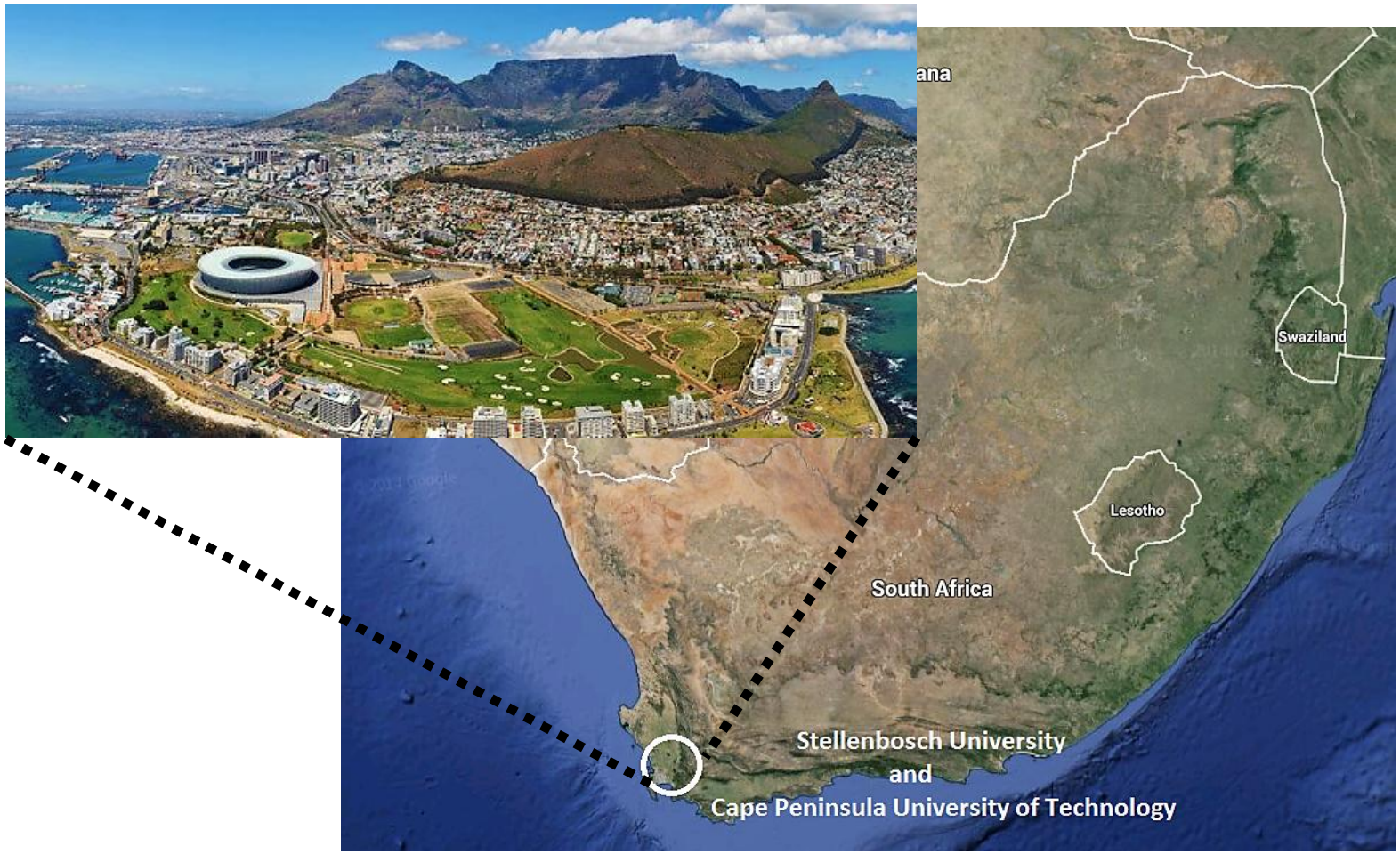
Stellenbosch University (SU) and Cape Peninsula University of Technology (CPUT) are the two largest academic institutions focusing on satellite research and development in South Africa.



