WWW.CSHARK.IT

Our History

CShark was born in 2018.
We have been operating in the Information Technology sector designing and developing custom software and hardware solutions for all types of realities.

For the past few years we have also been operating in the Aerospace sector thanks to the design and launch of our first PILOT-1 satellite.
To date, the company holds two patents registered at European level: PONGO and PILOT

Alessandro Fanni

Founder, CEO and R&D Director

W W W . C S H A R K . I T

Alessandro
CEO and R&D Director

Igor
CTO

Nadia
CFO

Pietro
Hardware Designer

Claudio
Hardware Designer

Sergio
Firmware Designer

Stefano
Business Developer

Jessica
Business Developer

Kalin
Business Developer

Paolo
Software Developer

Marco
RF Designer

Massimo
Senior Scientific Consultant

Paolo
Aerospace engeneer

Rachele
UX/UI Designer

Simone
Physical engineer

Gaetano
Administration

Team Members

CShark's team consists of a group of professionals with complementary skills and solid experience in various areas of ITC.
Thus we can help our clients find the most advanced solutions to various problems in the technology field, with a comprehensive service managed in-house and developed around their needs.

Piacenza

Cremona

Cagliari

An Overview Of The Problem

We identified:

- A lack of communication systems in remote locations to transmit data machine-to-machine
- A difficulty for system integrators to integrate IoT different devices into a unique environment

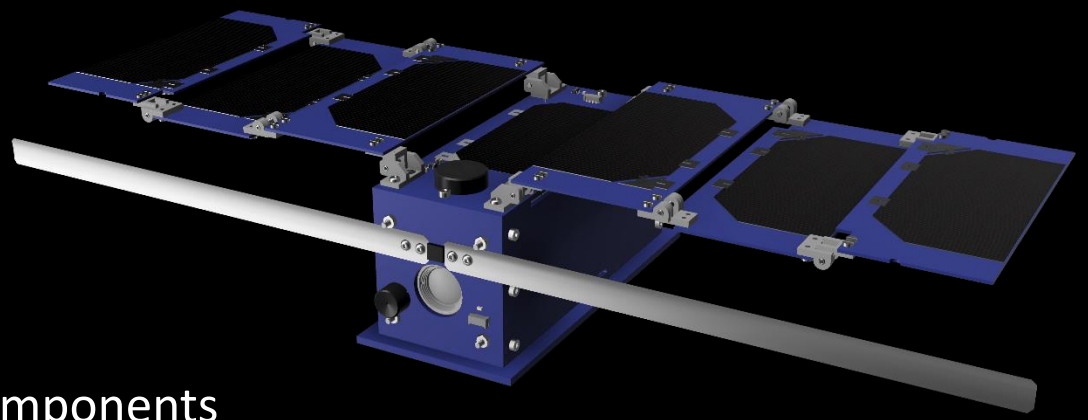
- No Internet
- No powerline
- Different IoT brands
- No specific SW

Target

To create a new innovative HW/SW infrastructure that permits to integrate any IoT devices, gateways and that can communicate to the control room also without Internet connection at an affordable cost

PATENT

P1LOT



- Maximum miniaturization of components
- Smallest dimension on market
- High performance solar panels
- Full range of radiofrequencies usable
- All components developed by Cshark

PONGO®

IDEAS OUTSIDE THE BOX

PATENT

- Metalanguage and API-Based Cloud IDE Development Environment.
- Integrated IOT module
- Management of uplink and downlink from devices
- Big Data processing
- AI Module
- Data Learning Module

INDOOR APPLICATIONS

Farming

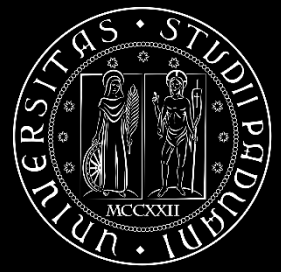
Smart building

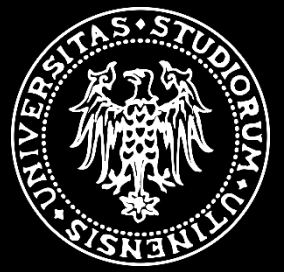
Industry 4.0

Energy efficiency


Pipelines monitoring
Logistic monitoring
OUTDOOR APPLICATIONS
Railways monitoring
Public lightning management

PARTNERSHIP





AWARDS AND NOMINATIONS

Mar. 2019

Top 100 Products Milano finanza (MMF 2019)

CShark's Pongo software was honoured by Milano Finanza at the Milano Marketing Festival 2019 and was listed among the top 100 products that stood out in 2018

Unicredit Start lab finalists

UniCredit Start Lab is the initiative created to support young entrepreneurs, innovation and new technologies. The UniCredit Start Lab business platform targets innovative startups from all sectors

Jun. 2021

UniCredit Start Lab

Jul. 2023

DigithON 2022

DigithON is the largest Italian digital marathon in which numerous start-ups took part. Following the first selection, Cshark came first in the list of one hundred innovative start-ups thanks to the Pilot-1 nanosatellite

Forbes

Apr. 2023

Top 100 under 30 Forbes

Alessandro Fanni, CEO of Cshark, was included in Forbes' top 100 under 30 list for the science category.

Up2Stars Award

The start-up award given by Intesa San Paolo for the Aerospace category

May. 2023

May. 2023

Premio America e Innovazione 2023

The Italy USA Foundation promotes the America Prize for Innovation, an award to innovators of the best Italian start-ups that is given at the Chamber of Deputies. An award of international prestige, representing a qualification and certification of quality.

SOCIAL AND JOB REVITALIZATION INITIATIVES

Cshark is very active in initiatives dedicated to youth, schools and new entrepreneurs. It engages mainly in the Piacenza area but also throughout

Rewarding and supporting youth

For the third year in a row, Cshark is enhancing the winning young talents of the Mathematics and Physics Olympiad by actively participating in the event's final awards ceremony and encouraging young people in Piacenza.

high school conferences and careear day

CShark is very active in many schools in the Piacenza area for alternation internships and carrear days but also outside the area. Alessandro engages in dialogue with young people to talk about his own story and inspire them to achieve their goals.

Talks and conferences

Talks and conferences both for the Piacenza area and at large events throughout Italy. The topics covered are especially dedicated to young people and entrepreneurs through lived experience and achievements

Internships and hiring of young graduates

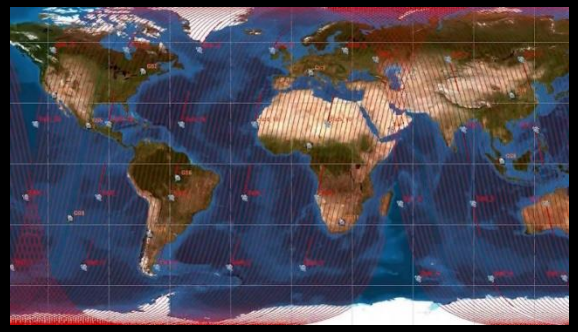
CShark is active in carrying out curricular and non-curricular internships for college students. In the past 2 years the company has hosted and then hired many young people following them on full work and training paths. The company's reality and its projects have also been the subject of some dissertations.

Where we are:

- 1 satellite in LEO orbit;
- 15 earth revolutions per day;
- 2 passes per day over the same spot.

