

NEUROPULS

Use Case n.2

Protecting Critical Applications: The Role of GNSS Anti-Jamming in the NEUROPULS Project

Start date of the project: 1st January 2023

Duration 48 months

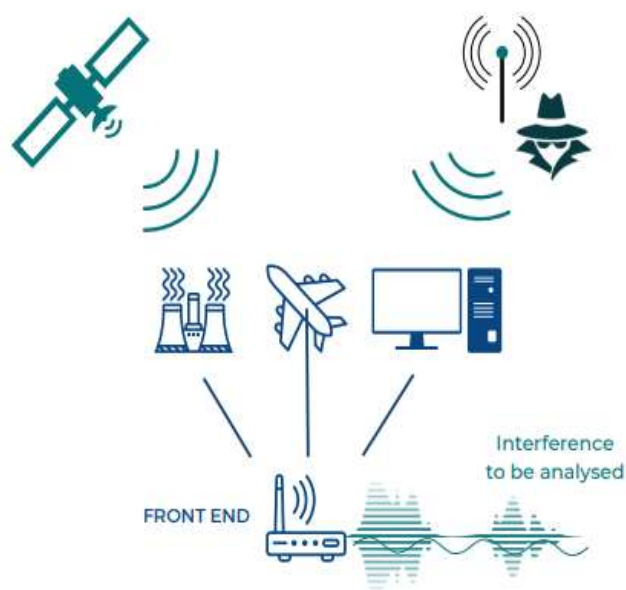
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Protecting Critical Applications: The Role of GNSS Anti-Jamming in the NEUROPULS Project

In our increasingly interconnected world, Global Navigation Satellite Systems (GNSS) play a vital role in various sectors, including civilian, security, and defense applications. However, the growing reliance on GNSS has brought to light significant vulnerabilities, particularly the risk of signal jamming. This is where the NEUROPULS project steps in, offering innovative solutions to protect these critical systems.

Understanding the risk

GNSS technology is the backbone of many critical operations, from navigation and timing to emergency services. Unfortunately, this dependence makes it a prime target for intentional interference, or jamming. Studies reveal a 20% annual increase in jamming incidents, underscoring the urgent need for effective countermeasures. The consequences of disrupted GNSS signals can be catastrophic, leading to significant economic losses and operational failures.

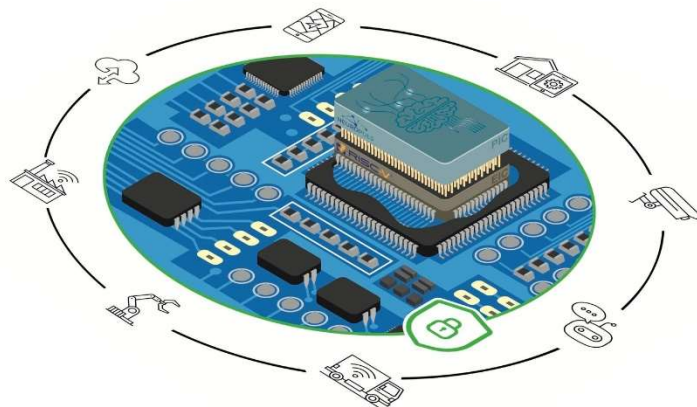


NEUROPULS: a pioneering solution

The NEUROPULS project is dedicated to addressing this pressing issue by developing advanced GNSS anti-jamming technologies. With a focus on proactive detection and response, NEUROPULS aims to safeguard critical applications against the threats posed by signal interference. This initiative is part of a broader effort to enhance the resilience and security of our essential infrastructures.

How it works

At its core, the NEUROPULS solution is designed to detect and neutralize jamming threats before they can cause significant harm. By employing cutting-edge neural network-based interference detection systems, the project ensures early detection and timely alerts for potential jamming signals. This proactive approach enables rapid responses, minimizing the impact of any attempted disruption. The neural network interference detector is tailored to leverage the photonic technology that NEUROPULS is developing, which provides a major reduction on the system latency to flag the alarm compared to digital NN solutions where sub-ns operation can be achieved thanks to high-speed multi-Gb/s photonic NNs.



NEUROPULS approach based on a photonic accelerator interfaced with a RISC-V processor.

Real-World Impact

The practical benefits of NEUROPULS's anti-jamming technology are profound. By improving the reliability and accuracy of GNSS-based services, the project helps to prevent economic losses and operational failures that could arise from signal interference. This not only enhances the security of critical applications, but also fosters greater public trust in the reliability of GNSS technology.

Moreover, by reducing the frequency and severity of jamming incidents, NEUROPULS contributes to the overall resilience of essential infrastructures. This is particularly important in sectors where uninterrupted GNSS services are crucial, such as transportation, power grids, emergency response, and military operations.

Looking ahead

The work being done by NEUROPULS is a significant advancement in the field of GNSS security. As the project continues to evolve, we can expect even greater enhancements in the protection of our critical systems. The innovative anti-jamming technologies being developed are setting new standards for safeguarding against interference, ensuring that our reliance on GNSS remains a strength rather than a vulnerability.