Stellenbosch Satellite Missions

- SunSat (1999) – South Africa's first satellite
- SumbandilaSat (2009) – South Africa's second satellite

Current Projects

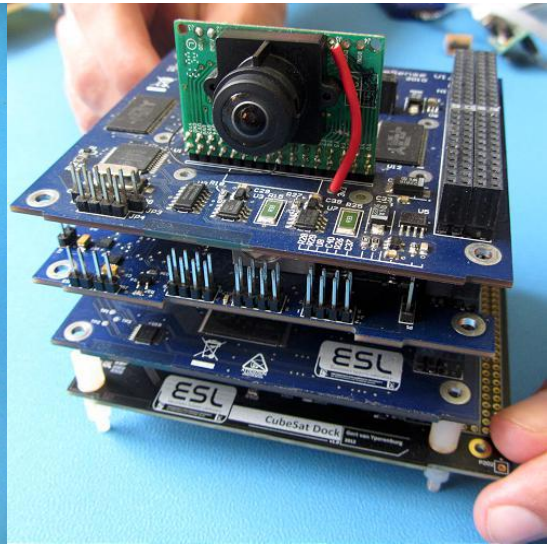
- ZA-AeroSat – QB50

(F'SATI supplies comms payload – TT&C transceiver (CMC) and deployable antenna system)

- 15 ADCS bundles for QB50
- CubeSail – Collaboration with SSC
- DeOrbitSail – FP7 EU project
- RemoveDebris – FP7 EU project

Stellenbosch CubeSat Components

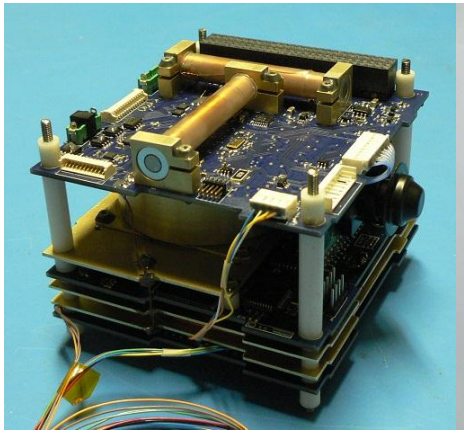
- **CubeComputer**: An ADCS OBC
- **CubeSense**: Attitude sensors
- **CubeControl**: Attitude actuators
- **CubeStar**: A star tracker
- **CubeTorquer:** Magnetic actuation
- **CubeWheel:** Attitude control

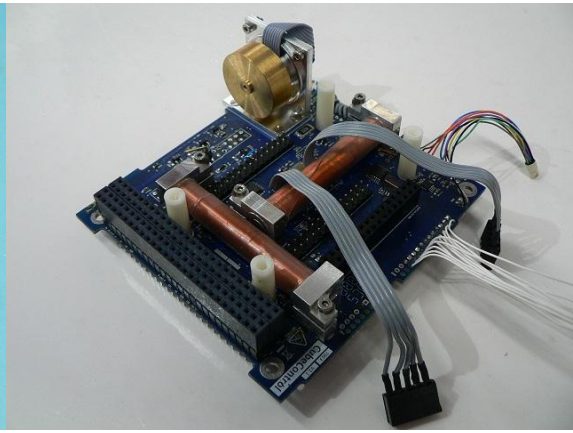


UNIVERSITEIT STELLENBOSCH UNIVERSITY

Stellenbosch Postgraduate Projects

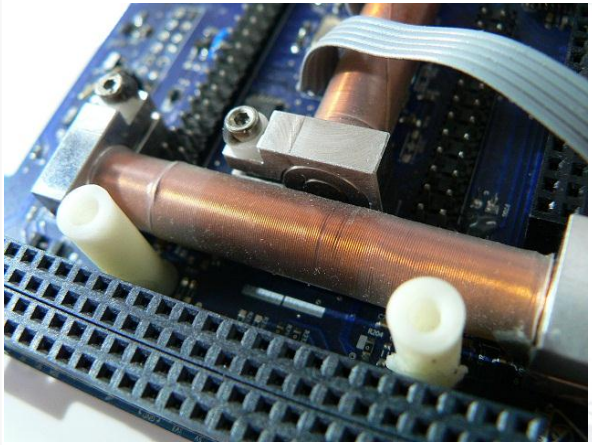
- Procedures and principles for cost-effective and reliable radiation testing of COTS components for use in South African satellite applications.
- Deployment and control of a spinning solar sail CubeSat.
- Ultra-fine pointing AODCS for an astronomical applications.
- Advanced ADCS for agile small LEO satellite.