Next step:

Simulation performed with 100 Pilot satellites



01

Pongo

Pongo software has been equipped with a specific IoT module to manage and visualize data from sensors on the ground via satellite or terrestrial gateway

02

Pilot-1

The first satellite was launched with Space-X on Jan 2022 and it is flying at 500kms low orbit

03

Devices

The company is completing the design of the antennas and nodes

04

Pilot

The new version of the satellite has been completed by January 2023, ready to cover the entire globe

PILOT-1

THE CONSTELLATION'S FIRST NANOSATELLITE WAS LAUNCHED ON JANUARY 13 2022 WITH THE FALCON 9 CARRIER ROCKET

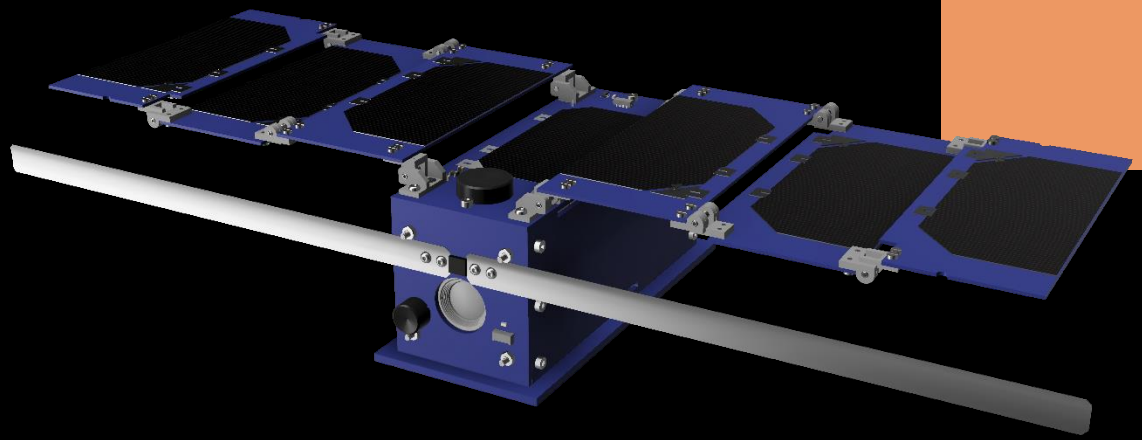
CAPE CANAVERAL

FLORIDA

https://youtu.be/30MQMAlz0ms

P1LOT

INTERNAL STRUCTURE



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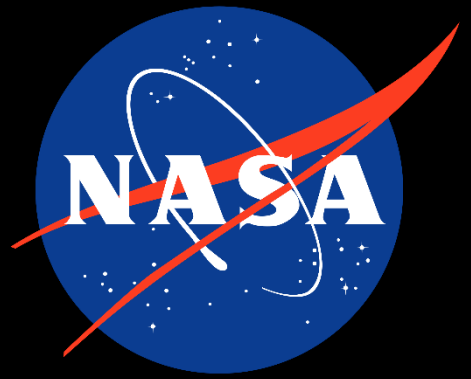
The PILOT platform has all the 3 ESA/NASA criterias:

European Space Agency



Research criteria:

all the Pilot has a NaNoSiPM a photo multiplier atomic particle detector to research purposes / watchdog for single event upset (SEU)

Innovation Criteria:

introduce new technology for In-Orbit demonstration on a single object already prepared to detect a precise telemetry and a optimized sizing.

Service Criteria:

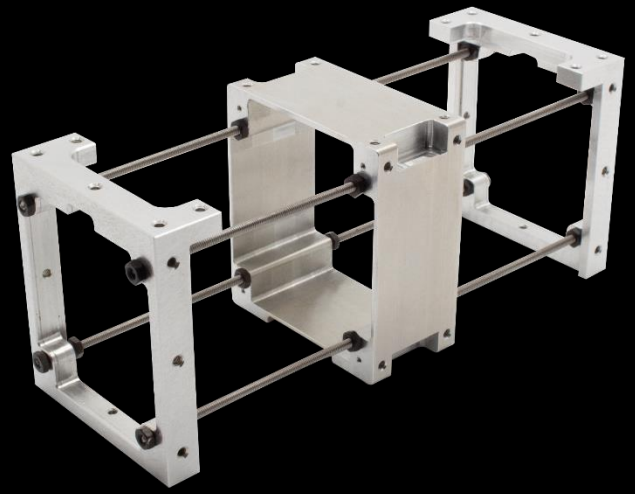
It’s possible to provide IoT band coverage with current subsystems (EU/US patent)

1. Research

2. Innovation

3. Service

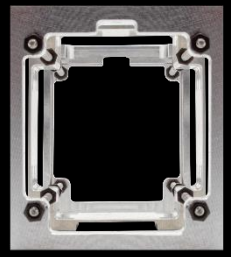
MODULAR STRUCTURE 2P

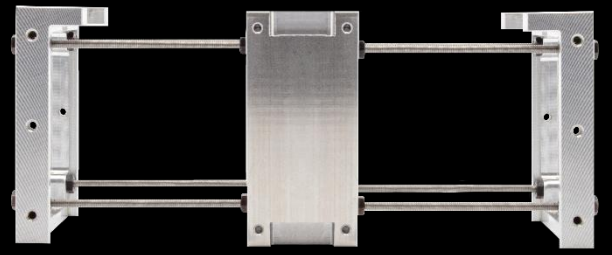


The mechanical structure of the satellite consists of three internal brackets made of aircraft aluminum, 1.7 mm FR4 PCBs and complies with the 2P canon.
This structure absorbs axial and lateral loads and has been successfully tested.

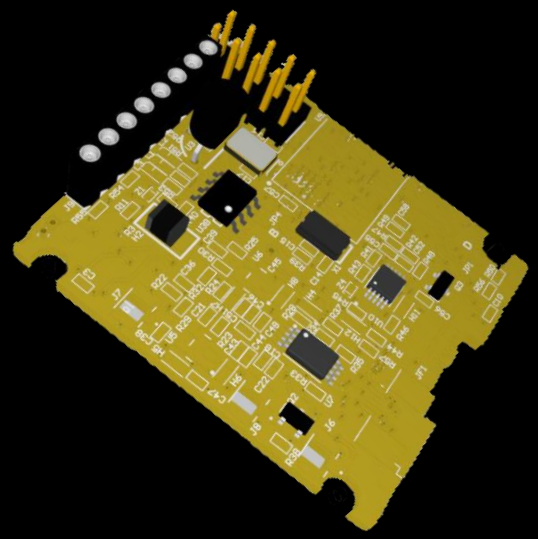
The design of the structure and bars is also conceived to fit any size standard during assembly (e.g., CubeSat).

Size:	5 x 5 x 10 cm
Weight:	75 g
Material:	Aluminium EN AW-7075 / 3.4365 / Al-Zn6MgCu





OBC (ON BOARD COMPUTER)

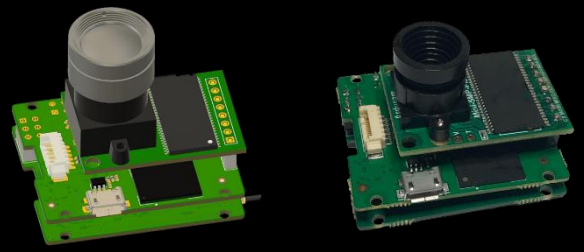


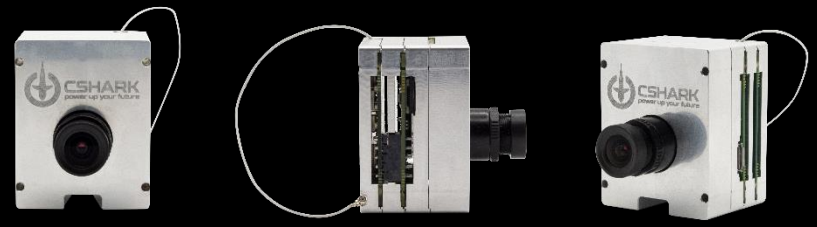
We design a new OBC in order to be scalable and spread inside a bigger platform. We design a new FREE-RTOS based operating system.

