

UNISEC-SAR (Southern African Region)

The Third UNISEC-Global Meeting July 3-5, 2015, Tokyo, Japan

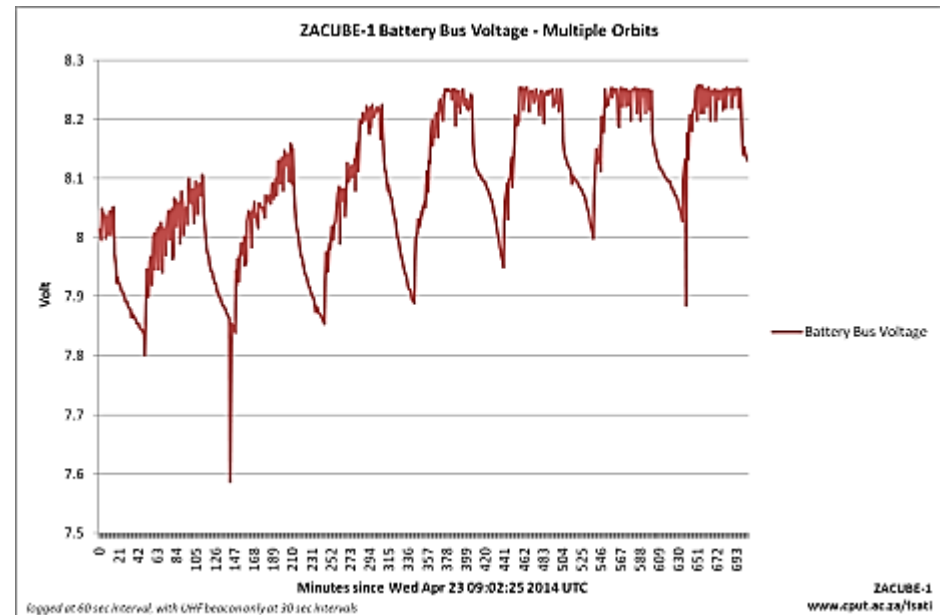
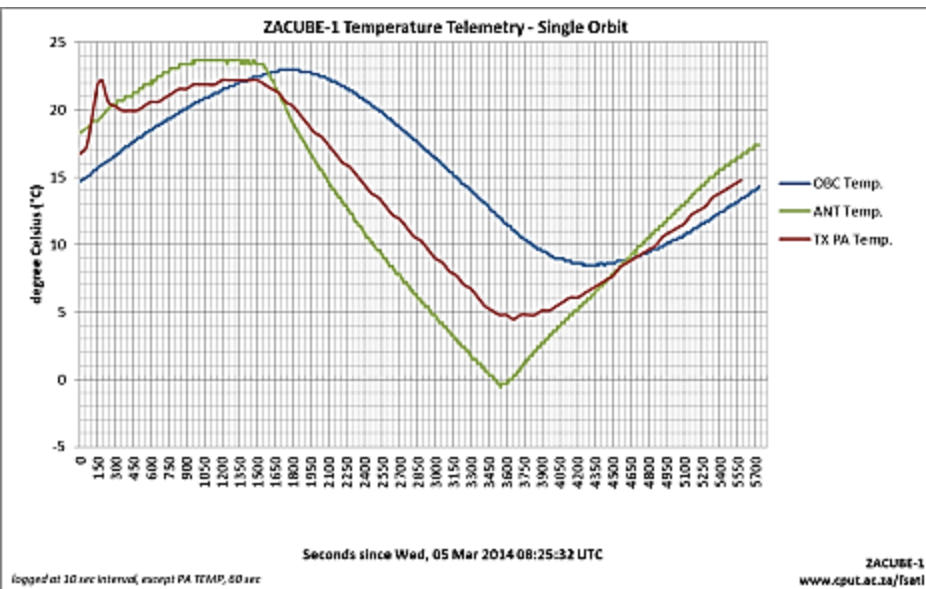
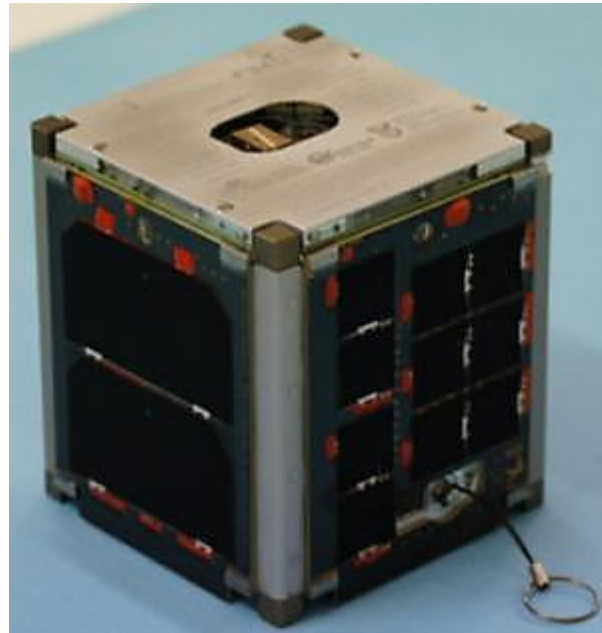
Presented by:
Morné Roman

