

# UNISEC Southern Africa Region Activities

## Members

Stellenbosch Univ

CPUT

UCT

NUST

Angola NOSA

NMU (New)

by  
Arno Barnard (PoC)



Electronic Systems Laboratory  
Department of Electrical & Electronic Engineering  
Stellenbosch University

October 2022

## Members

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Angola NOSA

NMU (New)

- Stellenbosch University (SU)
- Cape Peninsula University of Technology (CPUT)
- University of Cape Town (UCT)
- Namibian University of Science and Technology (NUST)
- Angola (Angolan National Office for Space Affairs)
- Nelson Mandela University (NMU)



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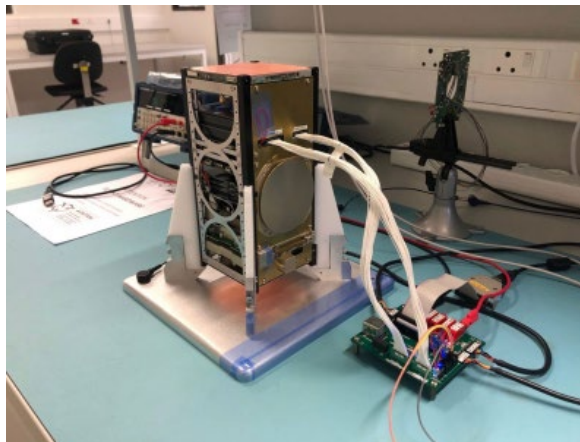
NUST

Angola NOSA

NMU (New)

# CPUT

- MDA-Sat Constellation – First 3 Satellites Launched 13 Jan 2022
  - Upgraded AIS receiver payload from ZACube-2:
    - Over the air upgrades
    - Raw data capture for diagnostics and signal interference
    - Long Range AIS via two channels
    - More effective messaging scheme to optimize the use of the data transmitter's bandwidth.



# UCT



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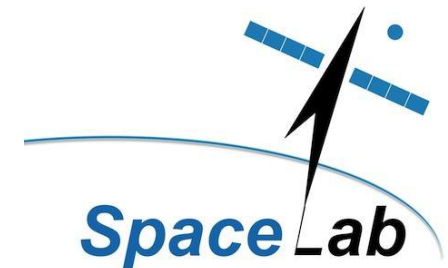
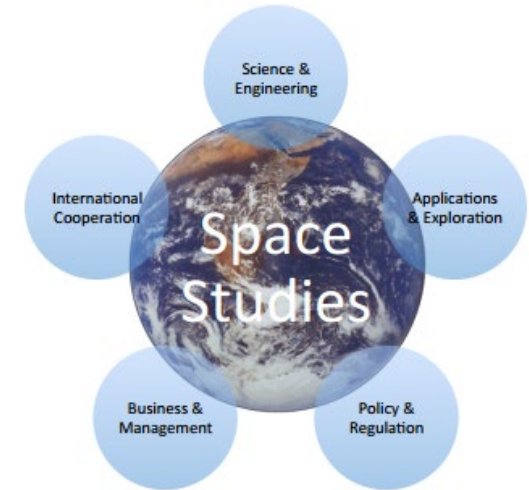
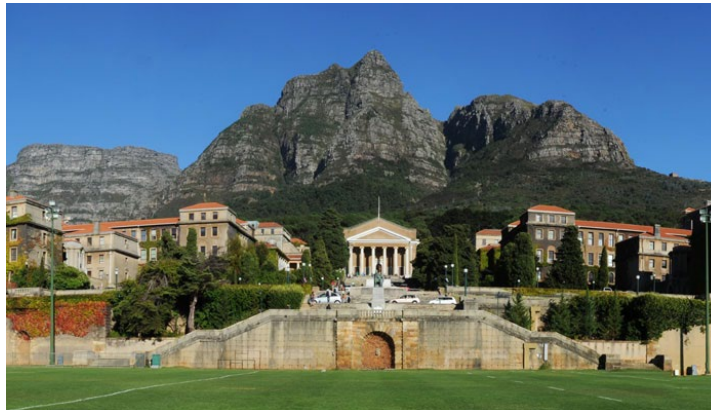
UCT