Dimensions:	47.5 x 47.5 x 6.5 mm
BUS supported:	SPI 8pin, 2xUART, STTLx1, microUSB/USB type C
MCU:	SAMA5D27 (Flight heritage on VEGA-C and SPACEX LEO missions)
Panel material:	FR-4(IPC-6012B)
Mechanical shields:	2x mechanical shields Ad Hoc in Al7075
Power consumption:	0,7W/h

INCLUDED:
EXPANTION I/O BOARD SUPPORTED
OS flash
NANOSIPM, THE MOST TINY PARTICLE DETECTOR ON THE MARKET (MOUNTED ON THE 8PIN SPI PORT)

KOUBE LORA GATEWAY
868 /915 MHz





KOUBE is an Optical Payload suitable for IoT and Earth observation applications with flight legacy and is designed for picosats or larger sizes. A connection can be established using the LoRa protocol with devices/sensors/nodes on the ground. The system can be used as a gateway for an IoT network and can be integrated via a UFL connector with region-specific frequency band antennas.

Dimensions:	47.5 x 47.5 x 30.5 mm
Uplink frequencies:	LoRa 868 /915 MHz
MCU:	SAMA5D27 reworked to fit the size of KOUBE
Radio module:	SX1302 for modulation/demodulation of LoRa packets coming from the ground devices;
Panel material:	FR-4(IPC-6012B)
Optics:	Sensors up to 12 MegaPixels, pixel size 1.85µm, UCi instrumentation (NEXT STEP: Adding multispectral camera)
Mechanical shields:	4 mechanical shields Ad Hoc in Al7075
Connector:	UFL connector for antenna integration
Antenna gain	5dBi
Antenna efficiency:	62%

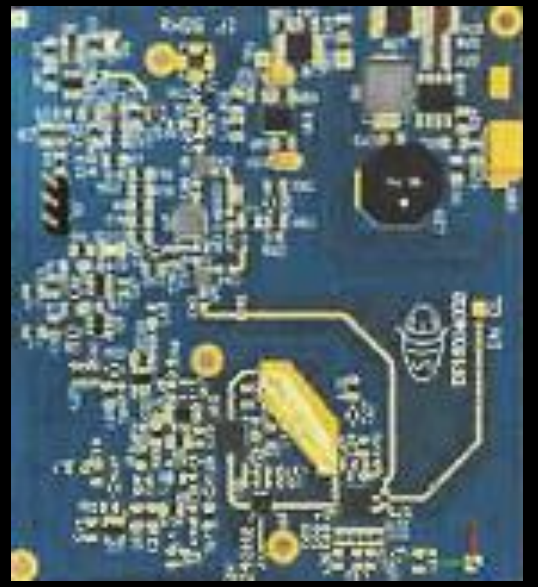
KORA SBAND – KIM UHF MULTICHANNEL GATEWAYS

RADIO UHF MONOCHANNEL
SX1278

SBAND GATEWAY MULTICHANNEL

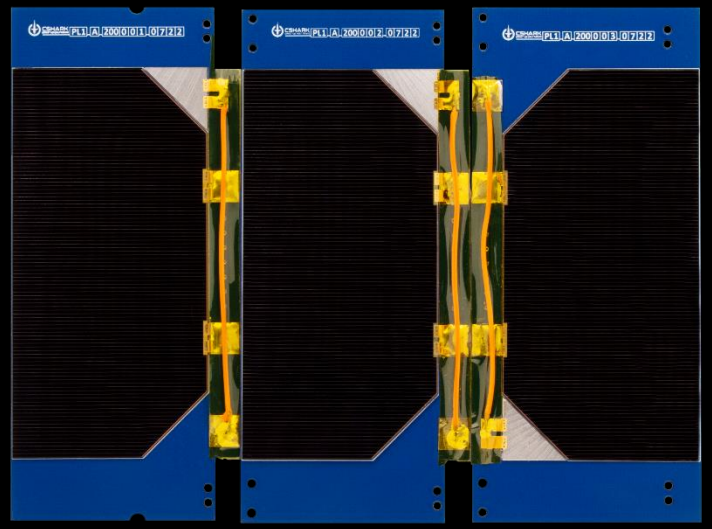
SBAND RADIO MONOCHANNEL

LR1120 semtech



KA BAND GATEWAY FOR INTRASATELLITE LINK

DEPLOYABLE SOLAR PANELS INNER – MIDDLE – OUTER

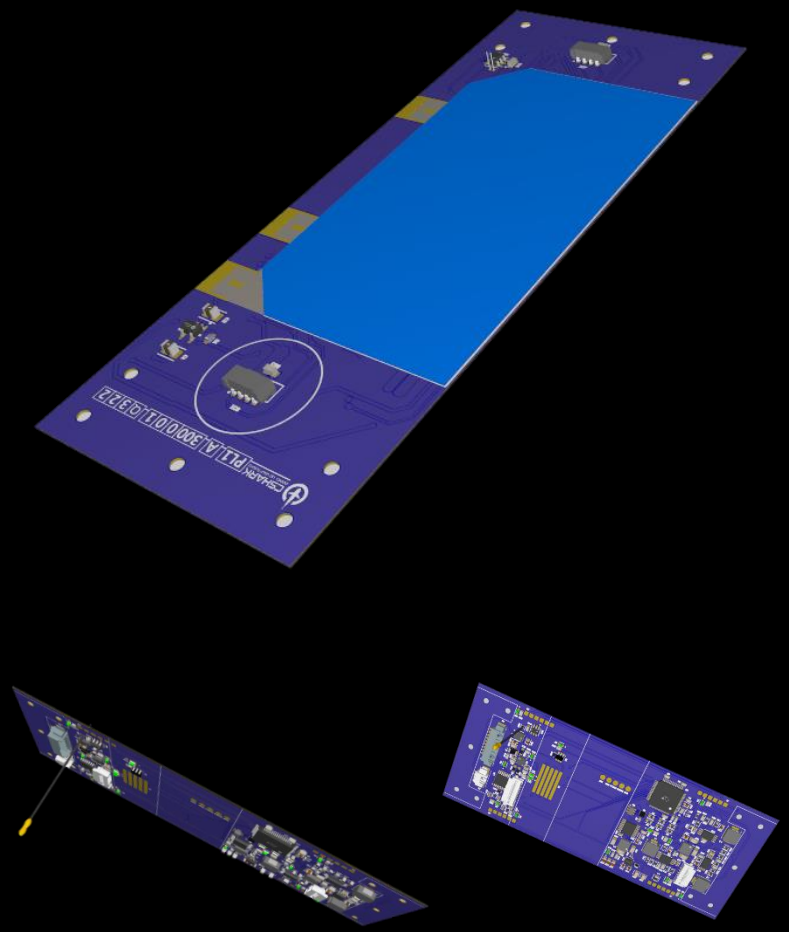


The panels consist of triple-junction, high-efficiency space solar cells that enable missions with high power requirements. These cells achieve an efficiency of 29.5 percent and have a built-in by-pass diode to protect series-connected strings from shading effects.

They are assembled using NASA-qualified 3M low outgassing adhesive materials in a clean room environment. Circuit design without current loops to prevent spontaneous satellite spin-up. Integrator cover glass for durability and radiation protection.

