Student Representative Talk

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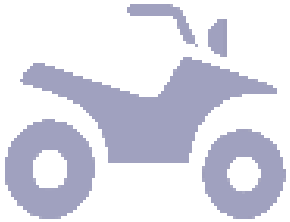
Stellenbosch University

Electronic Systems Laboratory

Aeronautical Systems



Terrestrial Systems

Space Systems

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Star Tracker and Stellar Gyro

Gabriël Roux

Table 8.1: Improved CubeStar Specifications

	Specification	CubeStar
Accuracy	(3σ) Cross-axis	0.0117°
	(3σ) Round-axis	0.0342°
	Catalogue Size	410
	Sensitivity	Up To 3.8 Mv
Physical	Mass	87 g
	Size	$50 \times 35 \times 70$ mm
Power Supply	Supply voltage	3.3 V
	Average Power Usage	277 mW
	Peak Power Usage	400 mW

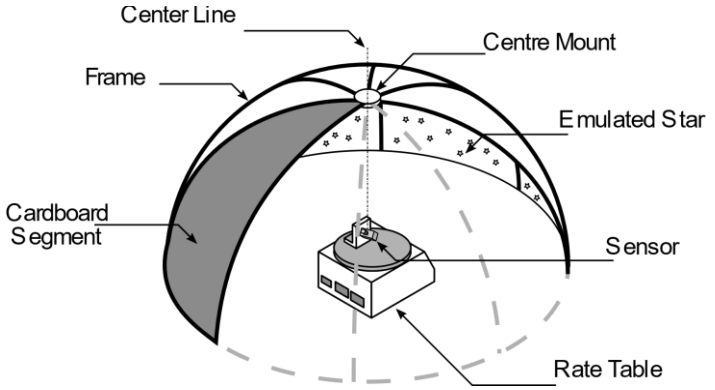


Image: Hardware test environment

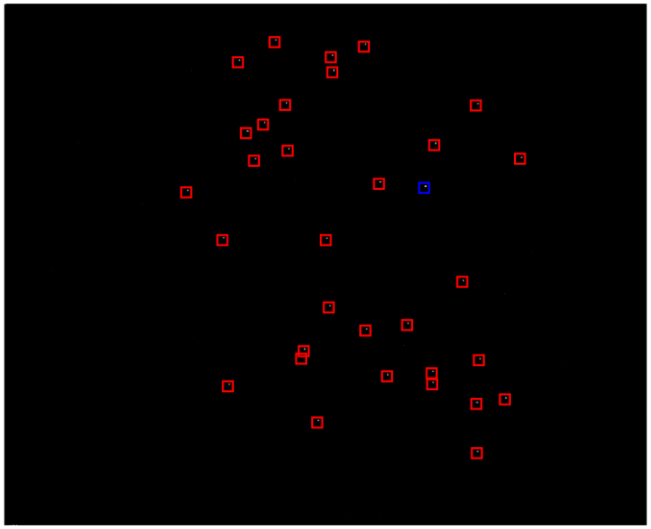
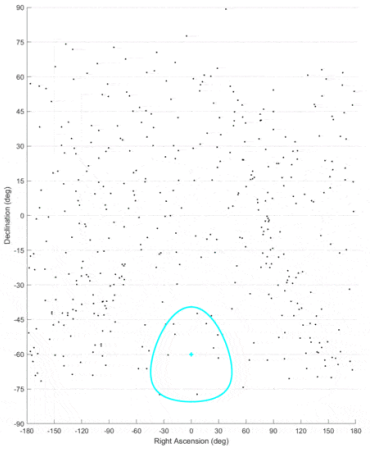


Image: Star Tracking



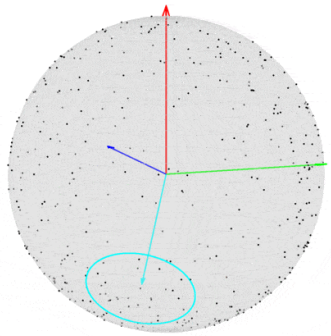


Image: Mapping Starts

Deployment Mechanism for a Spinning Solar Sail

Luke Hibbert

- Passive Deployment
- State estimation of booms without direct measurement
- Scalable solution with accompanying dynamic system model

