FFI Forsvarets forskningsinstitutt

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TNO innovation for life

FACT

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MilSpace2

Spectrum monitoring dual satellite system

The MilSpace2 satellite system will demonstrate the military use of a microsatellite spectrum monitoring system. The mission will build on experience from the Norwegian NorSat-3 and the Dutch BRIK-II missions.

The "Strategic Mutual Assistance in Research and Technology" (SMART) Military Use of Space (MilSpace) Science & Technology cooperation is a bilateral agreement between the MoD of the Kingdom of The Netherlands and the MoD of the Kingdom of Norway. The project team, acting on behalf of the MoDs, consists of FFI from Norway and NLR and TNO from The Netherlands. This consortium forms a bilateral project to develop an innovative dual satellite concept that will detect, classify, and accurately geolocate radars of interest including navigation radars used on ships.

TDoA and AoA

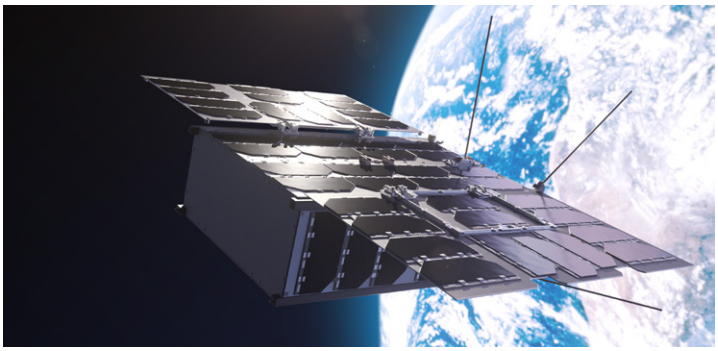
The mission will provide a non-cooperative and all weather capability for detecting radars of interest. The two nano-satellites, Birkeland and Huygens, will both be able to measure angle of arrival (AoA), and will give added capability through time difference of arrival (TDoA). Simultaneous detection of pulsed radio frequency emissions when the satellites operate in tandem enables improved geolocation through combined AoA and TDoA geolocation techniques. This is the first known concept that will offer combined AoA and TDoA for a two satellite system. Each satellite is 6U, where 1U equals 10 cm x 10 cm x 10 cm. The mass of each satellite is around 10 kg. The two satellites were launched with SpaceX from Florida in January 2023.

Tandem and formation flying

This is the first time Norway and The Netherlands launch a constellation of satellites that will fly in tandem, which means the involved parties gain experience in formation flying throughout the project. The two satellites will be placed into a polar Low Earth Orbit (LEO) with an altitude of 535 km. They will be positioned in the same orbital plane and the separation distance will vary throughout the mission.

Coverage

For the planned LEO orbit, the payload antenna footprint can cover any point on the Earth's surface at least four times per day. There will be a higher number of possible observations for higher latitudes. There may be as many as 15 daily observations of areas in the High North.



Illustrations: Nanoavionics

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