Efficiency:	Up to 29.5%
Power generation capacity in LEO:	36.85 mW/cm2
PCB thickness:	<1.7 mm
Panel material:	FR-4(IPC-6012B)
Assembly:	IPC - A600H class 3, calibration according to ESA ECSS-Q-70-08 specifications
Operating temperature:	-40 °C to +85 °C
Internal ground planes:	Copper for improved EMI compatibility NASA Qualified Cell Adhesive

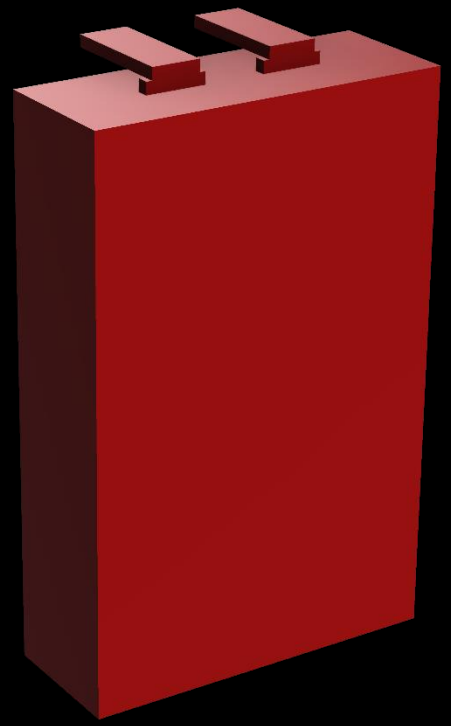
EPS (ELECTRICAL POWER SYSTEM)



The EPS is designed to be integrated into any type of mission and placed below other subsystems to reduce the volume occupied.

Indipendent MPPT lines for wings and top fly panel.	3
Full redondancy.	✓
Temperature battery check and heater.	✓
Sensors:	Attitude Control sensors + Sun Sensors + sensore di temperatura esterna + sensori di temperatura batterie.
Integrated Solar Panel dimensions:	3.9cm x 6.9cm.
Best battery handler from best to worst case scenarios:	The current flow to the batteries, if the batteries fail the EPS continue to dispense energy to the subsystems on redondance lines.

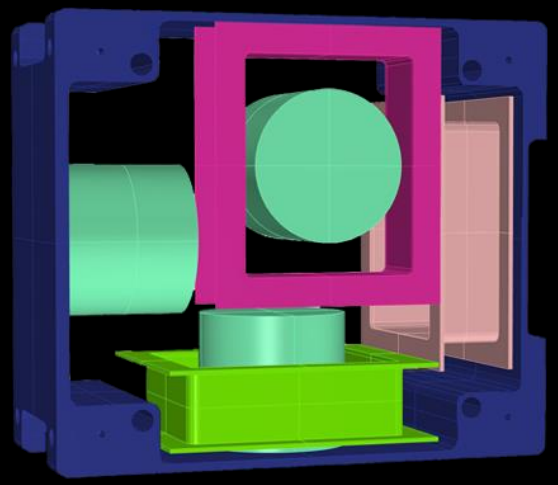
BATTERY

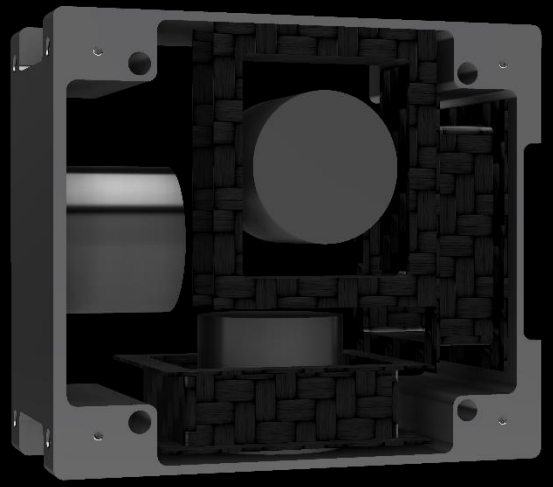


The batteries were created in Italy with the goal of improving energy density and performance under extreme temperature conditions. With these intentions, graphene batteries and future crystalline cellulose batteries will be the ones used aboard CSHARK's satellites.

Voltage:	3.7 V
Dimension:	29,50 x 11,30 x 46 mm
Capacity:	3800 mA/h (Li-On battery) 7350 mA/h (graphene battery) R&D new project
Thermal threshold range:	Li-On -40 °C / +80°C (heater engine included) Gp: -80°C /+150°C
Composition:	Lithium Graphene

ADCS DESIGNING AN BUILDING





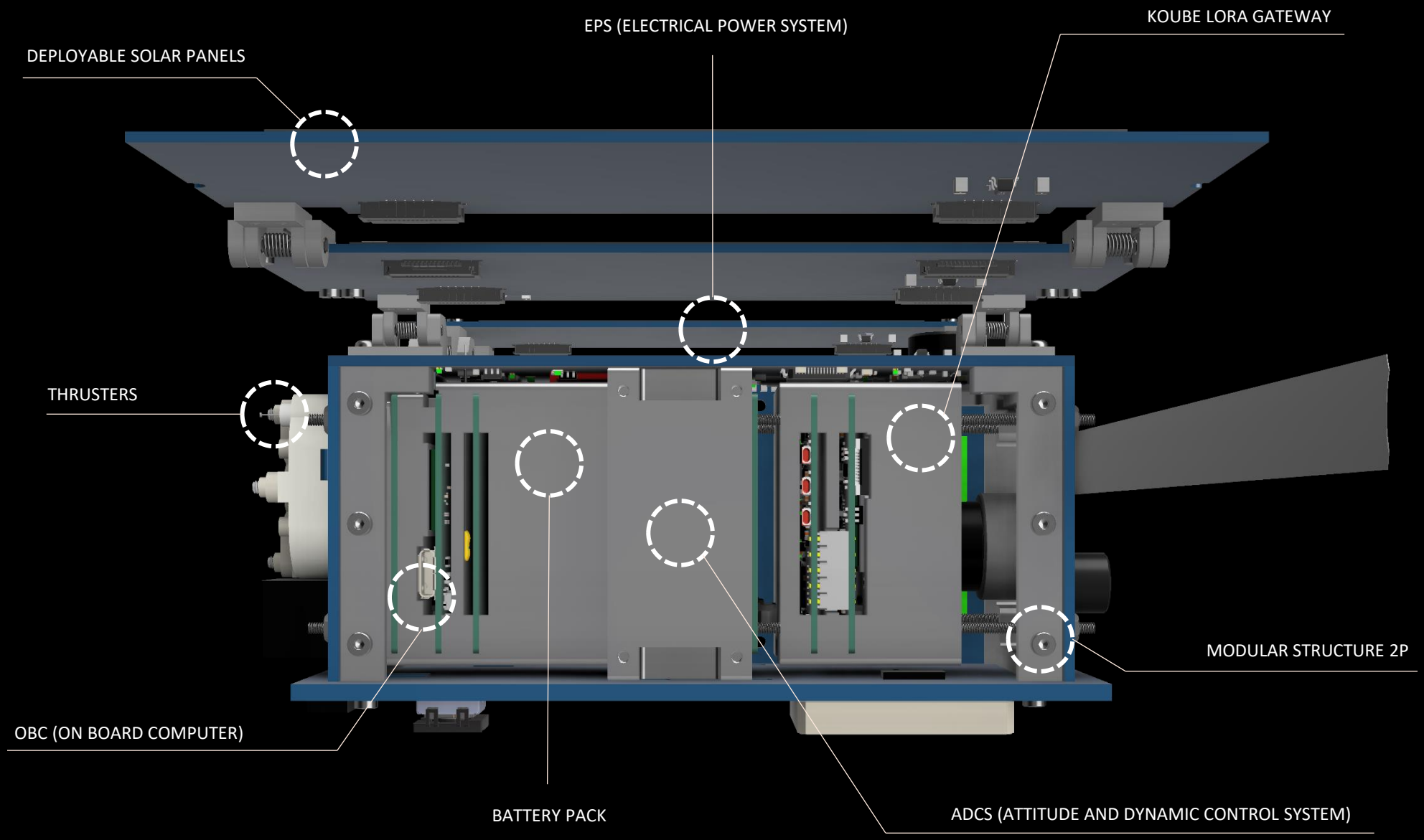
We design and manufacture customized MAGNETORQUER and REACTION WHEELS for each satellite.

