INSTITUTO TECNOLÓGICO DE GALICIA

Researching:

Smart Techs
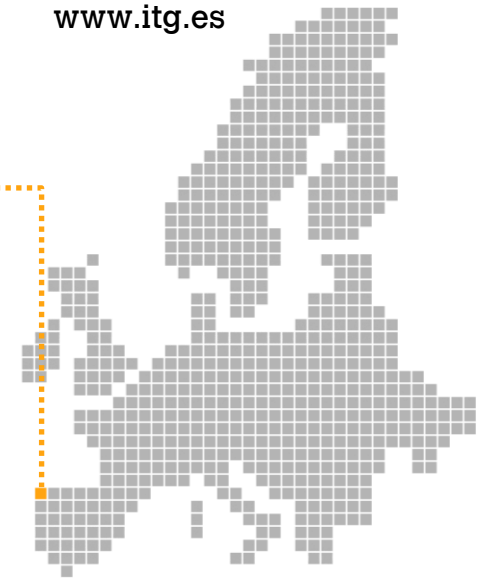
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Who We Are

Instituto Tecnológico de Galicia | ITG

TECHNOLOGY CENTRE located in Galicia, **Spain**
[No. 115 Spanish Ministry of Economy & Competitiveness Register]

PRIVATE NON-PROFIT FOUNDATION set up in **1991**

BOARD OF TRUSTEES: Architects, Civil Engineers and Industrial Engineers Galician Associations, Mining Engineers' Assoc., Galician Agronomic Engineers' Council, Naval and Oceanic Engineers' Assoc.; Galician Businessmen Confederation, and Universities of A Coruña, Vigo and Santiago de Compostela

Certification in UNE-EN ISO 9001standard (Quality Management System) and in UNE 166002 standard (R&D&I management system)

At ITG we are organised in **5 INTERCONNECTED KNOWLEDGE AREAS:**

Energy   **Water**   **Sensor & Comms**   **ICTs**   **Sustainable Construction**
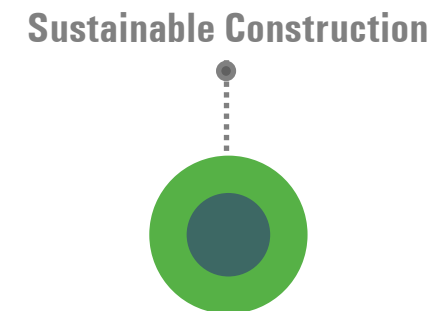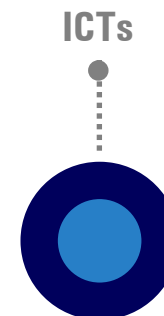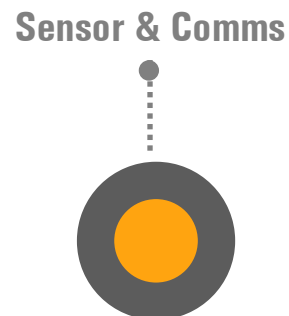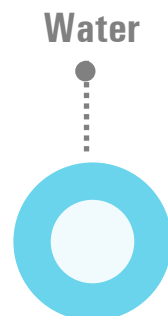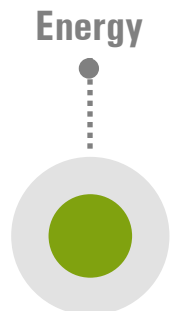
Research & Development Activities on Smart Techs

SMART TECHNOLOGIES are the CORE R&D ACTIVITIES of SENSOR & COMMUNICATIONS DEPARTMENT

EMBEDDED SYSTEMS, ADVANCED COMMUNICATION SYSTEMS; MONITORING & CONTROL; SENSOR NETWORKS, SPECIALLY WSN, SW ENGINEERING, BIG DATA, BUSINESS INTELLIGENCE

Remote Monitoring & Control

Integral Systems and Solutions for remote control and monitoring mainly based on the open SWE (Sensor Web Enablement) of the Open Geospatial Consortium, OGC and OSGi (Open Services Gateway Initiative) standards.

- Modular, scalable and code reusable designs.

- Sensor data management, distributed devices management, interoperable and scalable architectures, based on REST approach, complex event processing, plug&play systems integration and auto-discovering.

Sensor Systems Modeling

Through coding and metadata, using Sensor Model Language (SensorML) as reference, Observation Modeling based on Observation&Measurements (O&M) specification, Events Modeling based on Event Pattern Markup Language (EML) specification[1].

