

RadioLabs

Expertise & Profile

July 2018

<http://www.radiolabs.it>

+ 17 years experience in

Innovation
ICT
Research
5G
Multimedia
Cyber Security
Location based Services
TLC
Smart Environment
IoT
Collaborative
Knowledge sharing

Consortium Founded in 2001



AnsaldoSTS

Hitachi Systems CBT S.p.A.

RadioLabs is a non-profit research Consortium of Universities-Industries established in 2001. Since 2011 has been involved in the study, design and test of high-integrity localization systems, GNSS simulators, multi-bearer TLC and anti-jamming anti-spoofing technologies for train control systems.

The headquarter is in Rome, Corso d'Italia 19, Italy and the associated laboratories are in the University of Rome Tor Vergata, University of L'Aquila and University of Roma Tre.

RadioLabs mission is to contribute on Applied Research, Innovation, and Knowledge Transfer in the emerging fields of ICT and GNSS technologies and relevant applications.

Moreover, RadioLabs trains high level technical personnel, assists young researchers with grants and any other applicable support to their research activities, provides support to PhD activities of the partner Universities, and promotes the dissemination of results through conferences, workshops and specialized publications.

Radiolabs

Research Consortium

Radiolabs is involved on major international research projects with ESA, ASI, GSA and Centers of Excellence