Reaction weals have a diameter from 13mm and have new encoders capable of counting with an accuracy of <=1/4 turn(to increase pointing accuracy)

THRUSTERS DESIGNING AND BUILDING

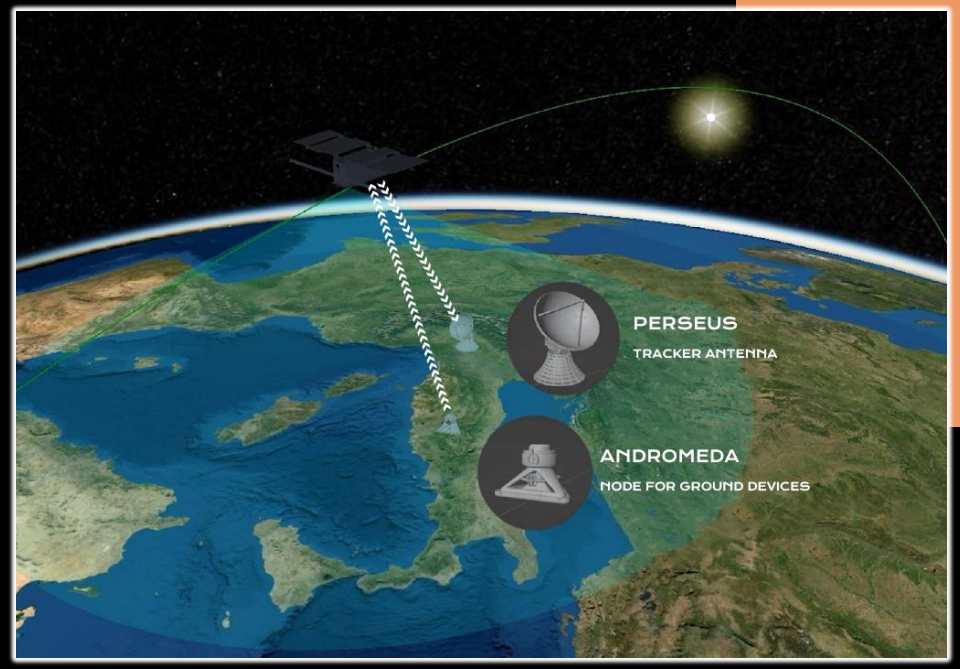
We design and manufacture customized THRUSTERS for each satellite. We test the impulse in TVC and calculate the right spray time to produce target manouvers.

These thrusters are able **TO DOUBLE THE LIFESPAN** of satellites that would otherwise remain in orbit for only 3 years before colliding with the atmosphere.


DEPLOYABLE SOLAR PANELS
EPS (ELECTRICAL POWER SYSTEM)
KOUBE LORA GATEWAY
THRUSTERS
MODULAR STRUCTURE 2P
OBC (ON BOARD COMPUTER)
BATTERY PACK
ADCS (ATTITUDE AND DYNAMIC CONTROL SYSTEM)

P1LOT

OPERATION AND GROUND NETWORK

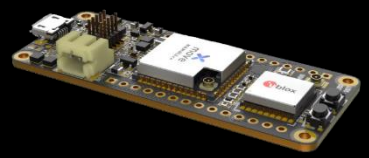


BANDO START UP INNOVATIVE

SMART & START ITALIA

For the realization of the infrastructure, Cshark has just obtained resources from the Emilia Romagna Region's "Start-up innovative" call with a contribution of 150,000 € and applied for Smart and Start for 1,500,000 €.

ANDROMEDA



ANDROMEDA

ANDROMEDA is the node that allows the Hardware part to communicate with PILOT SATELLITES.

Through it we can make any device on the ground communicating.

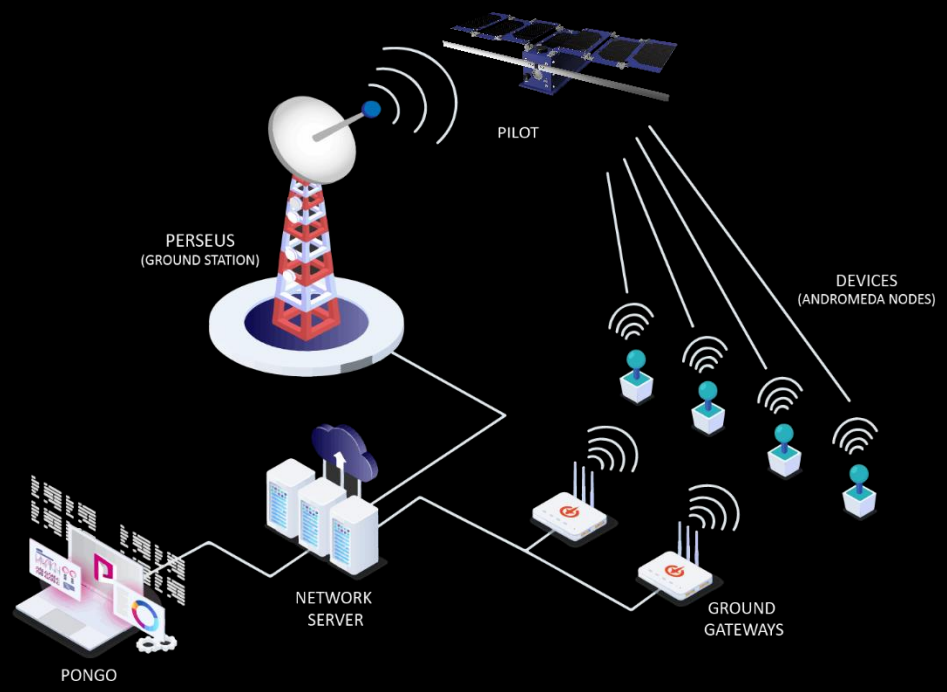
We can provide a stable uplink/downlink in 868MHz, 915MHz and 2.4GHz with LoRa protocol modulation.

PERSEUS

PERSEUS
link around

PERSEUS is the ground station (tracker antenna) that allows us to talk to the nano-satellite constellation. The Antenna provide a stable dual link in S-BAND on 2.4 GHz band and a UHF link as a backup line. The helical polarization allow us to see the income satellite before it raises over the horizon.