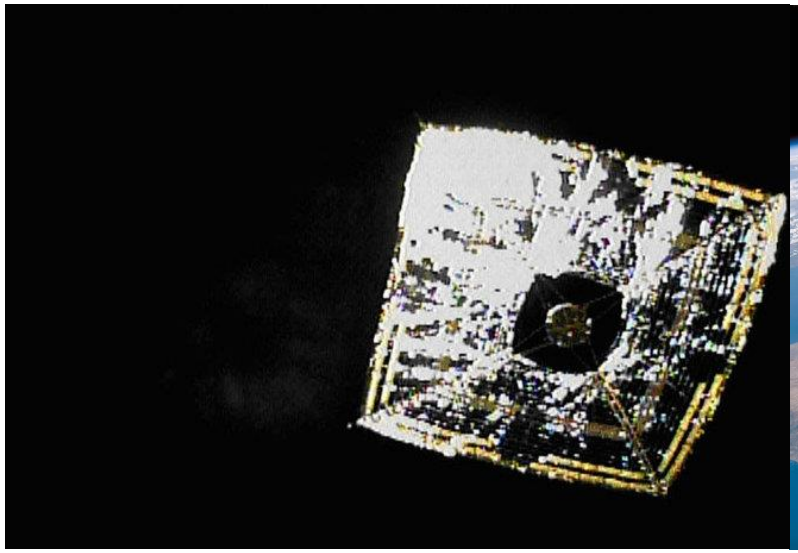


Image: IKAROS - JAXA

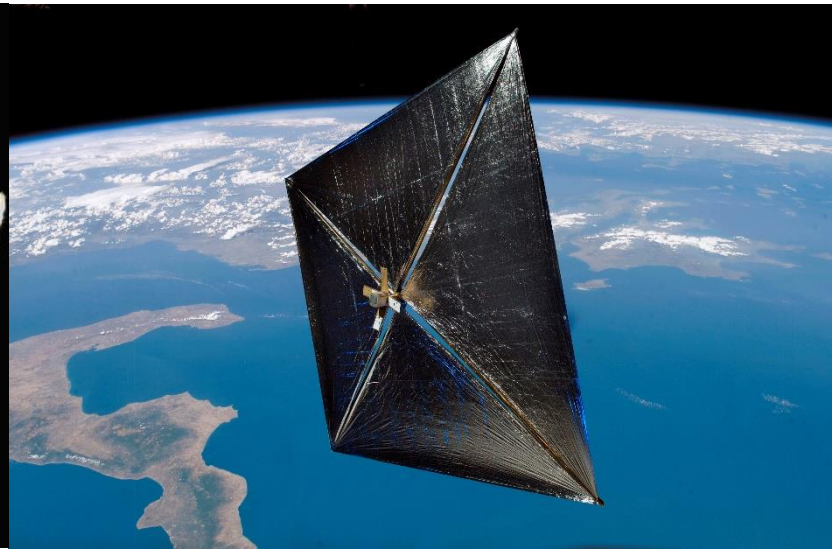


Image: LightSail – Planetary Society

Dark Vessel Detection

Francois Nicolaas Lombard

- AIS and optical payload on-board a CubeSat constellation
- Identify illegal fishing vessels in the EEZ of RSA

