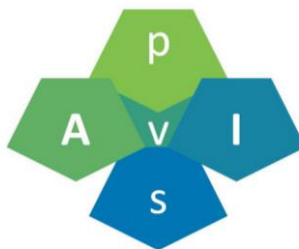# Patient and environmentally aware intelligent sensor systems

for improved diagnosis & treatment

Paris, 12 October 2022- PENTA project, pAvIs, is developing innovative electronics and intelligent sensor systems for healthcare applications such as medical imaging and vital signs monitoring. Its goal is to improve patient outcomes through more personalized diagnostics and treatment based on sensor systems that can adapt to the patient's physical features, their physiological processes (e.g. breathing, heartbeat) and movements, and also to the operating environment.

Many medical devices – from MRI, CT, and ultrasound scanners to monitoring patches stuck to the skin and sensing elements built into implantable medical devices – use complex sensors to diagnose, monitor, and help treat medical conditions. But the sensor-based systems they use are designed around an 'average' size patient and their performance can be affected by patients' movements and changes in the operating environment.

By creating intelligent sensors that embed AI the pAvIs project will overcome the limitations of existing systems to capture extremely small signals and adapt in real time to patients' physical features, motion, and operating conditions. This will not only lead to more personalized diagnostics and treatment but also support physicians in their work, speeding diagnosis and helping reduce healthcare costs.

The pAvIs results will include a new architecture for intelligent sensor systems, including a sensor module with an embedded mixed-signal processing chain at its core and new, adjustable components. The architecture will also feature dedicated neuromorphic processors and/or AI hardware accelerators and embedded AI algorithms for resource- and power-efficient execution and high performance.

These innovations will be prototyped in two use cases: 1) Adaptive sensor arrays for MRI (Magnetic Resonance Imaging) – adapting to patient size and movement; 2) Adaptive neuromodulation devices for cochlear implants, deep brain stimulation and non-invasive wearables – allowing stimulation to be optimized for each patient and pave the way towards closed-loop stimulation.

Bringing together a mix of large industries, SMEs and research organizations covering the complete business and technology value chain, pAvIs will deliver significant opportunities for consortium members and the European industry. The smart sensor market is expected to see double-digit growth in the coming years. And the global medical imaging systems market alone is expected to reach USD 37.0 billion by 2026 with a CAGR
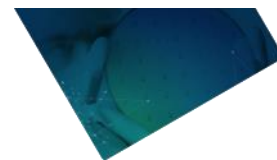
of 5.5%.[1] Moreover, the basic technologies developed in pAvIs have a wide range of applications beyond exclusively healthcare, opening extensive possibilities for both hardware component suppliers and software developers.

About the PENTA programme

PENTA is a EUREKA cluster whose purpose is to catalyse research, development and innovation in areas of micro and nanoelectronics enabled systems and applications. Guided by the Electronic Components & Systems (ECS) Strategic Research and Innovation Agenda (SRIA) four technology layers, four cross-sectional technologies and six ECS key application areas, the PENTA programme enables the development of electronic solutions to help drive the digital economy through the formation of collaborative ecosystems along the ECS value chain. This creates the opportunity for rapid competitive exploitation and a strong impact on European societal challenges. PENTA supports SMEs, large corporations, research organisations and universities to work together in project consortia by facilitating access to funding, fostering collaborative work and creating consortia in areas of mutual industrial and National interest. PENTA is managed by the Industry Association AENEAS

More on PENTA: http://www.penta-eureka.eu
More on AENEAS: https://aeneas-office.org

About the pAvIs project:

pAvIs is a RD&I project consortium involving 12 partners. The project partners are Bitbrain Technologies, Cochlear Technology Centre Belgium, Eindhoven University of Technology, GrAI Matter Labs, HealthTech Connex, ICsense, INBRAIN Neuroelectronics, Instituto Superior Tecnico UTL, Philips , SiliconGate, SystematIC design, TransEON. The project is funded by Belgium, Canada, the Netherlands, Portugal, and Spain.

pAvIs website: http://pavis-project.eu/

More on pAvIs: https://penta-eureka.eu/project-overview/penta-call-5/pavis/

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[1] Reports and Data, "Medical Imaging Systems Market", https://www.globenewswire.com/news-release/2019/11/12/1945018/0/en/Medical-Imaging-Systems-Market-To-Reach-USD-36-97-Billion-By-2026-Reports-And-Data.html