NUST

Angola NOSA

NMU (New)

- Offers MPhil in Space Studies
- Focus not only Satellite Engineering but also on regulation, space law aspects and orbital debris
- Recent research towards Synthetic Aperture Radar (SAR) for Small Satellites



# Angola - NOSA

- AngolaSat 1 lost – infant mortality
- Zolana on LinkedIn: “After four years of hard work and setbacks, today, October 12, we successfully launched satellite ANGOSAT-2. The Solar panel rotated to the sun, and we fully control ANGOSAT-2. All satellite subsystems are nominal, and we will keep you posted”

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# Nelson Mandela University – New Member

- 15 Years working in Radiation effects mitigation
- Space based FPGA systems
- Post-Doc = MIC 1 – Participant
- New research on degradation of space materials

NELSON MANDELA  
UNIVERSITY

**Mechatronics**

## Members

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Angola NOSA

NMU (New)

- 30 Years of satellite development
- Offers MEng (Research), PhD in Satellite systems
- Research Focus on Satellite hardware, Control Systems, Radiation effects testing
- Graduates are satellite engineers in most South African space companies



AAC SPACE AFRICA



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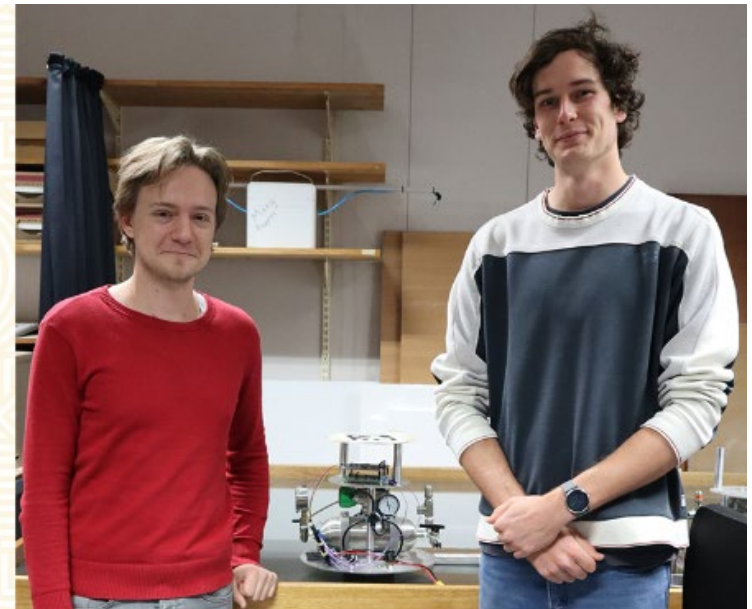
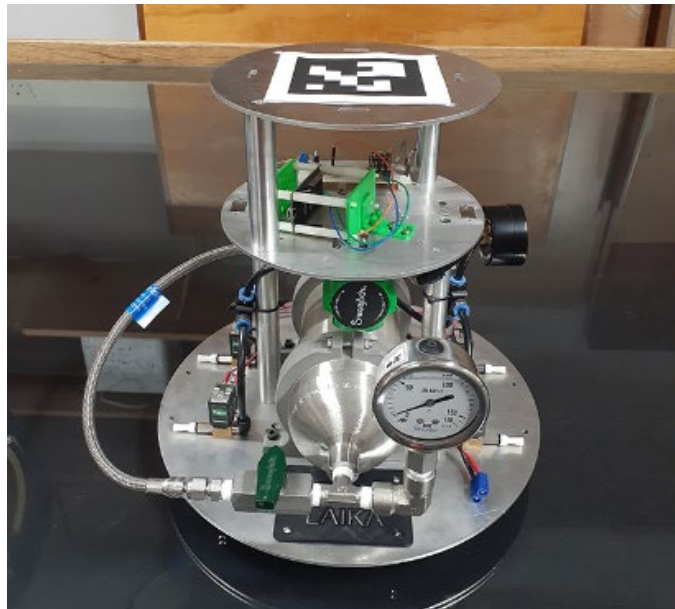
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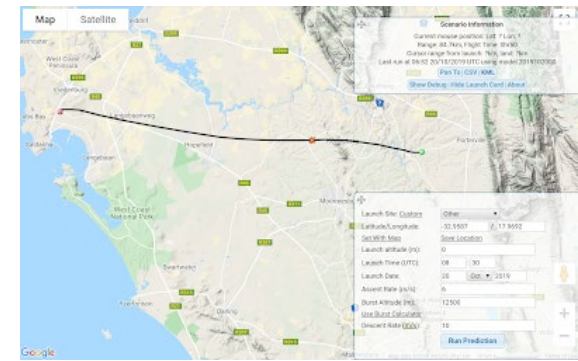
NMU (New)