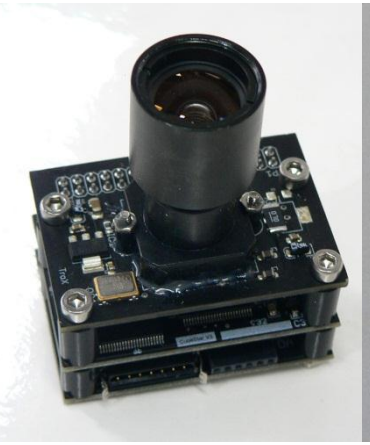




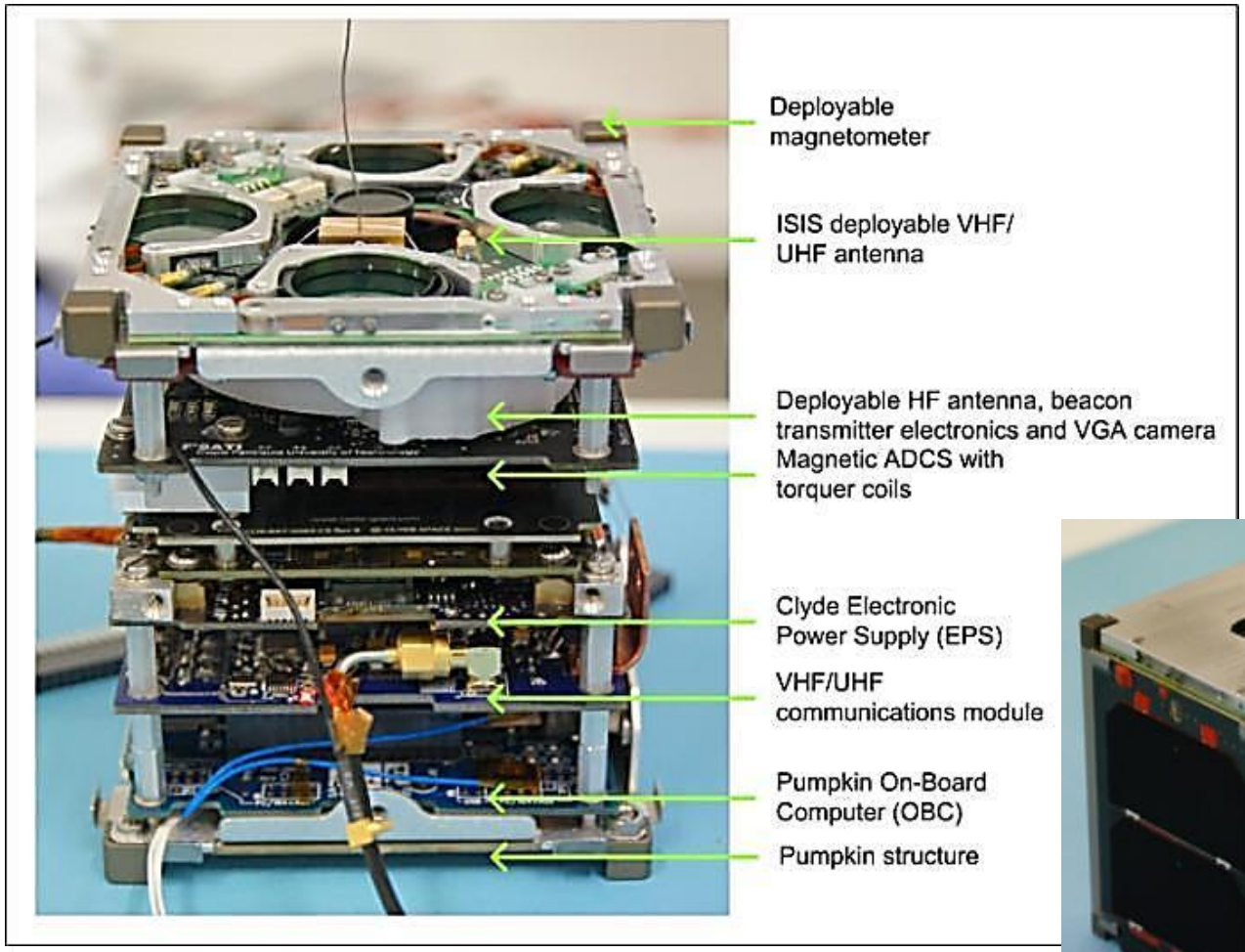
Stellenbosch Postgraduate Projects

- Design and development of a flight software framework for a nano-satellite.
- Development of ADCS and HIL testing of a 3-axis stabilised CubeSat.
- GPS propagation for a CubeSat.
