Best-in-class Spaceborne GNSS Receiver Technology

SpacePNT+

About us

SpacePNT builds on a long GNSS receiver tradition originating from the activities of its founders and key engineers at the Ecole Polytechnique Fédérale de Lausanne (EPFL), ranked 14th university in the world, where they pioneered the development of highly sensitive GNSS algorithms for space exploration missions.
After a stint with Syderal Swiss, SpacePNT, founded in 2020, took over the intellectual property and GNSS team to become a global leader in Positioning Navigation and Timing (PNT) solutions for space applications.
SpacePNT is supported for its technology and product developments by ESA, Swiss Space Office, and Swiss business angel investors

Our *solutions*

SpacePNT has developed its own HW&SW high-performance radiation-tolerant spaceborne GNSS receiver technology designed to address the most stringent needs and challenges of the New Space market, from LEO to Moon altitudes

- ***NaviLEO™***: our standard and flexible solution delivering meter-level positioning and timing accuracy autonomously and in real-time for LEO satellites
- ***NaviLEO-POD[1]***: our high-performance solution delivering sub-decimeter-level positioning and timing accuracy autonomously and in real-time for LEO satellites
- ***NaviGEO[1]***: our high-performance solution for launcher upper stages and in-orbit servicing vehicles, with optional dual-antenna inputs to provide optimal GNSS visibility from LEO to GEO
- ***NaviMoon***: our advanced super-high-sensitivity and autonomous solution, enabling Moon transfer orbits and cislunar missions, removing reliance on costly Earth station infrastructures
- ***Navi-G2[1]***: our second gen. solution optimized for LEO telecom and LEO-PNT satellite constellations requiring a lower SWaP-C (also customizable upon request for GEO, Moon and other missions)

In addition, SpacePNT has developed ***SimORBIT*** (in partnership with Spirent), a high-accuracy orbital modeling software tool for LEO satellite orbit simulations, implementing a highly accurate dynamic model specifically designed to meet the stringent simulation requirements of POD for LEO satellites

Our applications

Remote sensing; Earth observation; in-orbit servicing; space debris removal; provision of secured localization services from LEO (for GNSS backup or provision of alternate PNT services) or from cislunar orbits (for Moon PNT services); autonomous navigation and timing for Moon missions; optical constellations; launchers and upper stages; and more

Current participation in ESA and other intitutional/commercial programs

SpacePNT's spaceborne GNSS receiver solutions have already been selected by ESA and other major space agencies and commercial companies around the world to fly in many LEO (including ISS) and above missions (including around the Moon onboard ESA/SSTL Lunar Pathfinder satellite)

[1]under development, consult factory for availability

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Highest autonomous positioning and timing precision

- **NaviLEO-POD**'s high-performance autonomous on-board proprietary real-time precise orbit determination (POD) algorithm provides sub-decimeter (3D rms) positioning and ns-level timing in real-time onboard LEO satellites
- **NaviMoon**'s advanced navigation algorithms integrated with precise orbital forces model can provide <100 m (3D rms) in Moon transfer orbits and cis-lunar space, fully autonomously, cutting the dependence on costly Earth infrastructure for orbit determination
- **NaviGEO**'s dual antenna covers the needs for launchers and kick stages from LEO to GEO and beyond, no matter the spacecraft's attitude

New Space radiation tolerant design

- Based on the use of high performance rad-tolerant COTS EEE components and a radiation tolerant HW/SW/FW architecture including latch-up protections and ECC
- Compact design (low size, weight, and power)
- Total Ionizing Dose allows +10 years mission lifetime in LEO (typical)
- Upgradable on option for longer mission lifetimes

Highly reliable architecture

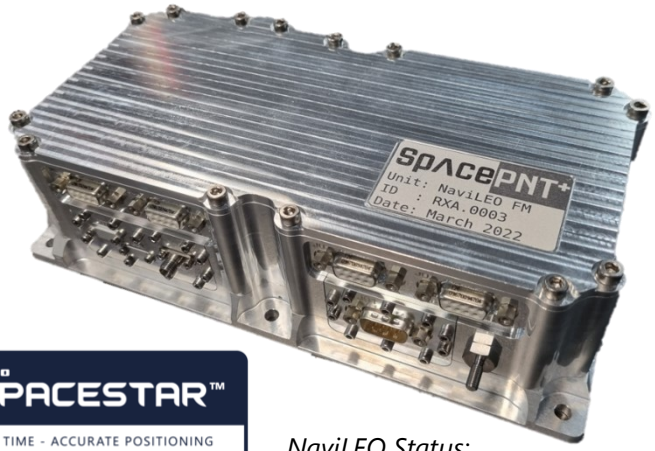
- Implements a tightly coupled orbital forces model for improved performance and availability, allowing to propagate the navigation solution even when few or no observables are available
- Supports multiple GNSS and multiple frequencies, including multiple sources for precise orbits and clocks
- Supports cold/warm redundancy with 2 units

Upgradable and scalable

- Full in-flight FW/SW upgradability (including FPGA)
- One unique platform solution for launchers, LEO, GTO, GEO, HEO, and even Moon missions
- Optional external LNA allows the use of passive antenna(s) and provides additional filtering
- Highly customizable with many options (POD, internal or external clocks, passive/active antenna(s), internal/external LNA, etc.)

Applications

- Remote sensing; Earth observation; Optical constellations, in-orbit servicing; space debris removal, LEO-PNT (GNSS backup or provision of alternate PNT services), Launchers and upper stages and more



FUGRO SPACESTAR™
REAL TIME - ACCURATE POSITIONING
SYSTEM ENABLED

NaviLEO Status: in production

Key performance characteristics	
Real-time pos. accuracy[1]	< 1 m (3D rms) < 10 cm (3D rms) with POD option
Warm / cold TTFF[2]	<60s / < 300s
Lifetime, reliability, Qualification levels	See relevant product datasheets
Technical	
Signals and frequencies POD correction channels[2]	GPS L1C/A L5I/Q Galileo E1B E1C E5a-I/Q Galileo E6 or L-band Inmarsat
Number of antenna inputs	1 or 2 on option (internal LNA supports both active/passive ant.)
PPS signal	6x RS-422 pairs (on 2 connectors) GPS/Galileo synchronized
TM/TC	2x (N+R), UART (RS-422) CAN on option PUS-CCSDS compliant
Update rate	1 Hz
Physical	
Power and voltage[2]	8 W typ. at 5V regulated (4.8 – 5.2V) 10 W typ. at 28 V (isolated input option)
Mass and dimensions[2]	NaviLEO/NaviGEO/NaviMoon: <1500 gr typical (no ant.) 234 x 121 x 66.3 mm[3] Navi-G2[3]: reduced size & weight

[1] *for a typical LEO orbit (800 km altitude)*
[2] *depending on configuration*
[3] *under development, consult factory for availability*