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VCUB1: Visiona Technology Demonstration Nanosatellite Mission

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- Visiona Overview

- Visiona Projects Timeline

- Visiona R&D Projects:

  - AOCS

  - OBDH

  - SDR

- VCUB1 Mission

ABOUT

- Strategic Defense company focused
- on Integration Space Systems to address the needs of the Brazilian Space Program.

- Prime contractor of SGDC Program.

- Technological heritage of INPE, Embraer and SGDC Technology Absorption Program.

- Present in the remote sensing market with the largest and most complete constellation of Latin America.

- Provider of satellite telecommunications solutions.

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- To become the Brazilian company of choice for technologically independent space-based integrated solutions

- with strong presence in the international market, fostering the domestic supply chain and this

- contributing to the country's development and sovereignty.

The Brazilian space systems integrator.

Joint venture between:

EMBRAER
Defesa & Segurança

TELEBRAS

Visiona Projects Timeline
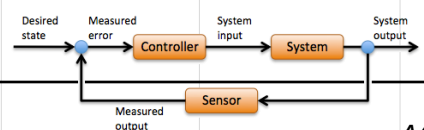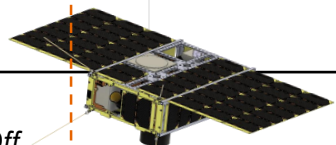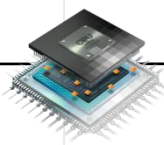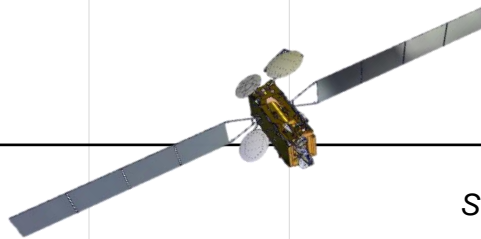
AOCS – Attitude and Orbit Control System

Attitude and Orbit Control System (AOCS) is critical technology for the fabrication of satellites. It is responsible for the automation and control of orientation and positioning of the satellite.
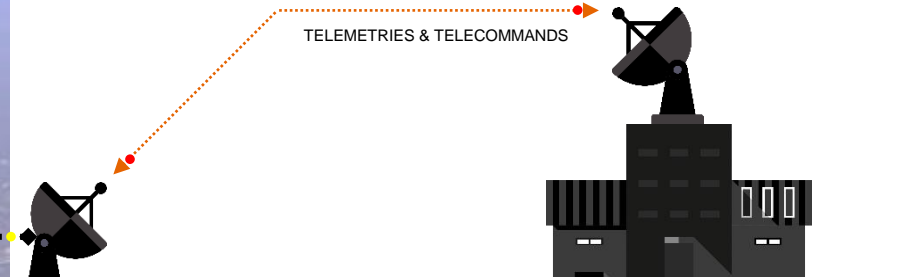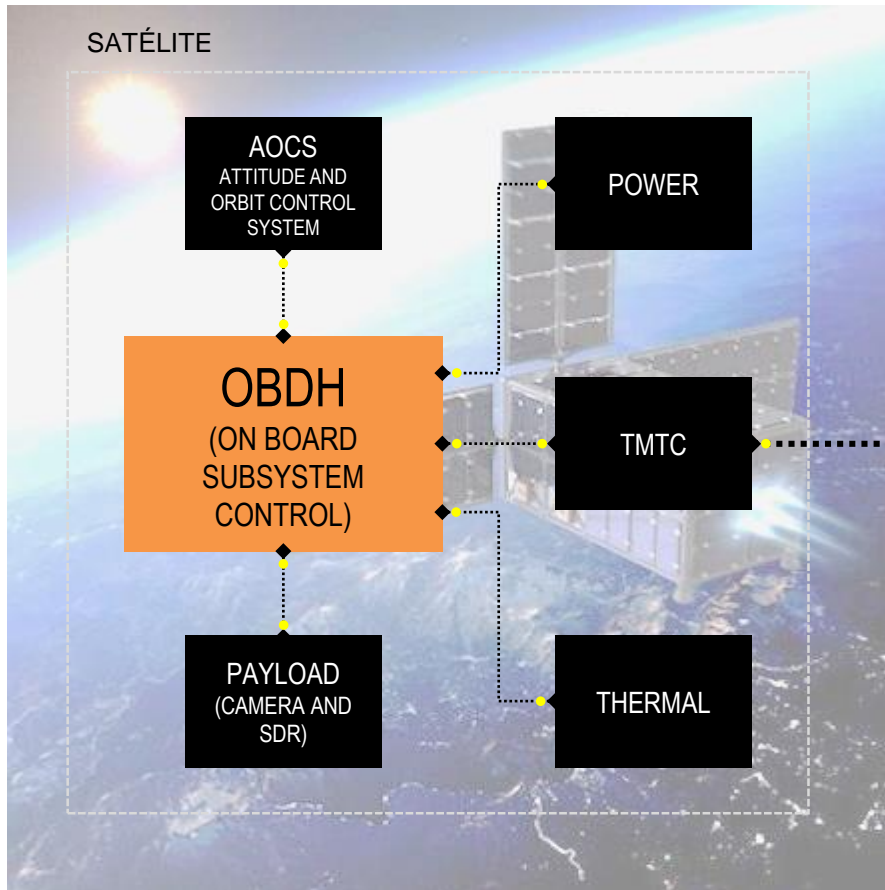
AOCS System Functions:

- Navigation - Determination of satellite states (orbit, attitude, etc.) using sensor measurements.