- New planar air bearing facility
- Test bed for spacecraft and space systems
- Two air-bearing vehicles *Laika* and *Belka*



# Stellenbosch University – Balloonsats 2018-2021

- Started 2011 with one student!
- Practical experience of building and launching a satellite payload



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# SU – Short Courses in Satellite Technology

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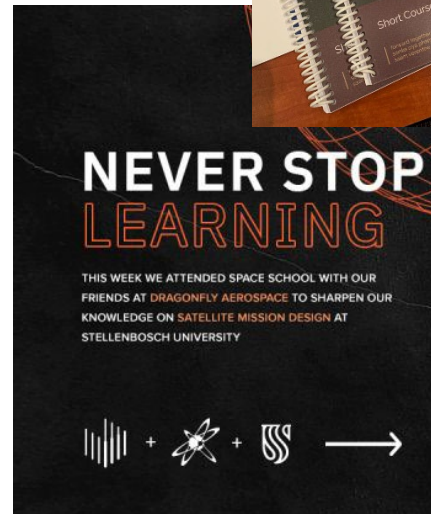
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NMU (New)

- Reincarnation of 12-Week Satellite System Course
  - To provide the needs of industry
  - Part 1 = 3-day Introduction to Satellite Mission Design
  - Customized versions planned for 2023
- Presented 3 times
  - March 2022
  - May 2022
  - Nov 2022
- 50+ Participants
  - 5 Students
  - 6 Companies



# SU – DockSat Project

## Members

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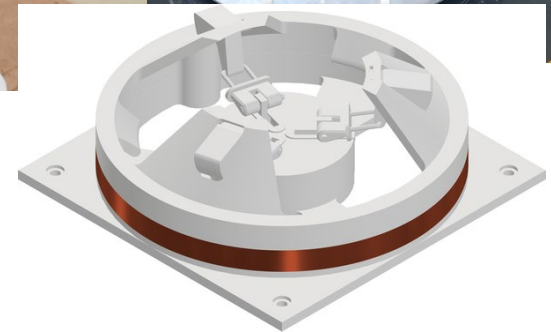
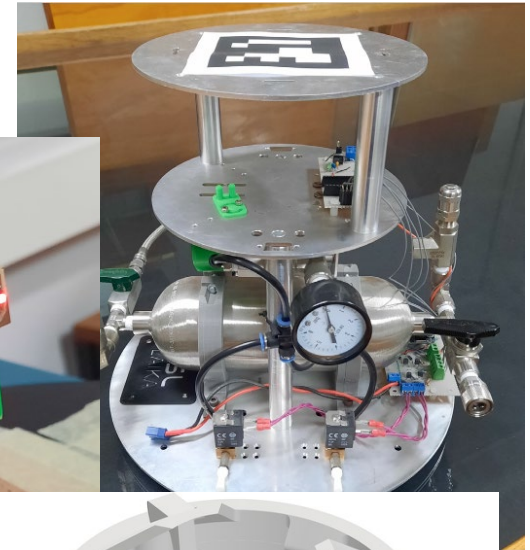
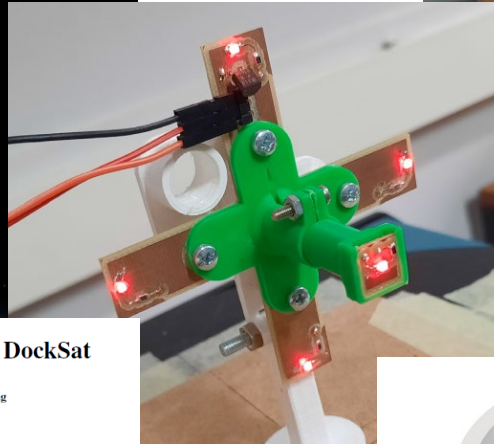
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NMU (New)

