

The Internet of things for environment

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The Internet of Things for Environment



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Presentation of the laboratory

Irstea :

- Full name: Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture.
- Public research institute in France focusing on land management issues such as water resources and agricultural technology.
- Collaboration with EurAqua, PEER, ENTAM and ENGAGE

Team "Systèmes d'information communicants et agri-environnementaux (COPAIN) ", Irstea, UR TSCF:

- Focus on (wireless) sensor networks, spatial data warehouses and knowledge management in agriculture and environment.

Team "Systèmes Multi-sensoriels Intégrés Intelligents Répartis (SMIR)", LIMOS:

- Focus on new generation of hardware and software for wireless sensors (Operating system, protocol stack, application and etc.).

key points

Management and publication of environmental data collected by Wireless Sensor Networks (WSN) through the Internet of Things (IoT)

Step1
Investigation of concepts: 6LowPAN, Linked (Open) Data, Sensor Bus, Ontology, Open Geospatial Consortium's Sensor Web Enablement (SWE) initiative , etc.

Step2
Deep understanding of 6LowPAN, Linked (Open) Data, Sensor Bus, Ontology, Open Geospatial Consortium's Sensor Web Enablement (SWE) initiative , etc.

Step3
Design of a new architecture for WSN in the framework of the IoT

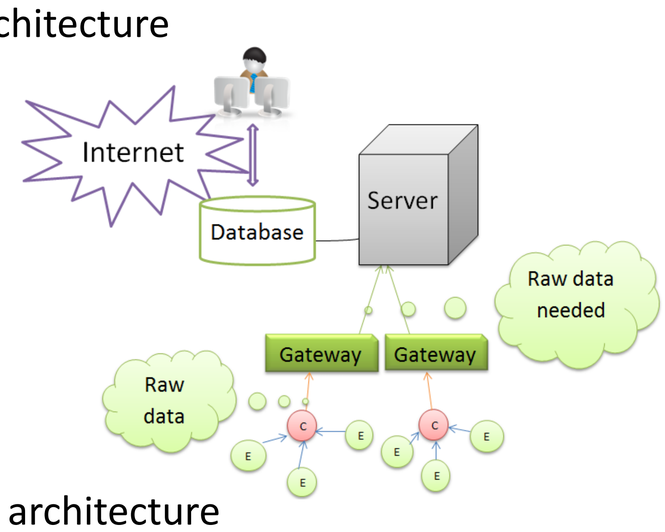
Step4
Implementation of the proposed architecture

Step5
Tests and evaluations using LIMOS SMIR team wireless sensor technologies deployed in Irstea Montoldre experimental site

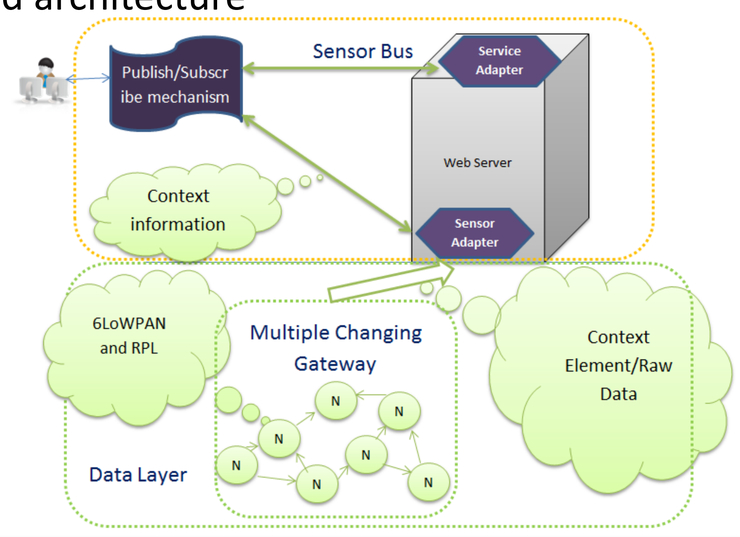
Step6
"Cyclic improvement" of the architecture based on real world experiment results

GLOBAL WSN ARCHITECTURES

Classic architecture



Proposed architecture



Abstract

Wireless sensor networks (WSN) are one of the important technologies of the 21st century. Most researchers and technical analysts believe that, in the near future, these micro-sensors will be integrated throughout anywhere of our life. In recent years, IoT and WoT gradually became a very popular and hot topic especially in the area of WSN. However, with the development of IoT, the devices that can provide information can be heterogeneous which generate different issues. In this thesis, we considered the Semantic Web associated to Ontology as a possible solution to solve some of these problems. Technologies of the Semantic Web, such as RDF language, are, for example, used to support the publication of structured data on the Web and their interoperability in the Linked (Open) Data. Besides, the 6LoWPAN (IPv6 over Low power Wireless Personal Area Networks) protocol has allowed the use of IPv6 protocol stack in the field of WSN. The use of this protocol should enable, in theory, to have all the nodes of a WSN individually "visible" from the Internet. So, relying on research works currently performed in the context of the WoT as well as the 6LoWPAN protocol, it should be possible to integrate WSN dedicated to environment and agriculture in the IoT.

PERSPECTIVES

Research area

- Semantic Web , Linked (open) data as well as 6LoWPAN protocol brought a great forwarding for integrating WSN dedicated to environment and agriculture in the IoT.
- Precision Farming and WSN applications could combine an exciting new topic of research. The current technical issues dedicated to this domain are waiting to be solved.
- The contribution for the new generation of WSN software and standardized approach for device communication.

Opportunities

- Improve the integration of WSN dedicated to environment and agriculture in the global concept/vision of the IoT

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