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DADES DE L'EMPRESA I DE L'ENTORN ACADÈMIC

Títol del projecte

Design and Implementation of Nodes for the Internet of Things

Empresa

IDNEO TECHNOLOGIES, S.L.

Responsable de l'empresa

Enric Vilamajó Fontanet

Universitat

Universitat Politècnica de Catalunya

Director/a de tesi

Manuel Gasulla Forner

Treballador/a de l'empresa i doctorand/a

Edgar Ripoll Vercellone

BREU DESCRIPCIÓ DEL PROJECTE DE RECERCA

The internet of Things (IoT) stands for smart objects that communicate each other directly through internet without human involvement. In the next years, the number of smart objects will grow exponentially. It is foreseen that by 2020 there will be 10 billion smart objects. In particular, the existence of objects or smart nodes (IoT nodes, hereafter) able to sense, wirelessly communicate and energetically autonomous opens the door to new applications that would not be economically feasible if the nodes had to be wired. Thus, an IoT node will consist of sensors and their electronic interfaces, a microcontroller, a wireless transceiver and a local energy source.

A major stopper for the broad deployment of the IoT nodes is their local power source. Two main alternatives exist: 1) use of primary batteries or 2) environmental or transmitted (e.g. by radiofrequency signals) energy harvesting. Primary batteries lead to simpler designs but have a limited energy budget. Their use is feasible whenever the available energy is enough to power the IoT node during a fair period of time. Such a period can be lower than the operating time of the IoT nodes but enough whenever the maintenance costs due to the periodic replacement of the primary batteries is acceptable. Contrariwise, energy harvesting leads to more complex designs but the available energy is unlimited. However, the available average power is limited by the primary energy source and the size of the energy transducer and needs to be higher than the average power required by the IoT node. Anyway, in order to increase the



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energy autonomy of the IoT node, a high power efficiency of its local power supply is required. In addition, a low power consumption of the node is needed. This is achieved by using low-power devices and techniques and by minimizing the duty cycle of the node.

This research project proposes the implementation of IoT nodes for different applications such as:

- Smart Metering: Device for monitoring gas consumption and data transmission to smartphones via NFC. Device powered by new tech thin film batteries and solar energy harvesting. Our target customers are all facilities companies related with gas, water and power.
- Smart Seal: Electronic seal, in substitution for plastic current seals, to avoid facilities manipulation and detect vandalism. This device improves traceability and tamper detection.
- Smart Disposables: Disposables that monitor their status and wirelessly alert you when they should be replaced. Especially useful for heavy construction machinery and medicine holders.
- Other products based on IoT and WSN for applications related with domotics, medical, and automotive Sectors.

All products will be fully market oriented, including from the initial technology research to final product design and validation.

The design and implementation of the nodes will tackle all the aspects from the power supply (either by batteries or by harvested or transmitted energy) to the measurement, gathering, processing and transmission of the parameters. The scientific approach will be as general as possible in order to extrapolate the achieved results to other products and scenarios.