Introduction



TshepisoSat

21 June - 19 Months in space





Cape Peninsula
University of Technology



F'SATI
French South African Institute of Technology **space**

Francois Visser

Renier Siebrits

Jacques Kleynhans

Jean Bester

Nyameko Royi

Leon Steenkamp

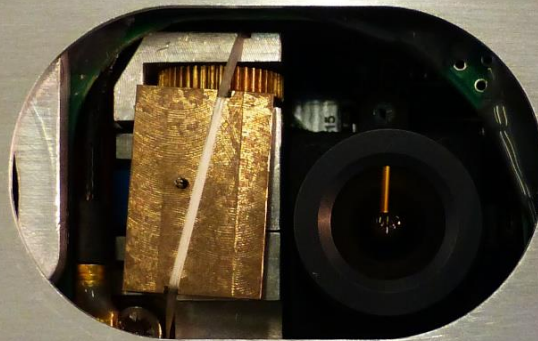
Jason Quibell

Charl Jooste

Daniel de Villiers

Patsa Khotso

ZACUBE-1



Robert van Zyl

Ian van Zyl

Siyabonga Copiso

Lee-Anne McKinnell

Pierre Cilliers

Ben Opperman

Roger van Schie

Lindsay Magnus

Theo Marnewick

Louis Steytler



National
Research
Foundation



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

The South African National Space Agency (SANSA) is proud to be a part of this august scientific journey of discovery and look forward in anticipation for the results borne forth from the passion, dedication and expertise of our local scientists, researchers, engineers and students. This may be a small step for South Africa, but it is certain to inspire a large transformation of our space technologies and education.

Dr Sandile Malinga, SANSA CEO

Products



S-band shorted annular ring patch antenna



S-band transmitter for large amounts of payload data

UHF / VHF transceiver for telecommand / telemetry



CubeSat S-Band Transmitter

Part number: CS-CPUT-STX-01

Cost: £10,000.00

The STX is a compact S-Band Transmitter designed for CubeSat missions. It is compatible with the CubeSat standard, with a CubeSat Kit PC104 form factor. The STX implements QPSK modulation with transmission data rates of up to 2 Mbps.

The STX is ideal for space missions where a high data-rate downlink is needed. The STX uses an open network encoding scheme based on the IntelSAT IESS-308 specification which makes this product compatible with low-cost commercial receivers.



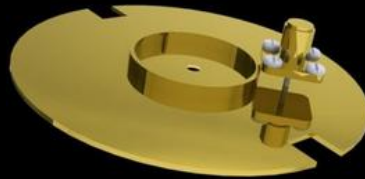
ZOOM 

S-Band Patch Antenna

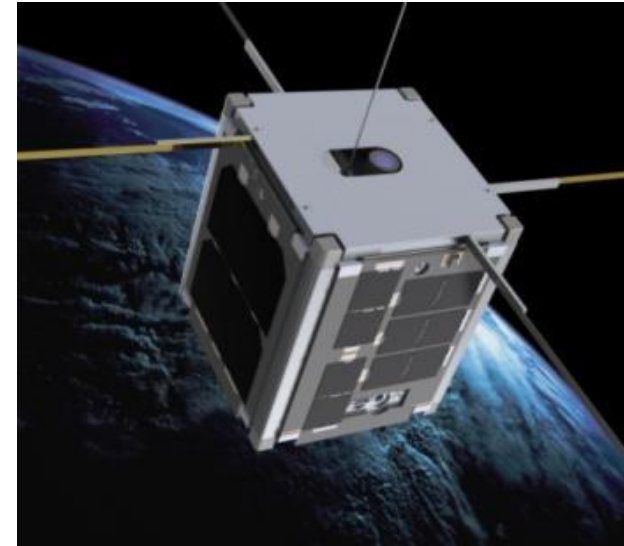
Part number: CS-CPUT-STX-02

Cost: £5,000.00

The S-Band patch antenna can easily be mounted on the nadir facing side of the CubeSat. A wide beamwidth ensures satellite communication from low elevation angles without the need to point the satellite. The antenna exhibits a good input reflection coefficient which allows for efficient radiation of up to 2 W of RF power.