Leader on scientific research for safety-critical geo-localization

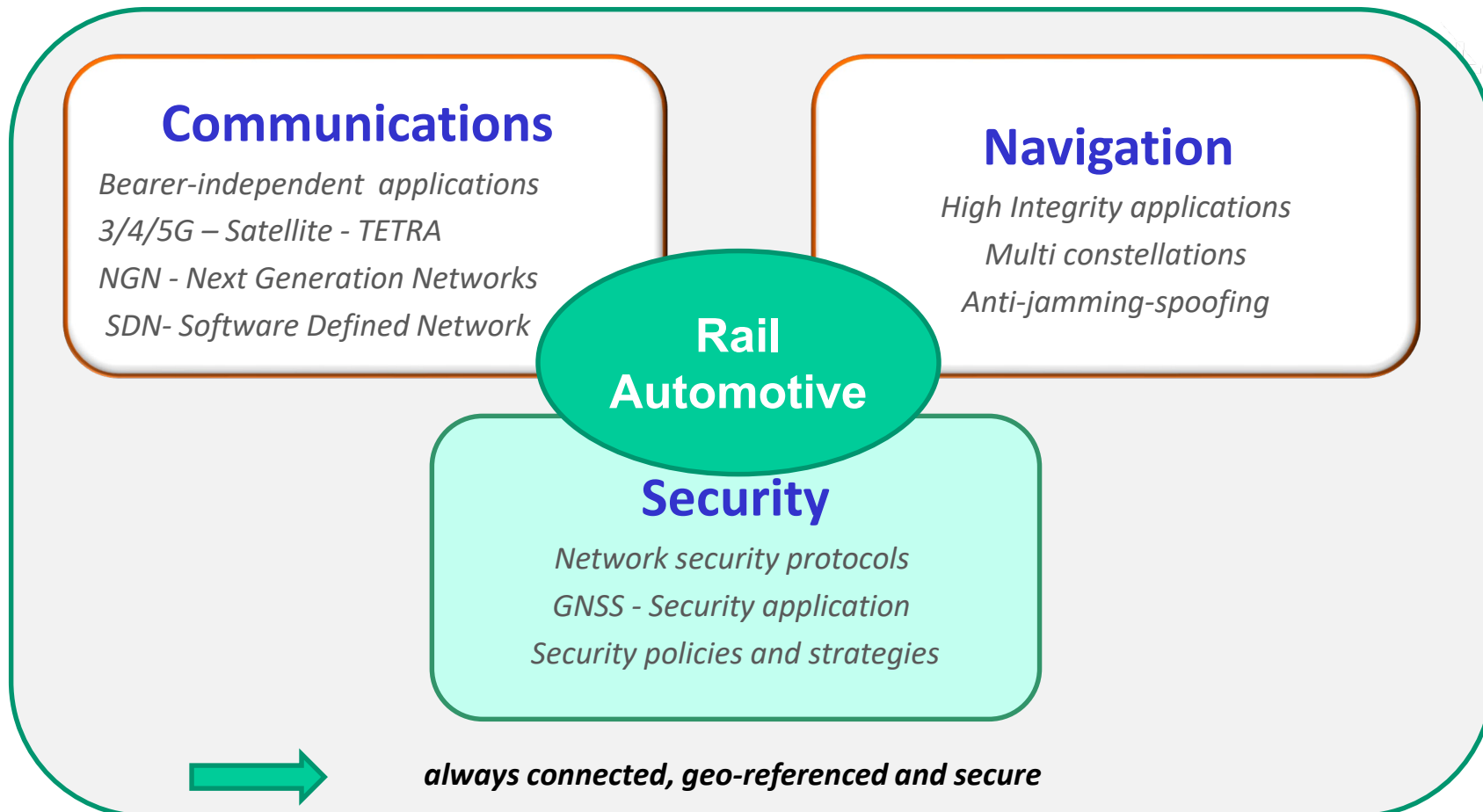


Università
degli Studi
de l'Aquila

Hitachi Systems CBT S.p.A.

Ansaldo STS

A Hitachi Group Company



Radiolabs collaborates with:



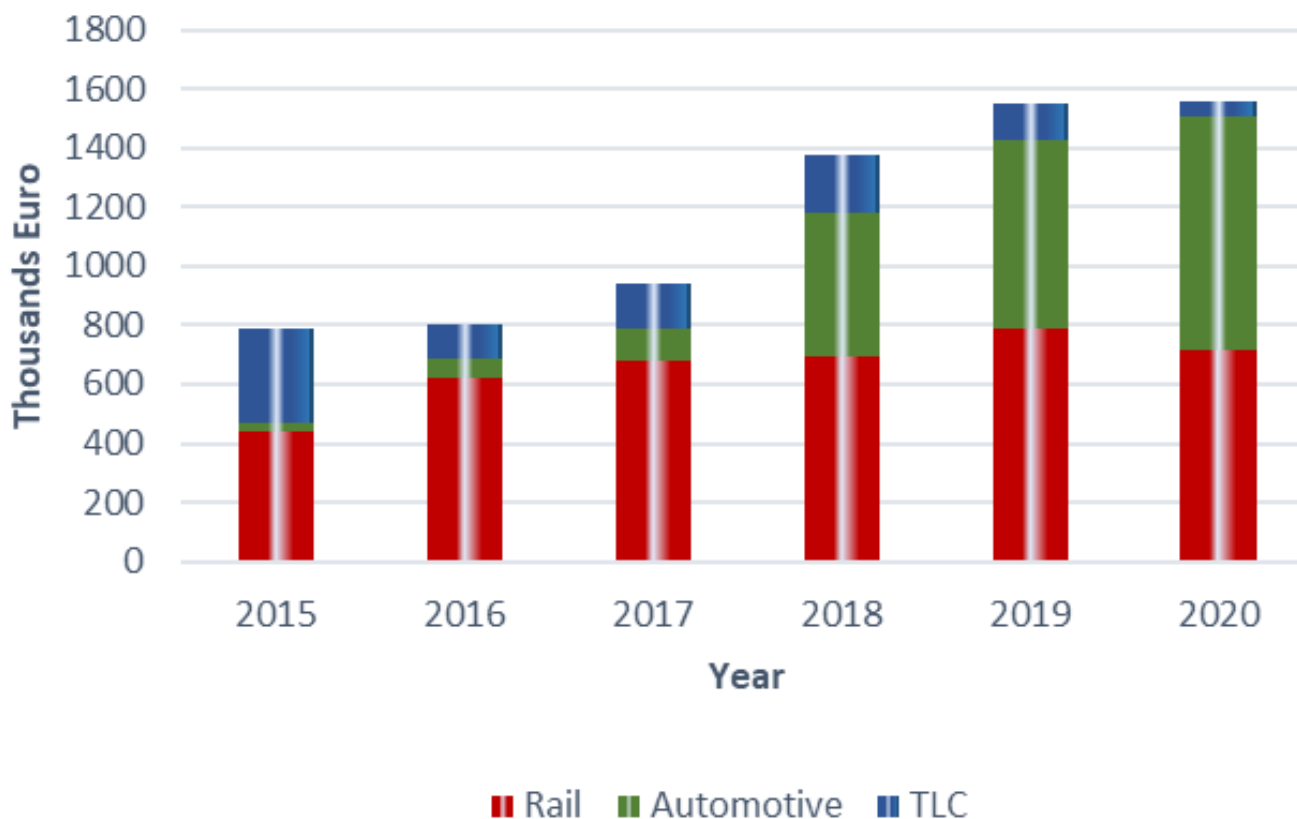
European Space Agency



FIAT CHRYSLER AUTOMOBILES



Market status & trend



The RadioLabs team includes 10 staff dedicated to specific projects (PhD, Masters and Engineers) with specific skill in the areas of telecommunications, including wireless, railways communication and navigation, and new media technologies. Other 23 researchers are affiliated through the Universities. Thanks to the close relationship between University and Industry partners strongly committed to research and innovation, RadioLabs is able to set up joint teams able to gather a wide range of high level and complementary research expertise.

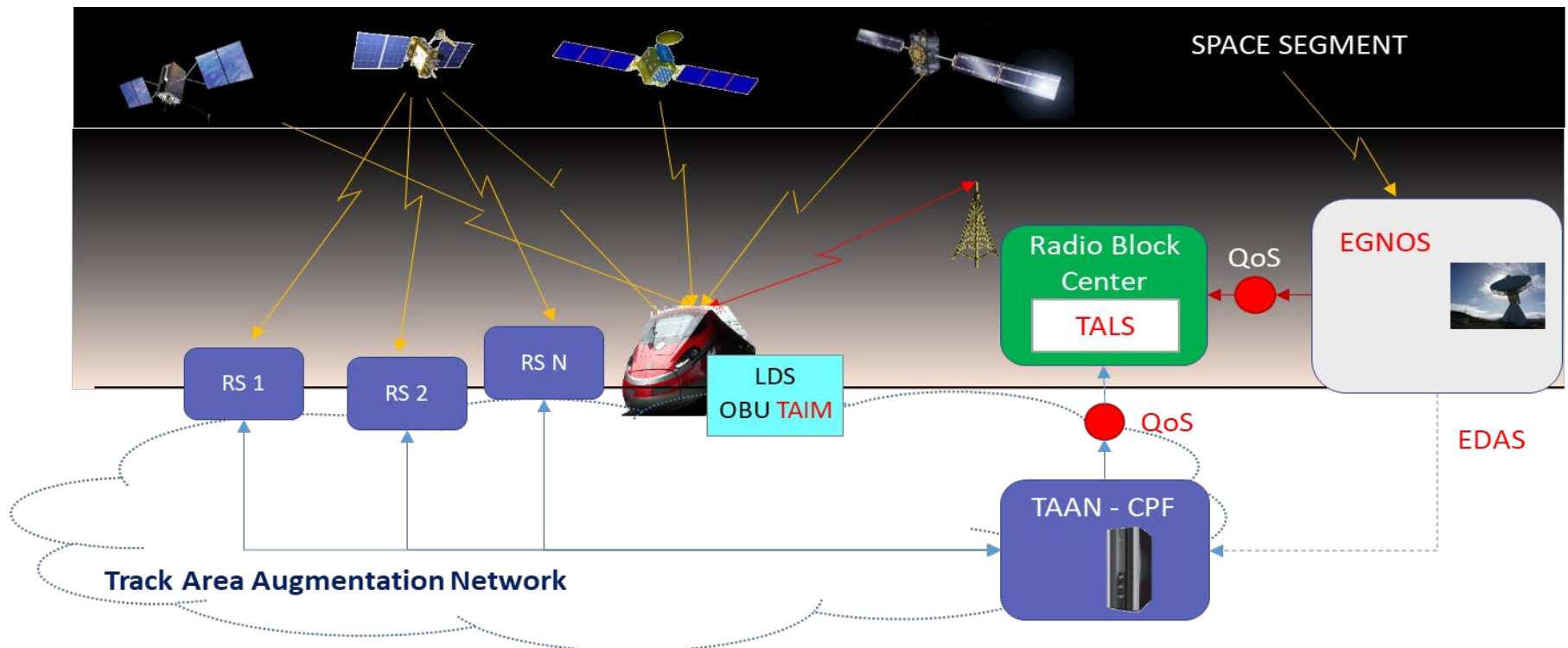
In the last 10 years, RadioLabs has developed research projects for a value of approximately 10 M€ and has published more than 40 Papers.

