PROJECT PROFILE

16003

Versatile test facility improves system and product quality while reducing design and operational costs [HADES]

The smooth operation of mission- and safety-critical systems calls for early detection of potential problems to avoid safety-related issues and to control costs. The versatile test facilities developed in the HADES project will go a long way to ensure systems are more robust and safer over the complete product lifetime, and help avoid dangerous and costly system breakdowns due to integrated circuit (IC) failures.

Failure in an electronic system could impact it in several ways, notably operational disruption, economic loss or questionable data-integrity. Importantly, mission- and safety-critical systems (like those deployed in the space, automotive, health care or avionic sectors) require early detection of potential problems to avoid safety-related issues and to control costs. In order to guarantee that these systems operate at optimal performance levels calls for the use of a network of embedded test instruments to monitor the status and operation of 'building blocks' or the entire system, providing key data for optimising performance and ensuring proper operation, or to predict future failures. In addition, extracted data must be handled using a standardised and secure interface; and firmware in mobile systems must be online tested and updated securely in real-time.

Unfortunately, current industrial test-technologies cannot handle the needs of a large variety of Internet of Things (IoT) devices that are just appearing on the market, for which large amounts of data must be handled in a secure way. Furthermore, despite the existence of industry standards for IC testing, there are no regulated standards, methodologies and tools that address all these requirements.

Developing a hierarchical and versatile test-infrastructure

HADES will develop and deliver a secure, hierarchical test-infrastructure based on existing standards. This test facility will be versatile and reusable and offer better system monitoring, resulting in reduced test and design costs. It will not only increase dependability through a standardised framework for handling numerous embedded test instruments (ETIs) at the electronic control system (ECS) level; but also on-chip-reliability monitoring and electronic design automation (EDA) tools with diagnostics and online self-repair capabilities. And all of this will be demonstrated at a component and system level.

The project will target the following domains:

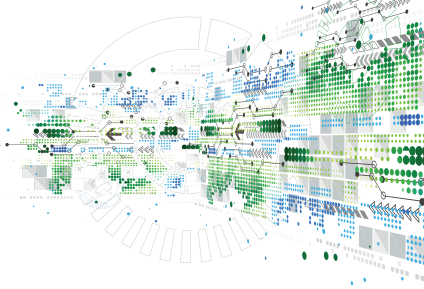
- Machine-to-machine and connected systems;
- Remote-controlled systems;
- Smart homes and mobile phones;
- Safety-critical systems (typically found in the automotive and avionics sectors);
- Mission-critical systems (such as in space and security applications).

HADES will deliver the following:

- Test capabilities and reusability throughout the product lifecycle;
- Test bus access at the required security level;
- Limited test costs compatible with IoT low-cost devices and high volumes;
- Online monitoring to enable prognostics and diagnostics, and improve dependability;
- Online monitoring for system power-management.

Core competencies

The project consortium is pan-European (from France and the Netherlands) and comprises five large companies; four small and medium-sized enterprises (SMEs); five academic and research institutions; as well as several OEMS. The consortium also provides the necessary expertise and experience needed to deliver a secure hierarchical online testing facility through ETIs. The large enterprises are already active in such areas as remote-controlled IoT systems, safety- and mission-critical systems, as well as automotive, smart homes and mobile applications. The SMEs, whose involvement is complementary to the work being done by the large companies, will focus on areas requiring their competencies. Academics and researchers will work on topics



KEY APPLICATION AREAS

- Transport & Smart Mobility
- Health & Well-Being
- Energy
- Digital Industry
- Digital Life

ESSENTIAL CAPABILITIES

- Systems and Components Architecture, Design & Integration
- Connectivity & Interoperability
- Safety, Security & Reliability
- Computing & Storage
- ECS Process Technology, Equipment, Materials & Manufacturing

PARTNERS

CEA / CNRS / Laboratoire d'Informatique de Robotique et Microélec IROC TECHNOLOGIES / ISSM / NXP Semiconductors France SAS / STMicroelectronics / TEMENTO SYSTEMS / Thales / TIMA Laboratory / Institut Polytechnique de Grenoble / Sorbonne University – LIP6 / D4T Systems / JTAG Technologies B.V. / NXP Semiconductor Netherlands BV / University of Twente

COUNTRIES INVOLVED

- France
- The Netherlands

PROJECT LEADER

Brigitte Descouts
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KEY PROJECT DATES

01 October 2017 - 30 September 2020

and challenges beyond state-of-the-art, and on unresolved technical and technological issues. This mix of project partners and expertise ensures that the project addresses relevant industrial problems and stays at the R&D cutting-edge throughout the project and beyond.

Improving quality, reliability and competitiveness

HADES not only supports failure detection, but also provides such capabilities as failure prevention, self-healing, self-repair and fault tolerance. In addition, it facilitates diagnosis and failure analysis and contributes to better system traceability. Furthermore, since ETIs will come with dedicated software, they will facilitate interaction and control across the complete ecosystem (such as IC manufacturer, system integrator and customer). Crucially, all concepts and techniques will be developed according to strict system-security principles. And by offering system developers greater robustness and dependability, HADES will make European products more competitive and ensure their wider use though improved quality (eliminating health hazards, for instance, will make them more attractive).

A promising market

It is important to point out that test tools are increasingly playing a key role in the overall manufacturing value-chain, regardless of product and its projected lifetime. Crucially, test is becoming a key enabler for IC and systems manufacturers to deliver products at the quality and cost-levels demanded by the market. In fact, without the backing of a powerful test architecture and test services, a product's sales potential will be reduced.

The global automated test equipment (ATE) market is expected to be valued at US$4.48 billion by 2020, according to Radiant Insights. In addition, increasing design complexity, coupled with the need for effective testing, is expected to drive demand in the global automated test-equipment market. Prime Research offers a broader view of the overall test market by including the electronic manufacturing segment, which is expected to represent another US$1.28 billion in 2014.

Furthermore, markets where HADES is expected to create added-value and enhance competitiveness are also growing, thereby also driving demand for this project's test deliverables. Gartner forecasts almost 30% growth through 2020 for IoT semiconductor revenue, which spans every industry and is driven by the immense scale of low-cost devices. Some in the industry even believe this growth will transform the semiconductor business. A case in point is automotive, which will see a significant rise in demand for semiconductors due to a 30% annual increase in networked cars, and where one in five automobiles will be receiving internet services by 2020. In fact, the total semiconductor revenue from electronic equipment is expected to reach US$45 billion in 2020, and with strong demand in the next ten years, IoT, which is at the heart of this growth, will generate revenues of US$11.5 billion in 2018.

Finally, consumers looking to enhance their lifestyles will also play a central role in growing IoT demand. In the home, where each household could contain more than 500 devices by 2022, demand will grow for semiconductors. Smart TV and set-top box (STB) revenues will continue to increase, and so will remote patient-monitoring for post-surgery or chronic-disease surveillance (in the USA, 86% of all health-care spending in 2010 was for people with one or more chronic medical conditions). Wearable systems are also expected to grow by more than 280% between 2015 and 2018. And other personal devices, like smart glasses, smart watches and mobile phones, will also be in greater demand as these devices start to play a bigger and more significant role in the life of the consumer.

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