Sensor Systems Management Platforms

Based on Sensor Instance Registry (SIR) and Sensor Observable Registry (SOR) specifications, Observation and Event Management Systems based on Sensor Event Service (SES) specification, Task Assignation System based on Sensor Planning Service (SPS) specificaction[1].

Open Methlogies for High Performance HW-SW Systems

Availability, fault tolerance, fast recovery, reliability, security and scalability. Working areas tackle with key aspects and techniques such as virtualization, clusterization, replication and Big Data.

[1] Specifications defined by OGC Sensor Web Enablement

Embedded Internet Architectures

Communications schedules based on IPv6 over sensor nodes [RFC 4919] for their integration in the Internet [RFC 4944], following the 6lowpan specification and its standard implementations, using open source operating systems (e.g. TinyOS, Contiki).

Routing Embedded Internet │ REI

Efficient, Secure and Low Energy Routing and Addressing Strategies, REI: Deliver an independent network of nodes, supporting IPv6. Mesh techniques (mesh under, route over), network intelligence, routing and IP networking are being tackled to integrate control functionalities in each of the network nodes, allowing the multi-hop communication in order to extend the nodes range.

Web Architectures for Wireless Embedded Web │ WIBEW

API's design for supporting web services in the node, to offer access to the node's resources from every device via Internet. Analysis of the protocols defined by the IETF CoRE, RESTful scope. Functionalities specification for the access and publication of the services (RAI, RPI) and methods for resource management (GET, POST, DELETE, UPDATE…), interactions management, and definition of the main components (resource directory, semantic question's resolution, communication interfaces, type of messages, type of XML compression…).

Architectures' Research & Design

Research and design of architectures, highly scalable and portable, open HW and open SW based on the DASH7 specification of the international ISO 18000 for RFID (DASH7 Technology Working Group, TWG), that allows implementations on embedded HW, especially in RF SoC type devices. Communication multiplatform full stacks allowing extension to multi-hop and Ipv6 environments, control, management and security mechanisms, i.e. Open Tag for DASH7 Mode 2 (ISO 18000-7.4).

Hardware Architectures Development

HW architectures development with different communication technologies integration capacity: IEEE 802.15.4 (ZigBee), 3G/GPRS, IEEE 802.15.1 (Bluetooth), IEEE 802.11 (Wifi), Near field communication – NFC (based on existing radio-frequency identification standards including ISO/IEC 14443 and FeliCa), etc. Interoperability: communication interfaces supporting different technologies/protocols/platforms; development of communication gateways (IEEE 802.15.4/RS232, IEEE 802.15.4/ETH, IEEE 802.15.4/3G, etc.); heterogeneous and complex sensor integration in a modular datalogger architecture, with the capacity of online data delivery, through wireless communications.

Data Adquisition – DAQ Systems

Flexible and scalable Hardware and Software Architectures for DAQ systems, integration of heterogeneous and complex sensors from different manufacturers on the same datalogger, posting data to web-based datacenter applications, autoconfiguration and plug&play capabilities.

ITG International R&D Projects

Since 1996, ITG has developed **international cooperation projects** with important public and private entities.

Project	Website
ROEM + Project – High resolution AppROach for ManagEMent of Surface Water EutroPhication in RuraL areas of the Duero River Basin	www.roemplus-life.eu
SANePLAN Project – Integrated Planning and Sustainable Management of Sanitation Infrastructures through Innovative Precision Technology	www.saneplan-life.eu
WIZ Project, WaterIZe Spatial Planning: encompass future drinkwater management to climate change	www.wiz-life.eu
ASAP Project – Actions for Systemic Aquifer Protection	www.klink.it/gate/asap
WETNET Project – Innovative in-pipe hot-tap insertion floW sEnsor plus smarT NETworks enable ecowise pervasive monitoring of water distribution grids	www.wetnet.it
ENTIC Project – Smart & Sustainable Energy Management for improving the competitiveness of SMEs in the Euroregion	www.entic.eu
GE2C'S Project – Efficiency, CHP and Energy Management in Service Sector	www.ge2cs.com
E4R Project – Building Energy Efficiency Assessment Tools. Refurbishment in SUDOE Territory	www.e4rproject.eu
GENER Project – SMEs' Accompaniment in Efficient Models for Energy Management Implementation	www.proyectogener.org
INCOPYME NETWORK Project – Cooperation between Centres and Research and Innovation SMEs improving competitiveness in the Euroregion	www.redincopyme.org
e-MEDI@TE P roject	www.emediate-justice.eu

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