- Development of a control moment gyro for a CubeSat.





TsepisoSat layout



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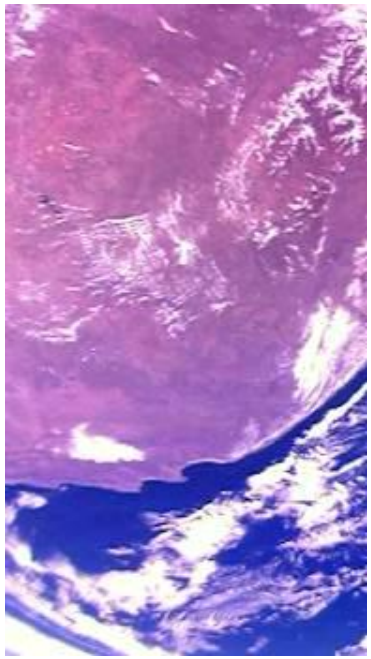
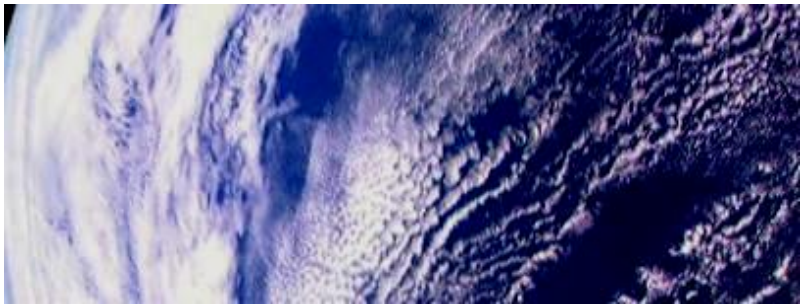
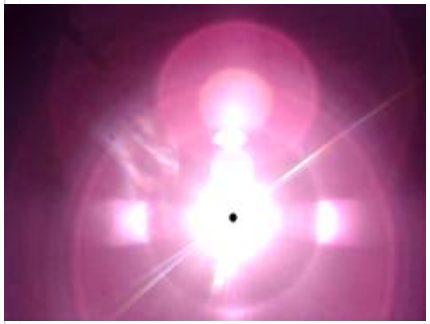
TsepisoSat Images