ZOOM 



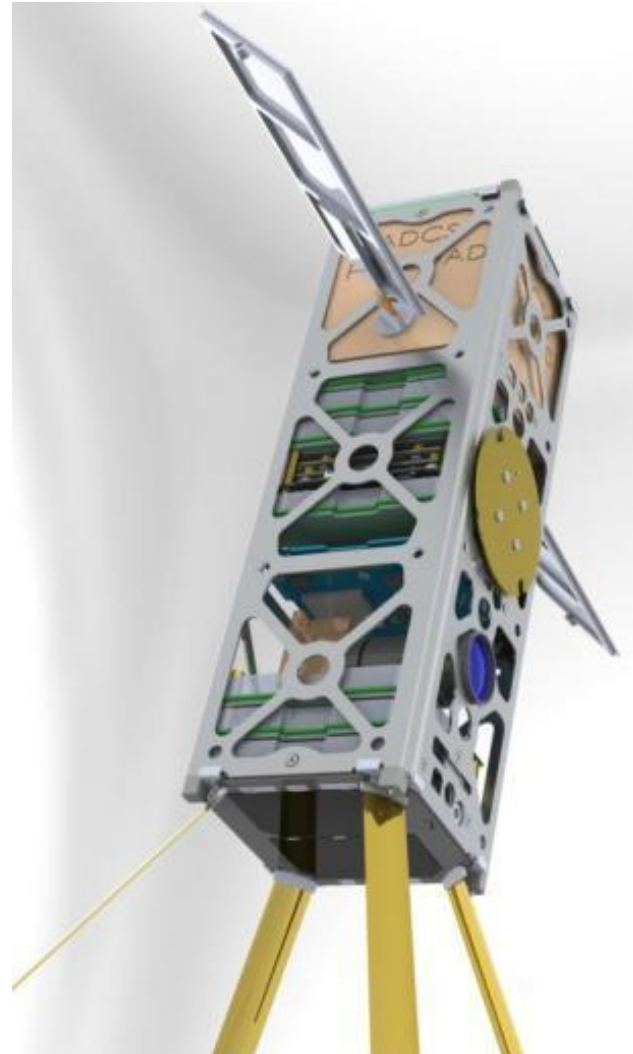
ZACUBE-1

Exhibited at IAC '11

To launched 2013

ZACUBE-2

- S-Band Transmitter
- ADCS System
- L-Band Receiver
- VHF/UHF Communication System
- HF Beacon Payload
- Space Weather experiment tbd
- 5 MP Camera Payload



Student activities at CPUT

- Obtained Amateur radio licenses
- French courses
- Visit to SALT



ESL activities at US



- 3 Year EU FP7 project “DeOrbitSail” was completed end of 2014.
- 3 Year EU FP7 project “RemoveDebris” started end of 2013 and will be completed end of 2016.
- Participated in the development of “CubeSail” a 16 sqm solar sail 3U CubeSat with the Surrey Space Centre at the University of Surrey in the UK.
- Responsible for Africa’s only contribution “ZA-AeroSat” (a 2U CubeSat) to the European sponsored QB50 project

Mtech / MsC research focus areas



- Nano-satellite technology platform – CubeSats
- Research domains:
 - Communications
 - Computer and Embedded
 - Power
 - Space science
 - EMC
 - Sensors
 - Earth observation

Partnership Universities



- US and CPUT
- Planned involvement of UWC , WITS and UCT
- Plan to include students from Namibia, polytechnic. University in Kenya, Angola and Ghana

CanSat launch with weather balloon

Release mechanism triggers separation from balloon

After separation the parachute opens and the CanSat descends while transmitting sensor data

Functionalities of the CanSat?

The CanSat communicates subsystem and sensor data back to the ground via an RF link. Typical sensor data are temperature, pressure, images from camera, GPS coordinates and humidity.

Afri-CanSat

Satellite in a can

CanSat stack	Sensor Board	Camera Board	UHF antenna
Electrical Power Board - 4.2V LiPo - 3.3V regulated - USB port charging	- digital pressure sensor with integrated temperature - analogue temperature	- VGA camera	
Microcontroller Board - PIC24 micro - SD card - RTC timestamp			
Ground station receiver - 433 MHz transceiver - receive sensor data from CanSat - display data on visualisation software			
		GPS Board	Communications Board - 433 MHz - 9600 bps - 10dB(10mW) RF power