Follows a Short Description of Main Projects



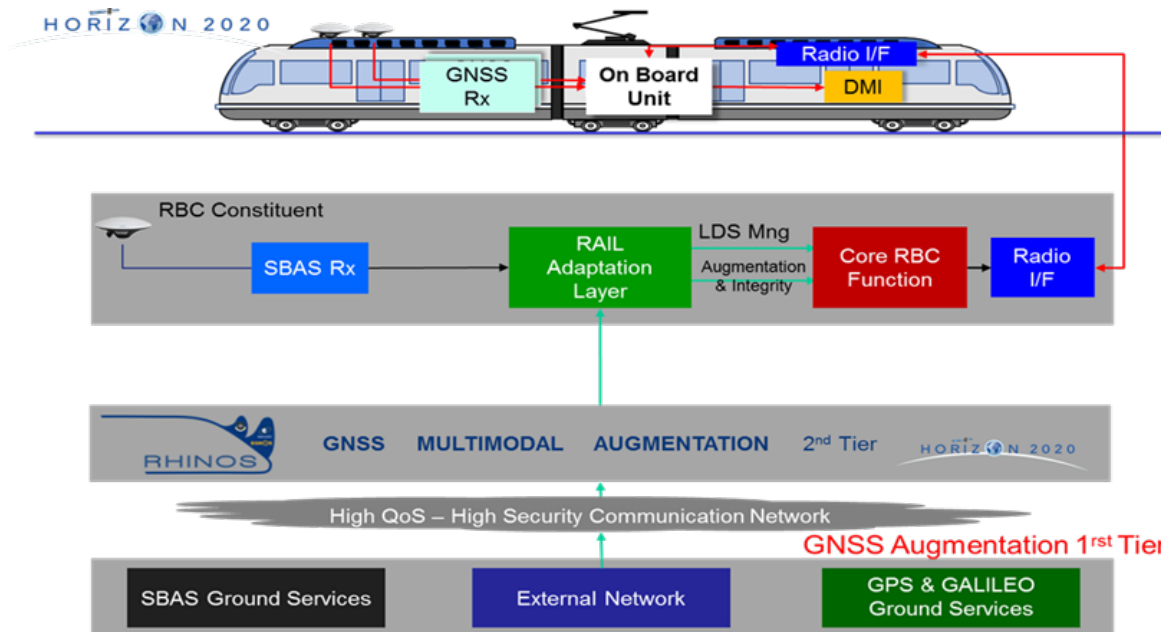
The main **ERSAT EAV** objective is to verify the suitability of EGNSS as the enabler of cost-efficient and economically sustainable ERTMS signalling solutions for safety railway applications.

The outcome of ERSAT-EAV is a priority for reusing the ERTMS standard architecture to satisfy the needs of the regional and local lines and for supporting the UNISIG Satellite Positioning Working Group that has been created (June 2012) to specify and standardize the application of the satellite positioning for the harmonization with the European ERTMS standard, by implementing and testing the solution on a pilot line as reference.