- Guidance - Calculation of the desired attitude (orientation) for the satellite (target on the ground, etc.).

- Control - Determination of actuator commands in order to obtain desired attitude.

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OBDH – On-Board Data Handling

The OBDH development project goal is to have a flexible and modular multi-mission embedded software (OBSW) for future Visiona satellite missions.

✓ Spacecraft's brain
✓ Subsystems Control
✓ Interface with Ground Segment and Operations

SATÉLITE

AOCS
ATTITUDE AND ORBIT CONTROL SYSTEM

POWER

OBDH
(ON BOARD SUBSYSTEM CONTROL)

TMTC

PAYLOAD
(CAMERA AND SDR)

THERMAL

TELEMETRIES & TELECOMMANDS

CONTROL CENTER

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SDR - Software Defined Radio

Beginning in August 2016, Visiona has been investing in the development of SDR - Software Defined Radio for satellites and ground segment, aiming the applications for systems of data collection and tactical communications.

Link de comunicação reconfigurável via telecomando.

GOAL

- Software Defined Radio (SDR) development with application for data collection systems and tactical communications.

MOTIVATION

- Because it is defined by software, the communication implemented in SDR is remotely reconfigurable, allowing to modify the operation of the system in orbit;
- Allows more efficient use of communication channels.

STATUS

- 1 – Mission Definiton/Feasibility Study;
- 2 – Conceptual and Preliminary Design;
- 3A – SW Detailed Design Implementation;
- 3B – SW Detailed Design Verification Validation;
- 4 – Embedded Software Validation;
- 5 – On-Orbit Validation.

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VCUB1 Spacecraft

VCUB1 has a high-performance platform, the same architecture of larger satellites, and will validate the subsystems developed by the company (AOCS, OBDH and SDR)

Camera

"TMTC + Payload Data" Antenna (S-band)

Plataform

AOCS Subsystem

SDR Antennas (UHF)
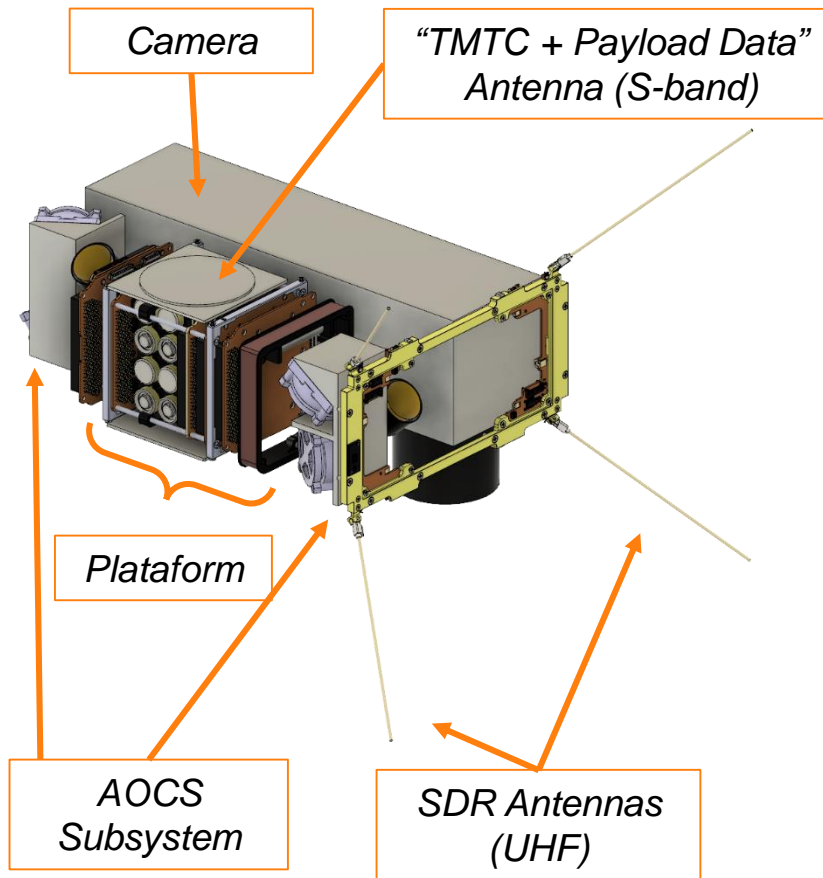
General Characteristics	
Mass	9,7 kg
Power (Peak)	50 W
Volume	10 cm x 22 cm x 34 cm (folded) 10 cm x 34 cm x 84 cm (deployed)
Attitude Control	3-axis stabilized High pointing accuracy
Payload	3,5 m GSD Optical Camera UHF SDR
Launch	1st Semester of 2020