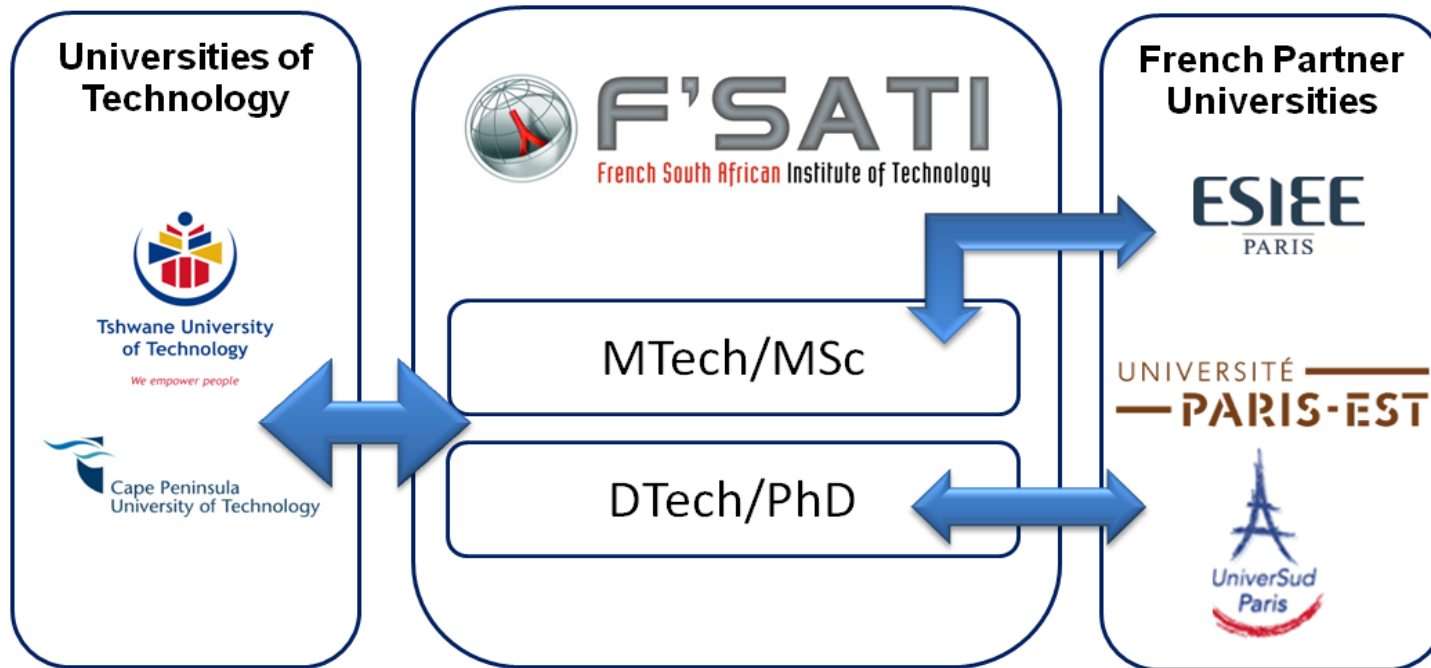
F'SATI
Frees State Institute of Technology

Cape Peninsula University of Technology

CPUT outreach program



Multi-National Institute



Multi-National Institute



the dti

Department:
Trade and Industry
REPUBLIC OF SOUTH AFRICA



UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

UF | UNIVERSITY of
FLORIDA

CAL POLY



Studying opportunities



F'SATI
French South African Institute of Technology



BURSARIES & SCHOLARSHIPS

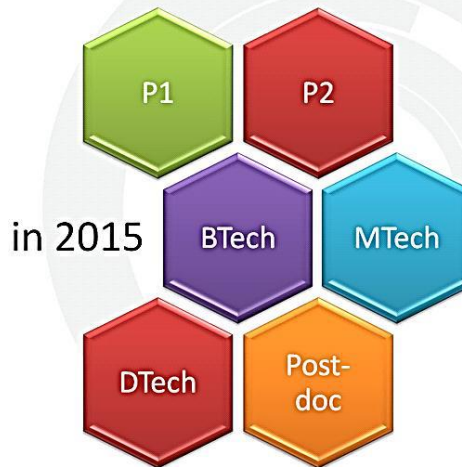
SPACE PROGRAMME

BE PART OF A WORLD-CLASS PROGRAMME!

WE OFFER EXPERT SUPERVISION, STATE-OF-THE-ART FACILITIES AND AN EXCELLENT CAREER PATH IN THE SOUTH AFRICAN SPACE INDUSTRY

Departments: Electrical, Quality, Mechanical

APPLY BY 31 OCTOBER!
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- 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

New Electrical Engineering building at CPUT



New Electrical Engineering building at CPUT



United Nations/South Africa Symposium on Basic Space Technology "Small Satellite Missions for Scientific and Technological Advancement"

Cape Town, South Africa, 1-4 September 2015

Topics

- Space Technology Development and Capacity Building in Basic Space Technology Development with a focus on Africa
- Applications of Small Satellite Missions
- Long-term Sustainability of Outer Space Activities



Thank You!!!