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TsepisoSat Telemetry

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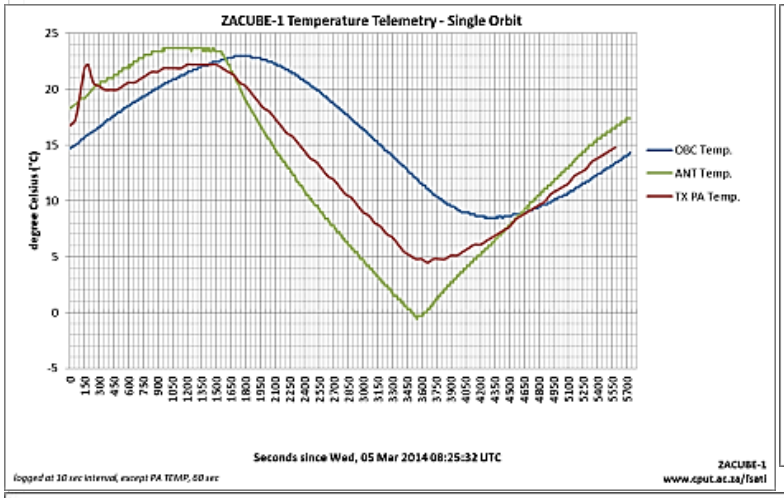
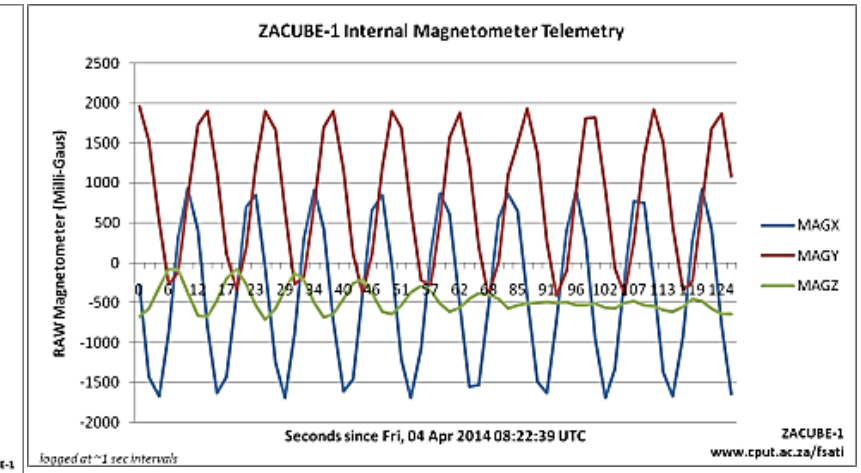
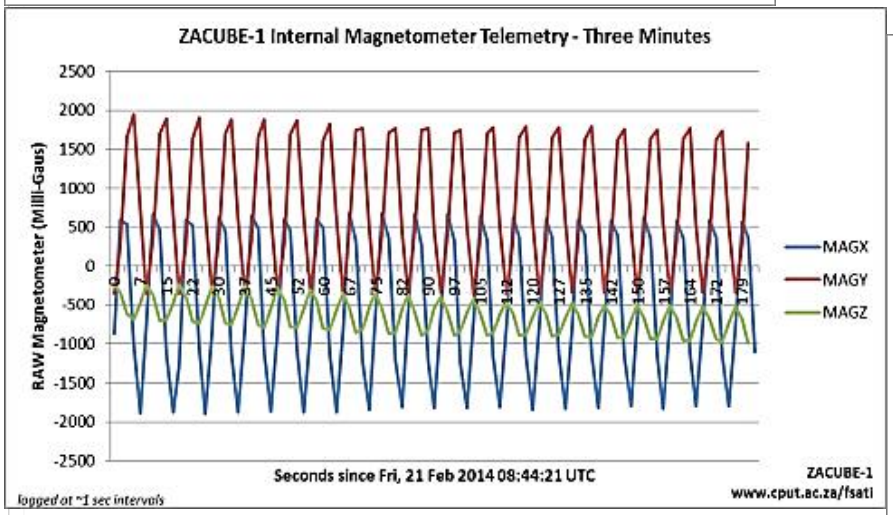
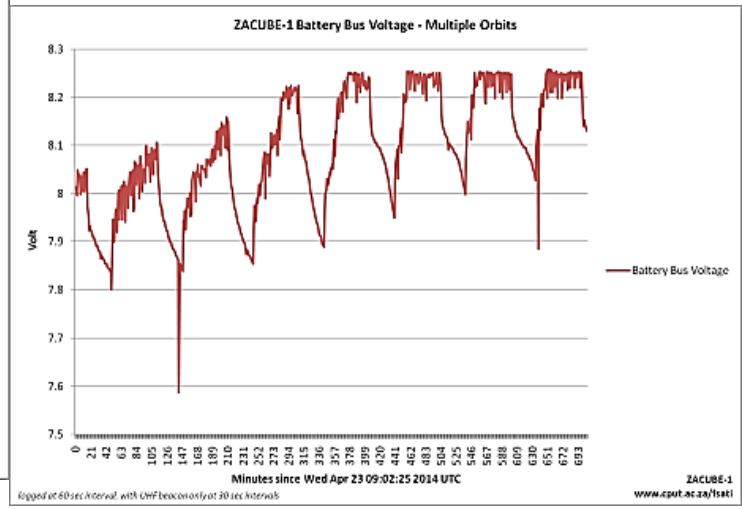