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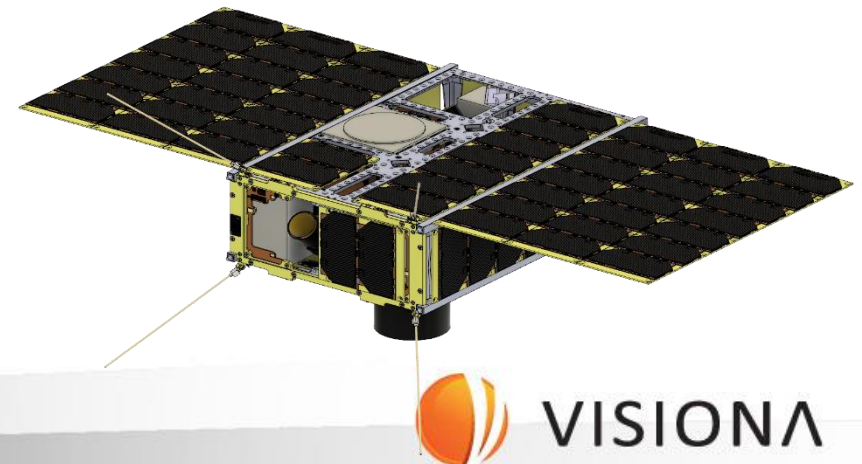
VCUB1 Optical Imagery Characteristics
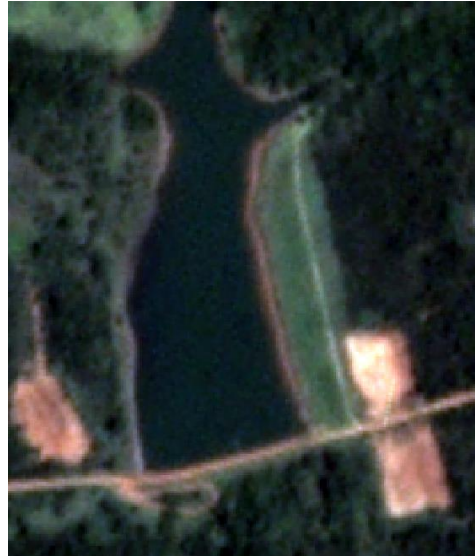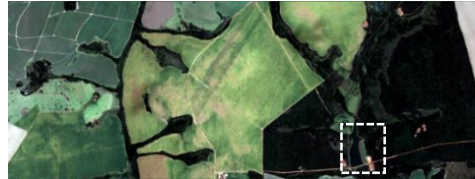
VCUB1 Simulated Scene (3,5 m GSD)
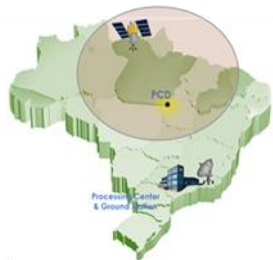

CubeSat Market Solution (3 m GSD)

Imagery Characteristics	
GSD	3,5 m (@500 km)
Spectral Bands	B, G, R, NIR
Swath	14 km
Standard Scene Size	14km x 14 km = 196 km²

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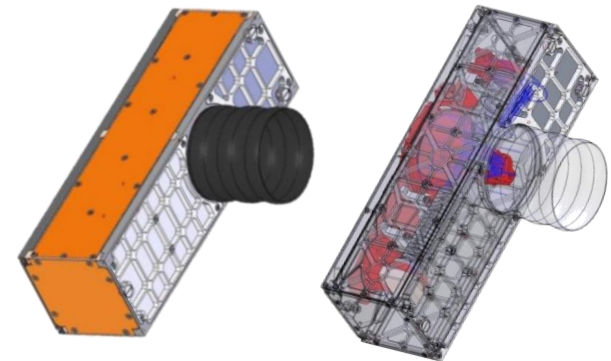
VCUB1 Data Collection

1 – Satellite flyby over PCD

2 – PCD Transmission to Satellite

3 – Satellite flyby and transmission to Ground Station

4 – Distribution to End-Users

Data Collection Characteristics	
Transmission	UHF
Mensage	1 kbit (per pass)
Protocol	SBCD (nominal)
Capacity (Visiona Data Collection System)	2000 PCDs (footprint) 10000 PCDs (Brazil)

PCD's
(remote Data Collection Platforms)

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VCUB1 Competitive Edges

- Similar architecture compared to bigger spacecrafts;

- High-precision pointing system, developed using National technology;

- Multi-purpose modular flight software (AOCS, OBDH e SDR) with National technology

- Dual *payloads*: High-resolution optical camera and IoT using SDR;

- Optical camera using TDI technology (*Time Delay Integration*);

- Off-nadir image acquisition;

- Enhanced PCDs data collection capacity;

- Hability to patch/upload software in flight.

![VISIONA Tecnologia Espacial logo]

THANK YOU!

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