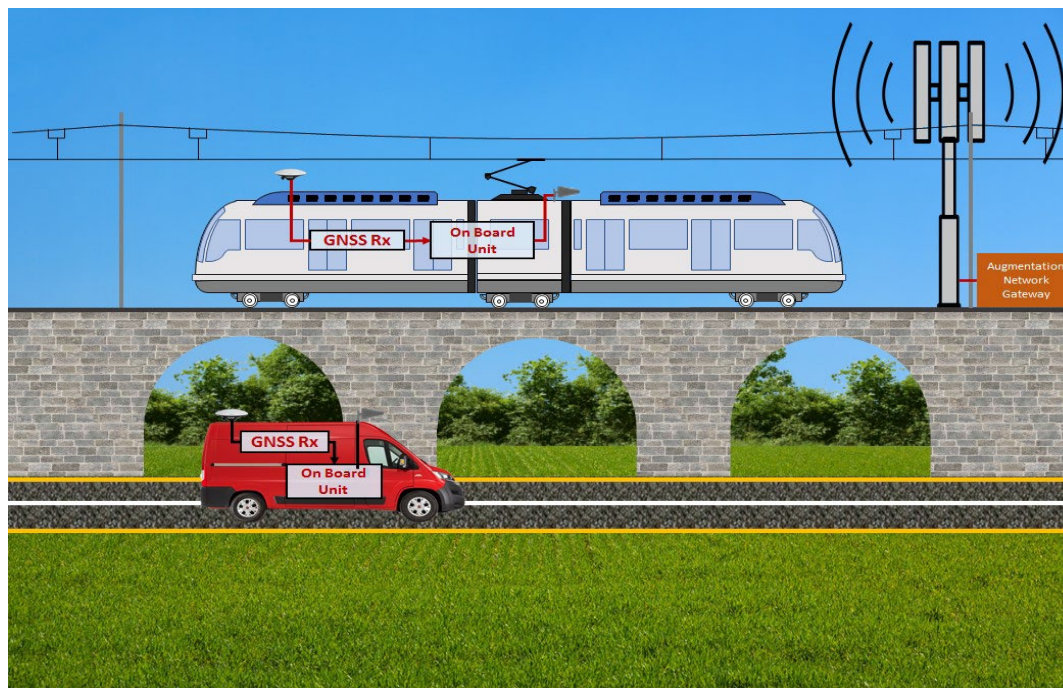


The RHINOS will develop candidate concepts for the provision of the high integrity needed to protect the detected position of the train:

- **EGNSS (GPS and GALILEO)** plus the SBAS constitute the reference infrastructure that is available worldwide. In addition to that, local augmentation elements, ARAIM techniques and other sensors on the train are the add-on specific assets for mitigating the hazards due to the environmental effects which dominates the rail application.
- **International cooperation with the Stanford University** researchers that have been involved in the aviation application since the birth of the GPS. They have indisputable knowledge of the GNSS performance and high-integrity applications.
- Ambition is a **global solution** a step beyond regional GNSS platforms.



