

Abstract

Technologies and, in particular sensors, permeate more and more application sectors. From energy management, to the factories one, to houses, environments, infrastructure, and building monitoring, to healthcare and traceability systems, sensors are more and more widespread in our daily life. In the growing context of the Internet of Things capabilities to acquire magnitudes of interest, to elaborate and to communicate data is required to these technologies. These capabilities of acquisition, elaboration, and communication can be integrated on a unique device, a *smart sensor*, which integrates the sensible element with a simple programmable logic device, capable of managing elaboration and communication.

An efficient implementation of communication is required to these technologies, in order to better exploit the available bandwidth, minimizing energy consumption. Moreover, these devices have to be easily interchangeable (*plug and play*) in such a way that they could be easily usable.

Nowadays, *smart sensors* available on the market reveal several problems such as programming complexity, for which depth knowledge is required, and limited software porting capability.

The family of standards IEEE 1451 is written with the aim to define a set of common communication interfaces. These documents come from the *Institute of Electric and Electronic Engineers (IEEE)* with the aim to create a standard interface which allows devices interoperability produced from different manufacturers, but it is not concerned with problems related to bandwidth, management, elaboration and programming. For this family of standards, now under review, it is expected a further development, with the aim to renew applicable standards, and to add new layers of standardization.

The draft of the **ISO/IEC/IEEE 21451.001** proposes to solve problems related to the bandwidth and the elaboration management, relocating a part of processing in the point of acquisition, taking advantage of elaboration capabilities of smart sensors. This proposal is based on a ***Real Time Segmentation and Labeling*** algorithm, a new sampling technique, which allows to reduce the high number of samples to be transferred, with the same information content. This algorithm returns a data structure, according to which the draft expects two elaboration layers: a first layer, in order to elaborate basic information of the signal processing, and a second layer, for more complex elaboration.