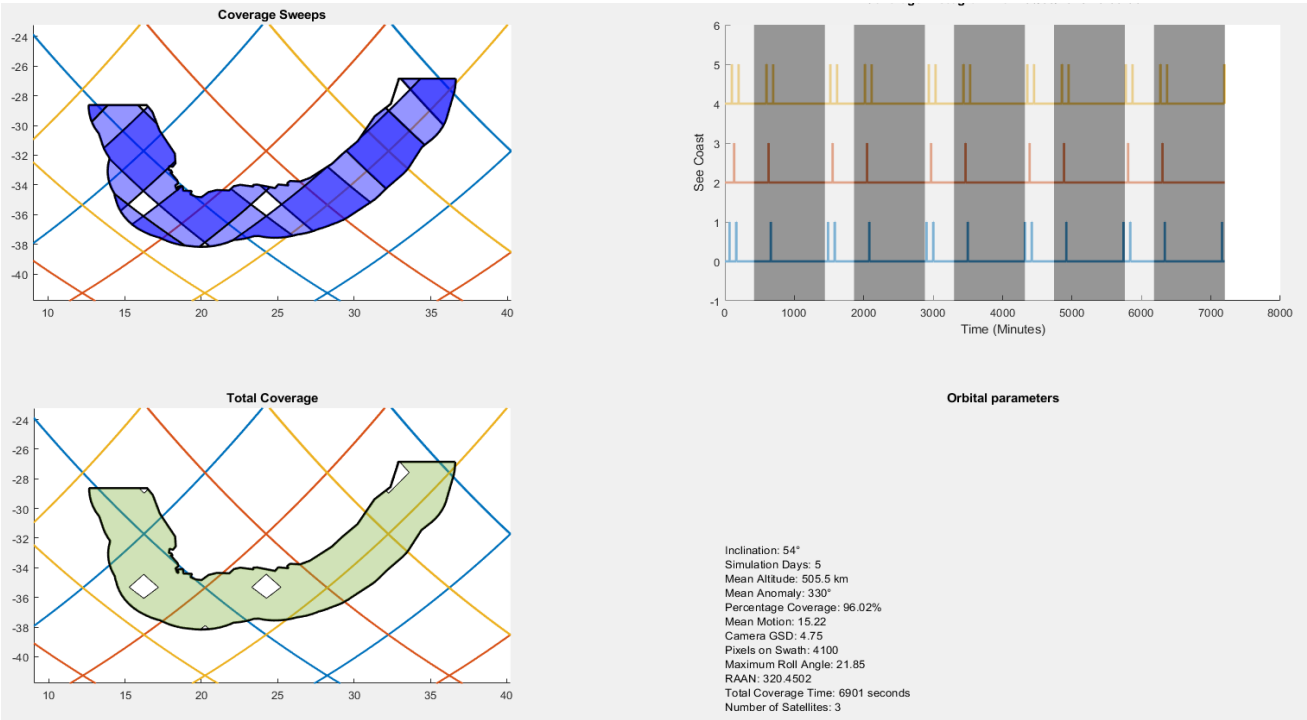


Image: MATLAB Simulation

CubeADCS Imager Pointing Accuracy and Stability

- CRM100 rate sensor analysis – temperature bias effects
- SGP4 propagator analysis for a 3U CubeSat
- Star tracker accuracy investigation based on CubeSpace data
- Develop noise models for each respective sensor to be used in a simulation
- Building a simulation environment which will emulate the project scenario as accurately as possible
- Look into enhancing the accuracy of SGP4 with GPS corrections

