IDEMIA

IoT device cybersecurity: HyGARDE consortium hits first milestone

The functional crypto-agile prototype is applied to hydrogen energy storage.

CONNECTIVITY   CYBERSECURITY

The HyGARDE consortium, led by IDEMIA Secure Transactions (IST), announces a functional prototype of its off-the-shelf cybersecurity platform. This achievement marks a major step towards ensuring the long-term security of critical connected equipment, with an initial focus on hydrogen energy storage.

For critical infrastructure with a lifespan of 15 years or more, the threat of future cyberattacks, particularly from quantum computers, is a major concern. To address this challenge, the HyGARDE platform implements **a crypto-agile architecture** that centralizes all critical cryptographic operations in a **root of trust** built on IST's eSIM and IDEMIA Sphere cryptographic libraries, both quantum-ready. This root of trust supports secure and remote updates of cryptographic assets, ensuring **continuous cybersecurity maintenance** throughout the equipment's lifecycle. With this architecture, critical systems can rapidly adapt to evolving threats and remain resilient against emerging vulnerabilities, including by preparing for quantum-safe migration.

This milestone, funded by France 2030 and achieved through the joint efforts of cybersecurity experts IST, IoT.BZH, SOLENT (part of Smart4Engineering group) and energy specialist Solutions Hydrogène, represents a key advancement toward a sovereign cybersecurity solution for essential systems and the migration to quantum-safe solutions.

Optimizing the full lifecycle and total cost of ownership of IoT devices

To streamline cybersecurity updates, the HyGARDE platform leverages IoT.BZH's software factory to **generate secure-by-design embedded systems**. This approach significantly reduces the costs and complexities of developing, certifying, and maintaining the cryptography that protects IoT devices in critical infrastructure. It optimizes the entire lifecycle of these devices, from initial development and secure installation to over-the-air maintenance and decommissioning.

Improving cybersecurity and simplifying compliance

The HyGARDE platform provides a **robust, multi-layered defense** by integrating key components from industry leaders. At its foundation is IST's hardware-based root of trust, seamlessly combined with IoT.BZH's secure operating system (www.redpesk.bzh).

SOLENT experts spearhead this defense, having designed and implemented the **secure communication gateway**. This critical component uses IDEMIA Secure Transactions' state-of-the-art cryptographic services to establish and maintain highly secure data exchange channels, thereby guaranteeing continuous data integrity.

Furthermore, SOLENT developed an **AI-powered anomaly detection solution**. This sophisticated tool is capable of self-learning and adapting to newly installed distributed systems, which provides an **active layer of defense** that effectively anticipates and mitigates **emerging threats**.

The platform also provides tools that industrialize and automate the certification process, **simplifying compliance with industrial standards** such as IEC 62443 for industrial control systems or ISO/SAE 21434 for automotive. This further supports adherence to regulatory frameworks like the EU's Cyber Resilience Act or the NIS 2 Directive.

Paving the way for a safe energy transition

The HyGARDE platform's initial application focuses on a hydrogen storage equipment system, a critical component in the transition to renewable energy. As connected sensors, digital monitoring, and industrial automation become essential to ensure safe and efficient operations across energy systems, **industrial cybersecurity has become a strategic imperative** for all actors in the value chain.

By securing the innovative storage equipment developed by Solutions Hydrogène[1], the HyGARDE project not only protects physical installations and sensitive operational data against cyberthreats but also helps **build trust in emerging clean energy solutions**.

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[1] https://www.solutionshydrogene.com/en/teli-un-systeme-a-la-pointe-de-la-cybersecurite/#elementor-toc__heading-anchor-7