GUIDE - GNSS

Testing Laboratory specialized in geolocation

Entity Name
GNSS Usage Innovation and Development of Excellence

Entity Form
SCIC SA - limited liability General interest Cooperative

Registered Identification
RCS Toulouse
524 351 244 00016

Industry code and sector
Technical testing, analysis and consultancy services [7120B]

Shareholders

CGX
Operator of specialized platforms and data centers

GEOSAT
Expert Surveyors specialized in modelling 3D maps with GNSS & LiDAR

OKTAL
Developer of simulators based on synthetic environments : IR, Radar & GNSS

M3 SYSTEMS
Developer of GNSS receivers and simulators

SILICOM
Developer of IT solutions including GNSS test benches

EXAGONE
Operator of the TERIA network providing GNSS correction services (NRTK)

History

Created in 2010, GUIDE, an Association “loi 1901”, has brought together 12 founding members to develop a Centre of Excellence dedicated to geolocation. The means implemented are co-financed by the French state and local authorities through an "Innovation Platforms" program.

The vocation of this entity is to provide solution developers with the instrumentation, skills, and approvals needed to address the most demanding satellite geolocation markets.

Over the years, GUIDE has built up a solid operational experience in conducting GNSS metrology tests. Its Quality Management System has been recognized and obtained a ministerial approval, 2 years in a row, as part of the ECOTAXE project.

Adopted by the European standard EN16803-2, the methods developed by GUIDE prove to be scientifically sound and economically indispensable for certifying on-board positioning systems on road vehicles and more broadly on all terrestrial vehicles.

Vocation

GUIDE is a Testing Laboratory specialized in GNSS+, implementing and providing all types of services intended to assess, validate and certify geolocation performance of critical functions used by ITS applications.

Missions

GUIDE offers 3 types of mission:

a. Study the levels of security and integrity inherent in geolocation data, especially those embedded in autonomous vehicles (cars, trains, robots ...)

b. Characterize and validate the performance of geolocation solutions as an independent expert in compliance with the requirements of European standards

c. Evaluate GNSS Performance throughout the industrial process, from design to production, including prototype validation (Design & Architecture, R&D, Prototyping, Production)

The skills of its engineers, experts in GNSS, also address the legal metrology dedicated to geolocation.

Technical Means

- Reference Instrumentation, including a high-precision inertial unit
- Record & Replay instrumentation, covering all the GNSS bands
- Constellation simulation
- Interference generator
- Anechoic chamber
- Propagation simulator in synthetic environments

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SERVICES

Engineering - Tests

- Specification of test methods
- Planning of tests
- Performing of tests
- Processing and analysis of test data
- Test reports

Engineering – Test resources

- Definition of metrology means
- Design, development and distribution of test scenarios consisting of signals and data to be replayed
- Development and distribution of analytical tools
- Training

Engineering - Performance

- Assisting the implementation of GNSS technology
- Assisting risk management
- Studies, Consulting & R & D Work

OUR CLIENTS

METROLOGY

Test Methodology

The test methods to evaluate geolocation solutions are selected according to 4 key criteria:

1. The **representativeness** of the test conditions: signals, sensor measurements, velocities, ambient conditions, ...
2. The **repeatability** of the tests: making comparisons possible;
3. The **speed** of testing: facilitating decision-making;
4. The allocated **budget**: adapting efforts to the stakes;

Three test techniques are offered by GUIDE:

- Live testing onboard a given vehicle: the implementation of this technique for metrology purposes is quite complex. However, it offers the best level of representativeness even if repeated tests are not identical. It is more often used for validating the final integration of the GNSS solution.
- Replay testing: This technique consists in replaying on a test bench GNSS signals and sensor measurements previously digitized in the field. It meets all of the previously stated criteria and provides more comprehensive analysis capabilities to assess accuracy and availability.
- Simulation: These tests are justified for difficult, even inaccessible, test configurations, as a complement to the other techniques.

Tests in the Real World

The planning of the field tests begins with the identification and the characterization of the routes to be taken. These must gather all the different types of environments that may cause errors. The test vehicle embeds the devices under test (DUT) and the necessary metrology instrumentation including:

- Reference instrumentation : professional receiver, inertial unit, odometer, base station
- Control instrumentation: metrology receiver, a panoramic video
- Digitization instrumentation: optional devices dedicated to GNSS signal replay-based analysis

The position measurements taken from the DUTs are then compared with the consolidated ground truth from the reference instrumentation data.

Tests in Record & Replay

The replay technique restores GNSS signals and any other digitized measurements from both real and synthetic environments on a test bench. They can also be mixed with other interference generated on a second instrument.

The user scenarios can cover all types of routes, for instance rural, peri-urban, urban, highways, mountainous ... In addition, this test methodology opens up new opportunities for in-depth GNSS terminal evaluation by identifying sources of errors, such as bridges, roads under canopies, avenues lined with more or less high buildings, ... and clearly assessing their impact.

The usual statistical dispersions are enhanced in particular to evaluate the persistence of errors.

The results lead to very precise characterization reports in order to determine choices according to given mission profiles, and to improve implementation conditions: antennas, augmentation/corrections, hybridizations, permanent or contextual settings, ...

Tests in Simulation

A generator can simulate all GPS, GALILEO, GLONASS, BEIDOU constellations and those covering regionalized areas. As seen previously, the development tools are able to intervene on the clocks, the orbits, the messages and the atmospheric phenomena.

Naturally, the location, date, time and speed of the virtual vehicle are defined in the scenario. Depending on the configuration, different antenna patterns can be applied and modified. The signal strengths are adjustable, for example to determine the sensitivity threshold of the terminals under test.

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