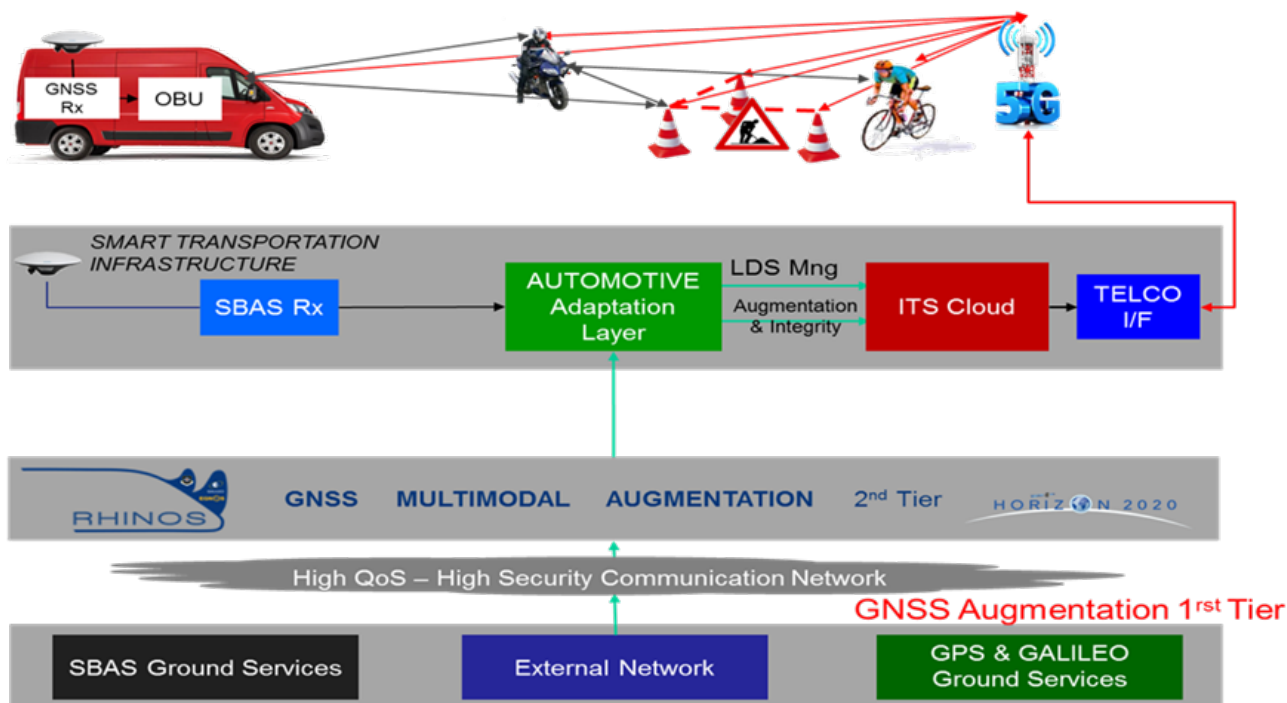
VIRGILIO is the latest simulation tool for high integrity GNSS applications in the land transportation domain. With flexible and customizable interfaces for the input data, VIRGILIO has everything going for supporting the design of augmentation networks. VIRGILIO is transparent to the input sources allowing the acquisition of GNSS data from field equipment and the synthetic generation representing the raw observations of the GNSS receivers at any earth location and at any time. Accurate navigation data can be downloaded from IGS or synthetically generated and used to improve the quality of the synthetically generated observables. VIRGILIO's main capability is the accurate simulation of the GNSS location determination system as well as the impact of local faults due to communication channels, multipath and Electromagnetic Interference (EMI).



EMERGE is a strategic initiative aiming to **develop & validate the enabling technologies for the Connected Car**:

- Develop and validate the enabling technologies;
- Deploy a living test bed with **5G** and **GALILEO**;
- Develop & test the electronic horizon platform for Level 3 automation;

From the implemental and experimental points of view, it is planned to equip a fleet of commercial vehicles with a platform that integrates the most accurate geo-localization, connectivity and cybersecurity solutions for the prevention of hacker attacks, to enable advanced dynamic navigation functions and security.



The Digital Beamforming for RAIL project aims to design, develop and prototyping a Digital Beamforming Platform coupled with advanced GNSS signal processing techniques for high rejection of GNSS interfering and counterfeit signals, fully exploiting the characteristics of the railway context, in order to support the evolution of the LDS based on GNSS in European ERTMS/ETCS.

Currently, no commercial anti spoofing and anti-meaconing solution has been designed for the railway context.

The proposed solution exploits both beamforming interference rejection capability and a DSP and Navigation stage spoofing mitigation operating in the temporal domain based on the tracking channels correlators. During the project, a 4-element antenna array and the RF front-end based on COTS components has been assembled, in order to support the development and test of the time-space adaptive beamforming, and the DSP and Navigation stages.

