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**SERENA CUP C49J23000680003**  
**A NON-INVASIVE, LEAK-FREE DIGITAL PRESSURE SENSOR FOR RENEWABLE ENERGY GRID  
AUTOMATION**

**Project description:**

The SERENA project concerns the development of innovative digital pressure sensors for pressurised pipelines.

Specifically, the company intends to develop a new pressure sensor, which can be applied externally on any type of pipeline, and which is able to measure the expansion resulting from the pressure level inside the pipe, and thus measure the pressure and stress state externally to the pipe without the need for drilling and measuring stages flanged to the pipe, avoiding the use of seals and therefore leakage. The external application also simplifies the application of sensors on existing installations.

The sensor's long-range radio interface (LoRa) allows control algorithms to be implemented, monitoring and predictive maintenance of hydrogen and water distribution networks even in remote areas, such as mountainous or hilly regions. Hydrogen gas is a very small molecule, which makes it much more difficult to avoid leaks, making it difficult to distribute this energy in mountainous areas, or by transalpine pipeline. The existing water network, on the other hand, is often old and prone to heavy leakage, a fact particularly felt in recent years of drought in the Alpine region as well.

Operators will be able to monitor the network with minimal operational expenditure, either with standard data analysis (inferential statistics), or with machine learning/ Artificial Intelligence algorithms.

**The challenge:** to improve and enhance the efficiency of gas and water distribution networks in remote areas, avoiding water and gas leaks, and thus counteracting the effects of pollution and drought. Improved working conditions for working mothers and persons with disabilities, who will be able to perform their work in smart-working and remote data transmission.

**Why it is so innovative:** first commercialisation of a pressure sensor for hydrogen and water, seal-less, weld-less, externally applicable, which measures the deformation of the tube. Moreover, this idea has multiple potentials, as it can also be applied in other fields such as medical gases, in the industrial field (hazardous fluids), etc.

**How it changes lives of those who use it:** the complete digitisation of the sensor will ensure that all processes can be managed remotely, allowing users, including those with disabilities, to do remote working, safely and with the ability to care for their children while they work. In the medical field, the sensor will increase patient safety and decrease medical gas wastage, while also making hospital supplies more efficient.