THE SATELLITE GATEWAY SERVICE (in LoRaWAN protocol)



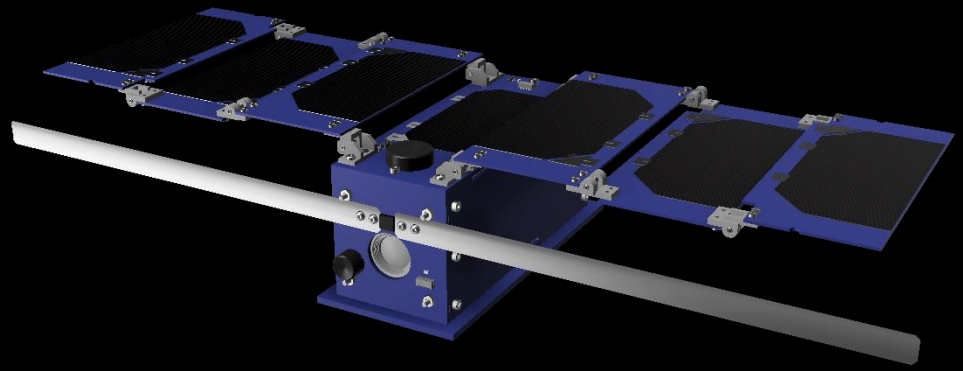
To have a full coverage the devices with Andromeda nodes on board will communicate data firstly to the satellite (a gateway in orbit), then to the Perseus ground station and finally to the Pongo control platform via a Network server.

In absence of satellite coverage, the process is done through the Internet connection, where the devices communicate directly to ground gateways.

PROJECT SUSTAINABILITY

- LOW ORBIT : LEO Orbit
- LOW FREQUENCY : LoRaWAN protocol (low power consumption)
- LOW POLLUTION : No space garbage (Deorbiting)
- LOW ENERGY : Energy produced by photovoltaic panels and low power consumption (9W)
- LOW COST : Low cost and small size

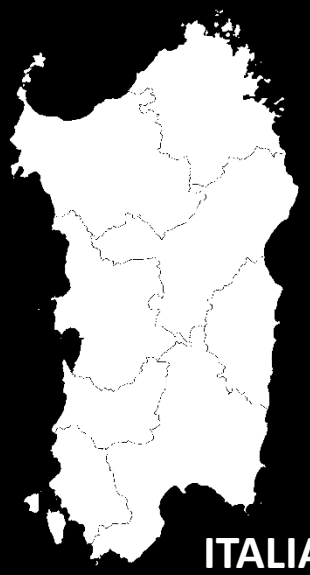
ITALIAN EUROPEAN FULL CHAIN



ITALIAN INFRASTRUCTURE AND SATELLITES

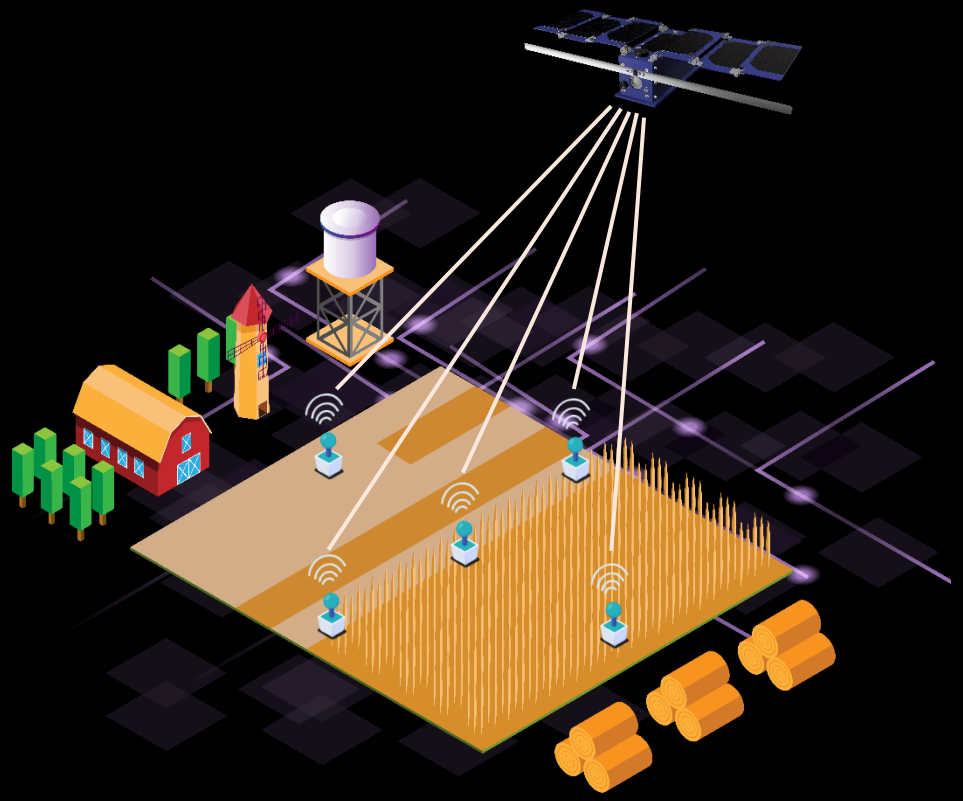
By CSHARK

ITALIAN DEPLOYER



ITALIAN SPACEPORT

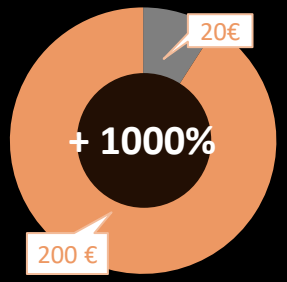
In Sardinia



The new legislation for CO2 DETECTION, mandates total coverage of arable fields through the placement of 5 sensors per hectare. CShark's satellite sensing therefore presents itself as the flexible and suitable solution to best monitor the production and health of the field according to ministerial directions.

Mining CO2 credits Climate change

In line with the New Green Deal and to further monitor and enhance the green redevelopment works, it is strategic to create a Distributed System for the extraction of carbon credits to increase the economic growth curve in the recovery of the affected area: an Agricultural production will have an additional revenue line.



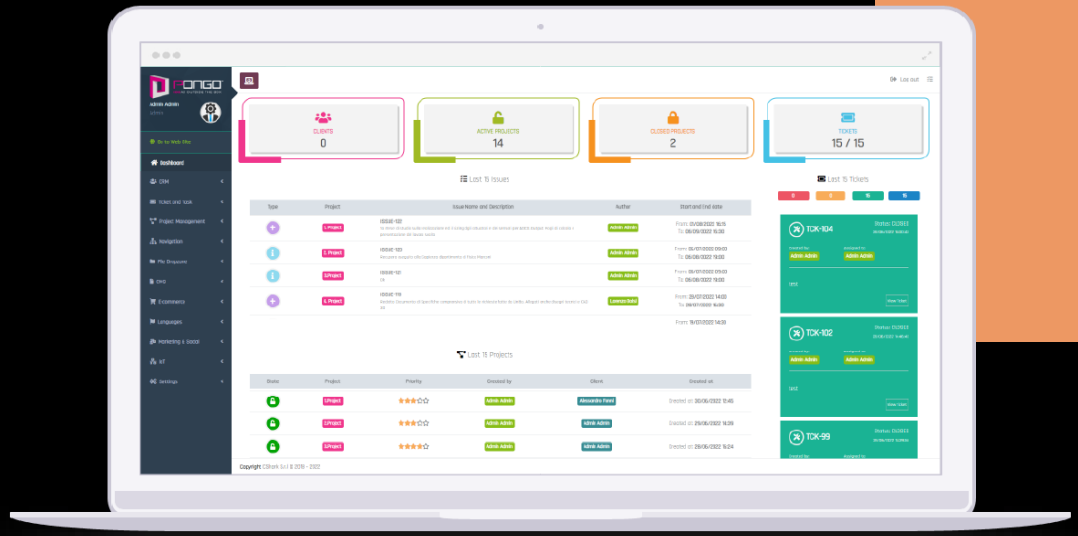
2023 - 2030

In the current year 2023, carbonium credits cost 20€ each and there is no obligation to purchase them. In 2030, however, an obligation for companies to purchase carbon credits will be introduced and the price will rise to 80€ per credit with an increase of % in 7 years

PONGO®

IDEAS OUTSIDE THE BOX

IoT MODULE



BREVETTI+

simest
gruppo cdp

For the integration of the IoT module, Cshark obtained resources from the "Simest" from the SIMEST 2021 call for proposals with a grant of € 45.000 and from the “Brevetti +“ from INVITALIA call for a grant of € 56.000.