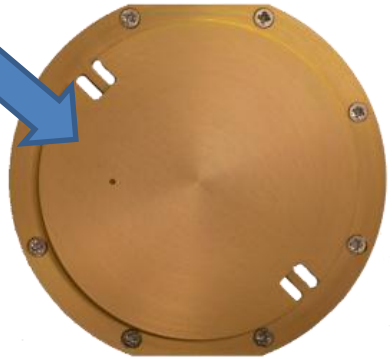




Cape Peninsula University of Technology

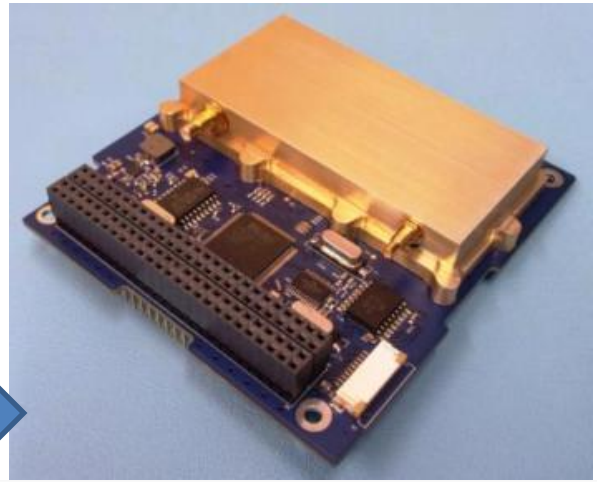
CPUT/F'SATI products

S-band shorted annular ring patch antenna



S-band transmitter for large amounts of payload data

UHF / VHF transceiver for telecommand / telemetry



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BURSARIES & SCHOLARSHIPS

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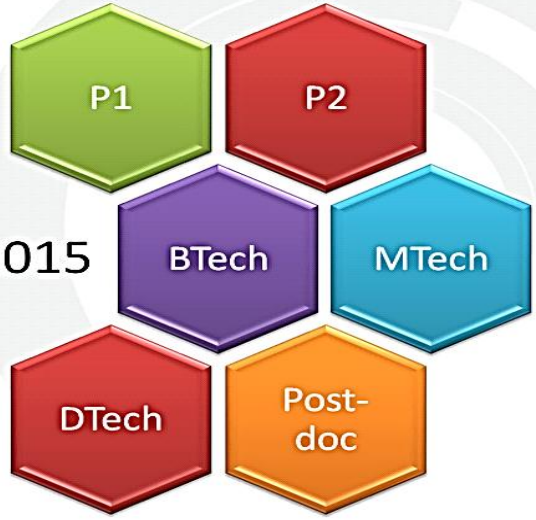
Departments: Electrical, Quality, Mechanical

in 2015



- Satellite communications
- Applied Electromagnetics, including Antennas
- Attitude determination and control
- Data security
- Remote sensing
- Space weather and radiation
- Industrial Engineering and Quality Management

AFRICA SPACE INNOVATION CENTRE In partnership with:

CENTRE FOR INSTRUMENTATION RESEARCH | INDUSTRIAL SYSTEMS ENGINEERING | ELECTRICAL, ELECTRONIC AND COMPUTER ENGINEERING

Thank you

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ESL
Electronic Systems Laboratory

F'SATI
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