Space Debris: Pose Estimation Using Stereo Vision

Willem de Jongh

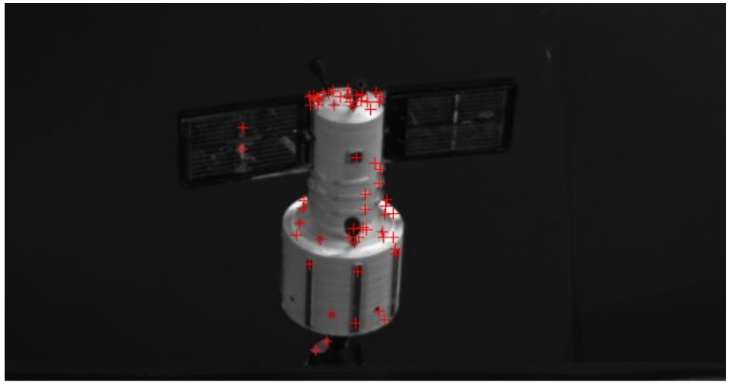
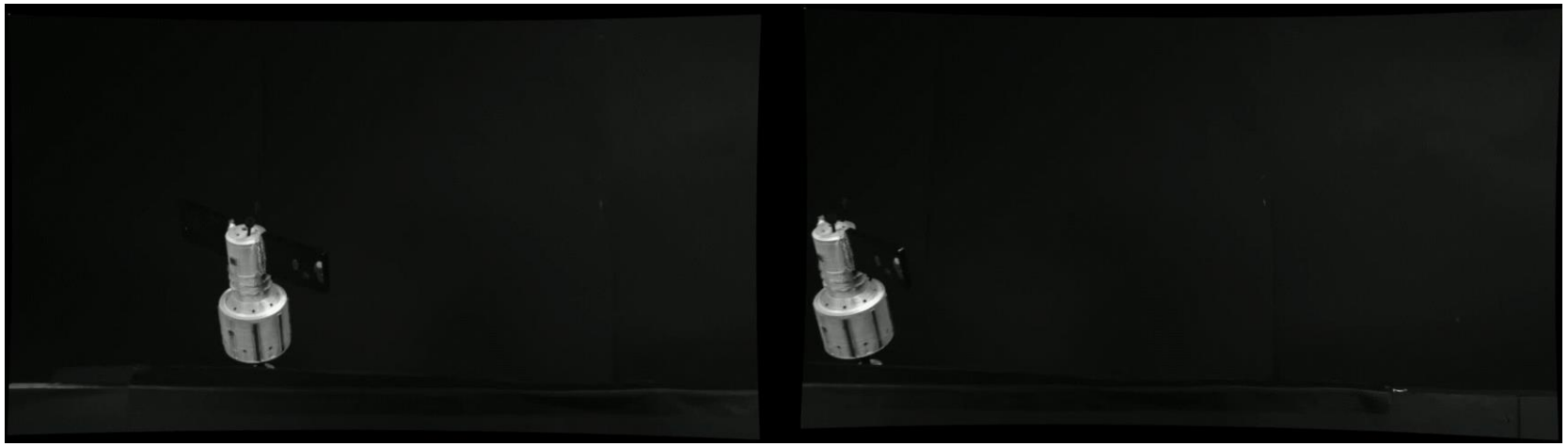


Image: Detected image features



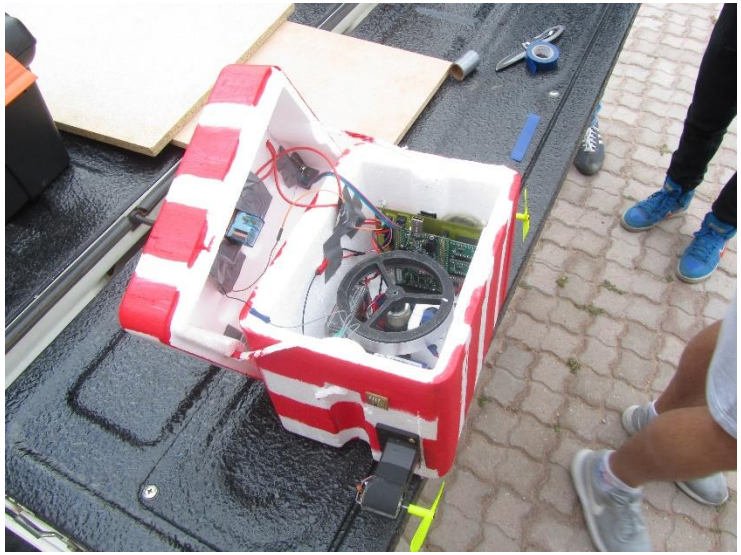
Video: Stereo vision of mock space debris

Additional Projects

- Development of an Autonomous De-Orbiting Device for a CubeSat
- Star tracker imager with fast implementation of detection, matching and tracking algorithms in an FPGA

CanSat Launch

- 2 CanSats launched with weather balloons
- Yaw axis stabilisation



HEPTA-Sat Workshop

Stabilization of a rotary wing UAV with dynamic payload

Anton Erasmus