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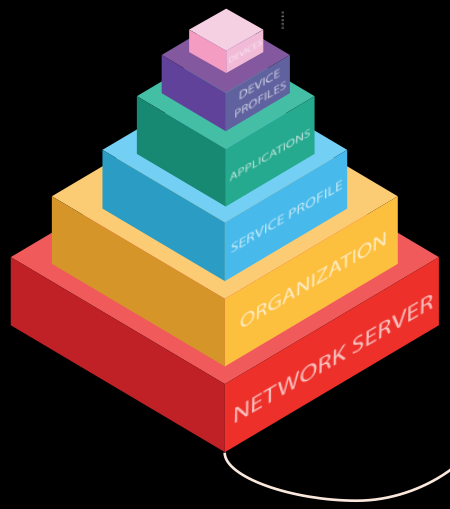
Pongo was born as an API-Based IDE Cloud Development Environment. Its integrated IOT module allows the long-range connection of the same with End-Devices in order to collect and process Big Data.

This allows not only the constant monitoring of data, but their visualization and collection in real time, allowing, in the medium/long term, to outline a list of the activities of devices useful for the creation of statistics that can describe both a past behavior and a future prediction, as well as telecontrol installations of all kinds.



The structure of the IoT module consists of several elements at the base of which is the Network server, the digital and secure repository for the sensed data. For the realization of the NWS, Cshark benefited from the SIMEST 2021 call for proposals.

IoT module features

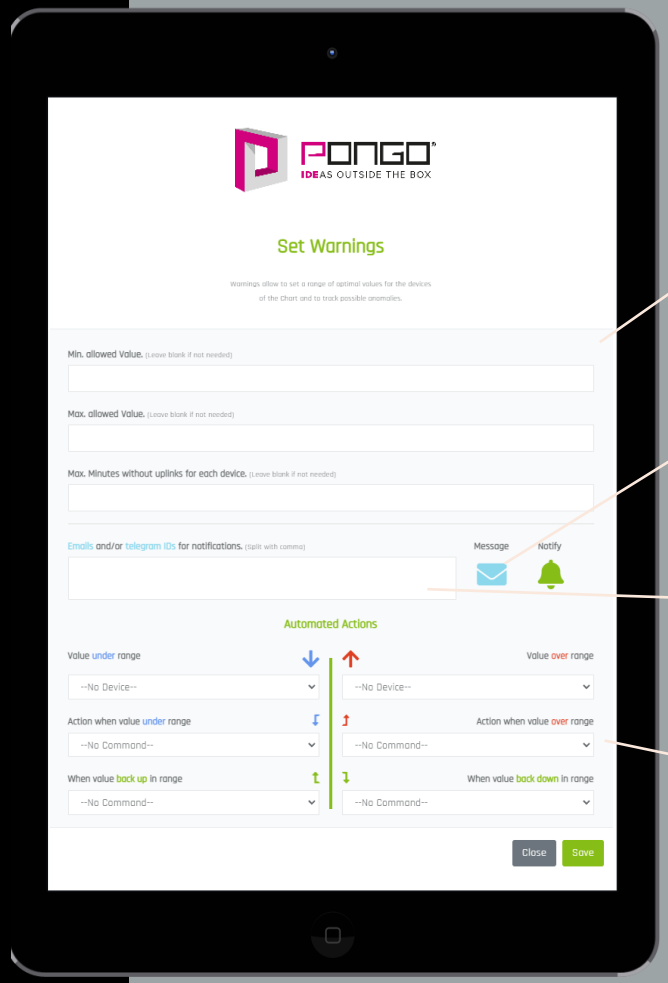
- Data management and visualization in dashboard charts
- Organization and Application management
- Devices management
- Uplink management and sending commands
- Sending multiple commands to multiple devices
- Alert setting on values
- Management of corrective actions on detected values

Predictive algorithms and artificial intelligence

Devices, connected to the satellite or ground gateways, can transmit data to Pongo and subsequently be processed and translated into graphs.

Thanks to Artificial Intelligence, it is also possible to make predictions based on the collected data, set threshold limits on the detected values, and send commands to allow actuators to perform actions to correct them.

W W W . C S H A R K . I T



Setting minimum and maximum thresholds on values

Setting custom messages

Email notifications and telegram messages

Setting corrective actions via commands to actuators

Sources of Projected Revenues

01

Cshark's band service

Bandwidth at very good price

02

Private Constellation

Customized private satellite constellations projecting

03

Products

HW products (gateways, devices) SW (Pongo)

04

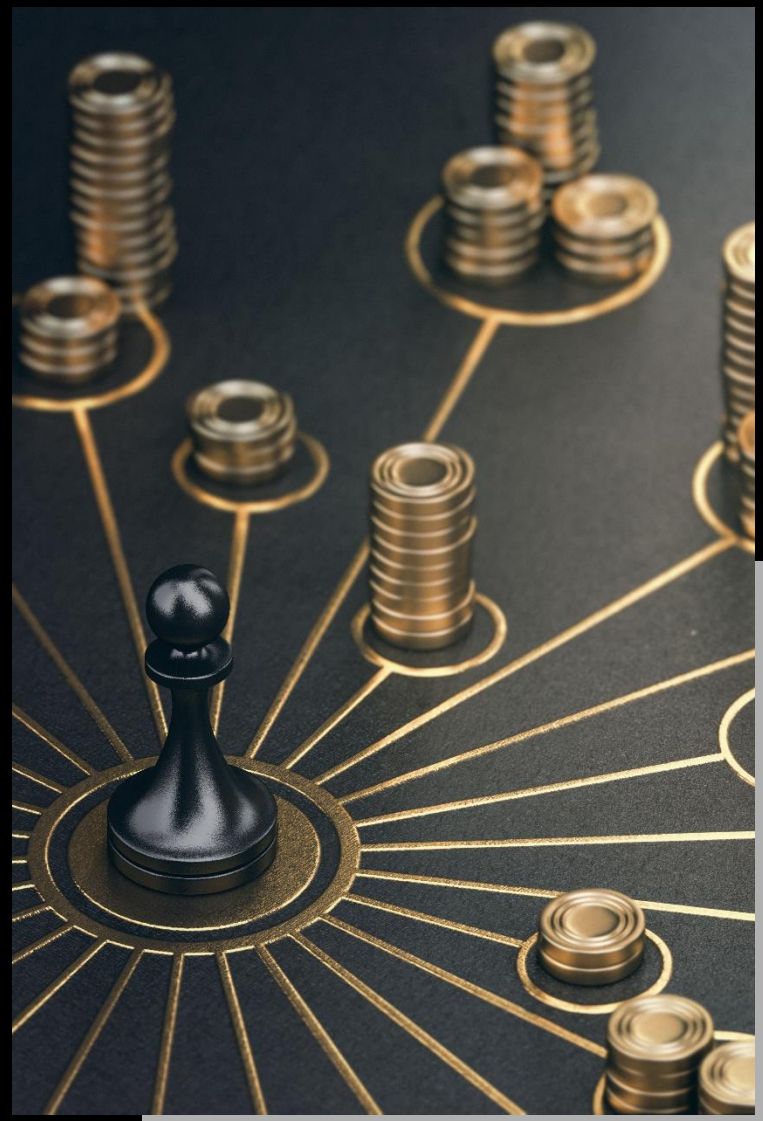
Consulting

Know how Consultancy for big projects

05

Research

In-orbit demonstration and validation service



SERVICES


CONSULTING FOR DISTRIBUTED NETWORKS


EARTH OBSERVATION JOURNEY

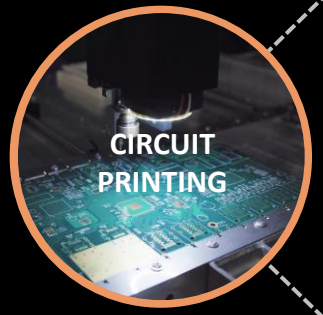

HIGH-LEVEL SOFTWARE DEVELOPMENT
Apps, platforms, ecommerce, AI, BIG DATA...