- To demonstrate in-orbit nano satellite docking/undocking
- 2nd place: IAF-CSA Space Universities CubeSat Challenge**



## Miniaturizing Docking and Undocking through DockSat

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**Abstract**—This project involves a 2U and 1U CubeSat that are launched together. The CubeSats are initially attached using a novel docking mechanism. The CubeSats will separate after being released from the deployer followed by rendezvous and re-docking maneuvers with one another. Multiple undocking and re-docking demonstrations will be attempted, with increasing separation distance between the satellites at each iteration.

Docking demonstrations will commence once the joined satellites have been deployed from the CubeSat deployer, and both chaser and target have been fully commissioned. Both the 1U target and the 2U chaser will have a docking interface. An undocking and re-docking experiment will involve an initial satellite

## TABLE OF CONTENTS

1. INTRODUCTION.....	1
2. SYSTEM DESIGN.....	2
3. DOCKING MECHANISM.....	4
4. RENDEZVOUS ANALYSIS.....	6
5. CONCLUSION.....	8
REFERENCES.....	8
BIOGRAPHY.....	9

# Recent UNISEC-Global Activity

- Host of 22<sup>nd</sup> UNISEC-Global Virtual Meeting: 18 June 2022

**22nd Virtual UNISEC-Global Meeting**

Host: UNISEC-SAR (South African Region)  
Time: 22:00 - 24:00 (JST)  
June 18, 2022

Moderator & Opening Remarks: **Arno Barnard**, Stellenbosch University

**PRESENTATIONS**

**Ivandro Rodrigues**, GGPEN-Angolan Space Office  
Topic: GGPEN Satellite Activities

**Robert van Zyl**, AAC SPACE AFRICA  
Topic: The Africa we want - how can nanosatellites contribute

**Mike-Alec Kearney**, CEO CubeSpace Satellite Systems  
Topic: TBD (Pre-recorded Presentation)

**Khalid Manjoo**, CEO of Astrofrica Technologies  
Topic: Astrofrica's 2020 Space Internship Program - A model for skills development and uptake into the Space sector

**Johan Erasmus**, ISISPACE South Africa Branch Manager & Systems Engineer  
Topic: ISISPACE Enabling offerings for HCD and Mission Success

**BREAKOUT SESSION**  
All Participants  
Moderator: TBC

**ANNOUNCEMENT & CLOSING**  
**Rei Kawashima**, UNISEC-Global  
and those who have announcements

*Themes: Satellite Engineering Training in Southern African Region: the impact of Universities, Industry, and Government*

[HTTP://WWW.UNISEC-GLOBAL.ORG/VIRTUAL-MEETING-HTML](http://www.unisec-global.org/virtual-meeting.html)

- Participant at CLTP11: 17-31 August 2022

**CLTP11**  
THE 11<sup>th</sup> CANSAT LEADER TRAINING PROGRAM

Hands-on training  
**August 17-31, 2022**  
Nihon Univ., Japan

**Participation fee**

Academic: 390,000 yen  
(about 3,100 USD)

Corporate: 600,000 yen  
(about 4,700 USD)

**Application Due**  
18, May 2022

**Notification**  
8, June 2022

# 2023 Plans

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NMU (New)

- . NUST
  - . Technical workshop on nanosatellites
  - . Date: TBD
- . SU
  - . Training
    - . Short Course on Mission Design – 13-15 February
    - . CLTP Africa – Oct/Nov
  - . Projects
    - . BalloonSats – Oct, 3+ student projects, Industry?, Schools?
    - . DockSat
    - . ESL Groundstation upgrade
- . UNISEC-SAR Seminar
  - . Platform for members to share activity information
  - . Date: TBD

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Angola NOSA

NMU (New)

# Thank you



## UNISEC-SAR POCs



Arno Barnard  
South Africa



Zolana Joao  
Angola



Smita Francis  
Namibia