METERING AND REMOTE CONTROL


ENGINEERING AND DESIGN CONSULTING


AUTOMATION


SELLING HARDWARE


CIRCUIT PRINTING


ANTENNAS DESIGN


FIRMWARE CREATION

Early customers:

Initially Cshark focused on developing software for businesses, from the smallest to the most complex. Now the company is beginning to have its first major customers operating in various industries for satellite services and products.

LOGISTICS

Railways maintenance with Trenitalia partners, the largest railway company in Italy and Se.gi S.p.A;

SMART ENERGY

Energy management for the largest independent electricity transmission grid operator in Europe;

HARDWARE

Production of RT (radiation tolerant) and RH (Radiation Hardness) chips for Microchip;

RESEARCH

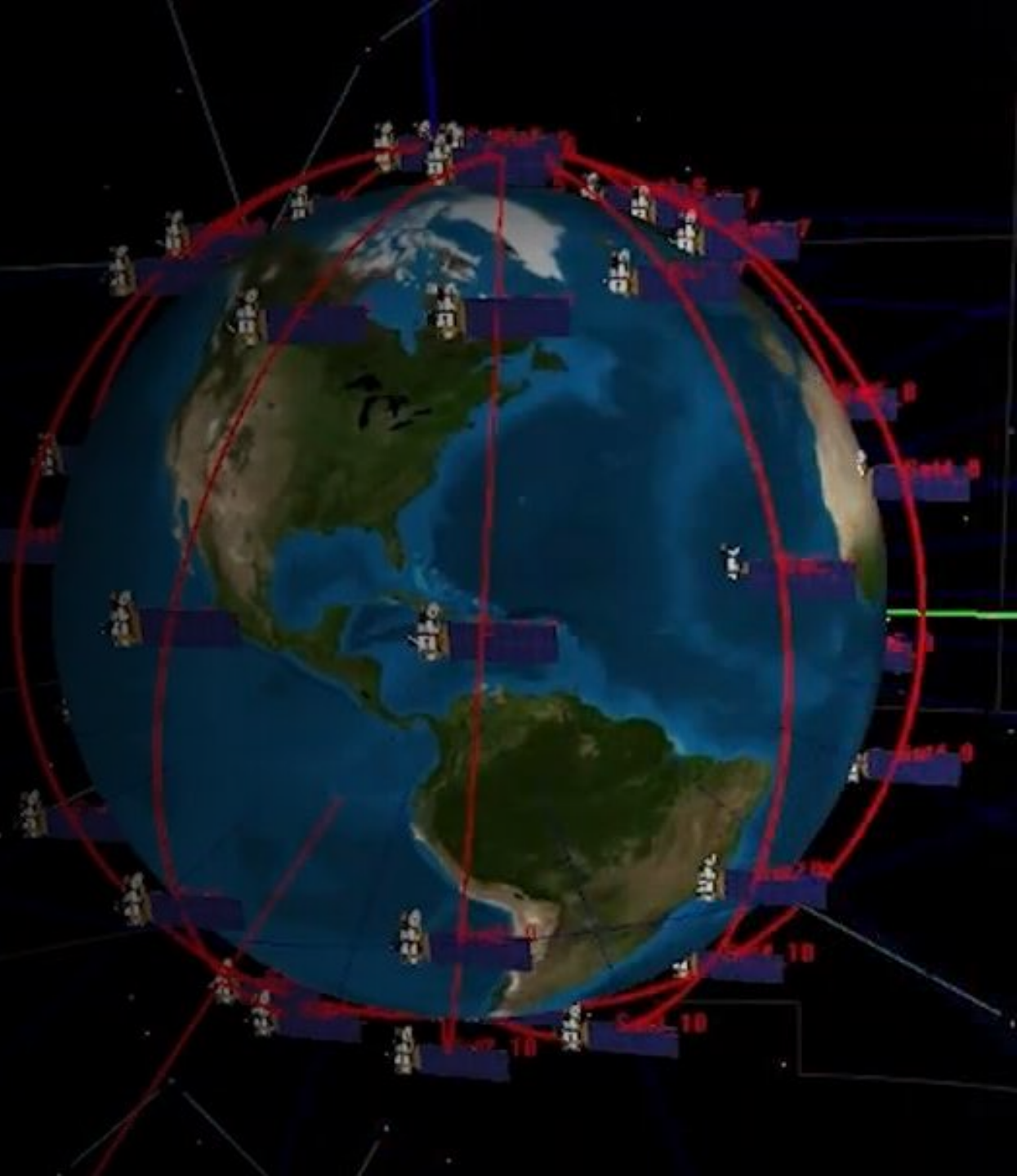
Strategic partnership with aerospace department Fondazione UniMi and many prestigious universities;

AGRITECH

Biomediteck and ESA to save European olive trees from xylella fastidiosa

NEXT STEP

To deploy 100 pico-satellites on orbit in order to cover any corner of the planet anytime



BUSINESS PLAN IN BRIEF

LORAWAN BAND CEILING CALCULATION	Amount	Uma
NUMBER OF PILOT SATELLITES	100	satellite
NUMBER OF ORBITS	5	orbit
GROUND STATION NUMBER	12	pz.
MAXIMUM NUMBER OF PACKAGES FROM GS TO GS	500000	pz.
RANDEVOUZ PERIOD	12	h
MEDIUM ALTITUDE ORBIT	500	Km
CONO AMPLITUDE	90	90°
MAXIMUM NODE DISTANCE	720	Km
LoRa PACKAGE SIZE	30	Byte
COVERED WORLD AREA	99,30%	%
NUMBER OF DAILY PACKAGES THAT CAN BE ACQUIRED	600.000.000	packets

Average price per package	€ 0,03
ANNUAL TURNOVER	€ 6.570.000.000,00

	Byte	KByte	MByte	GByte	TByte
BANDWIDTH GENERATED PER YEAR	131400000000000,00	12832031250,00	12531280,52	12237,58	11,95
MONTHLY BANDWIDTH	1080000000000,00	1054687500,00	1029968,26	1005,83	0,98
DAILY BAND	36000000000,00	35156250,00	34332,28	33,53	0,03

QUESTION: TOTAL LoRa daily packages	2.000.000.000	packets	DAILY OFFER	600.000.000	packets
APPLICATION: TOTAL ANNUAL PACKAGES LoRa	730.000.000.000	packets	ANNUAL OFFER	219.000.000.000	packets

Thanks For Watching

Alessandro Fanni

CEO

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WWW.CSHARK.IT