

Smart Sensors and Internet of Things

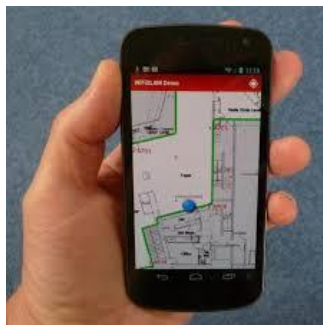


In the last years, wearable sensors and Internet of Things (IoT) are of great interest and the ES3 group has been involved in many financed projects on these topics (see Smart Aging, Smart Break, Brescia Smart Living and Smart ECG projects). The wide use of mobiles (smartphone, tablet) as gateway for sensor networks has yield to the project SAndroidE, where external sensors can be managed under Android OS as if they are embedded in the mobile device.

Sandroide <http://es3.unibs.it/SAndroidE/> is an open technology developed by the ES3 group (see Github) and it is supported by the Google Developer Group and the IEEE Student Branch of Brescia.



SAndroidE
Sensors for Android Embedded



Outdoor and Indoor localization based on GPS, WiFi and Bluetooth beacon

RESEARCH GROUP EMBEDDED SYSTEMS AND SMART SENSORS



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RESEARCH GROUP EMBEDDED SYSTEMS AND SMART SENSORS

Main research fields:

- Industrial communications and sensors networks
- Smart sensors and Internet of Things
- Smart Grids
- Instrumentation for health and environment

Technologies, Standards, Committee:

IEEE1588 (Study group), IECTC65, IECSC65, IEEE-IMS-TC37, IEEE-IE-TCFA, Profinet, WirelessHART, ISA100, LoRaWAN, Software Defined Radio, IEC61850, Android

Contacts, Contracts, Projects:

>1M€ of contracts and financed projects with Italian and foreign research bodies and industries

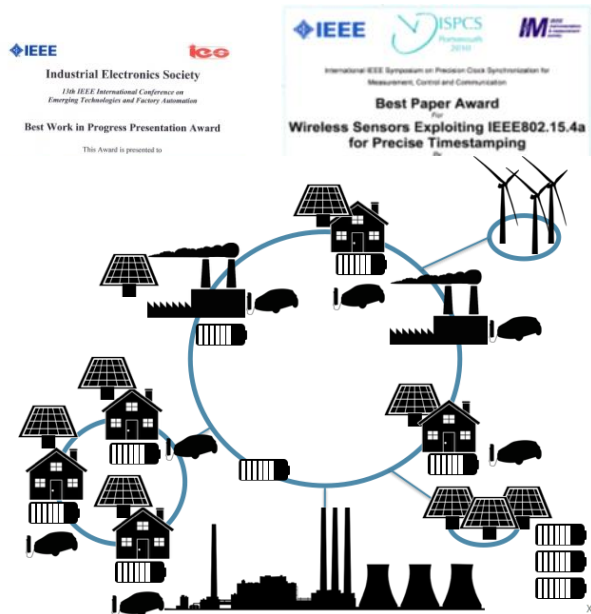


Smart Grids



Since 2015, ES3 group has been involved in several financed research projects related to smart grids, micro grids, renewable energy sources with storage systems and metering, including electrical vehicles and smart living (Projects SCUOLA <http://es3.unibs.it/SCUOLA/>, Brescia Smart Living <https://www.bresciasmartliving.eu/>). The group has developed the first living lab of the University of Brescia, eLUX (Energy Laboratory as University eXpo) <http://elux.unibs.it/>

Among other topics, communications for smart grids have been investigated, with particular attention to synchronization and real-time behaviour. Indeed, members of ES3 seat in the IEEE1588 working group, they organized the international IEEE conference on Synchronization in 2009, and their papers have been awarded.

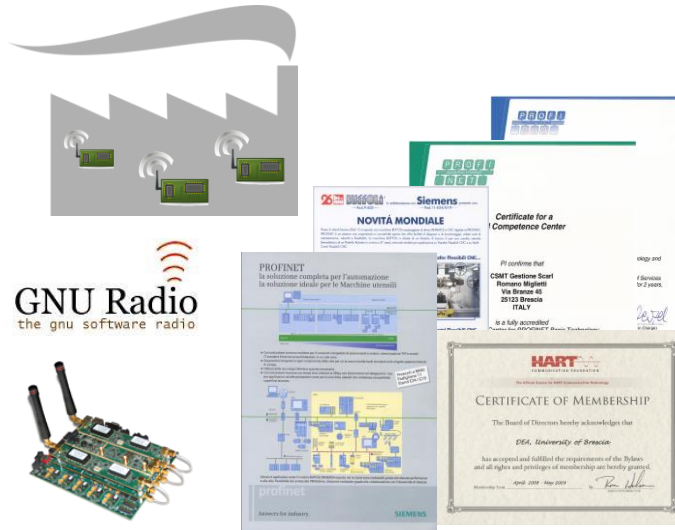


Industrial Communications and Sensor Networks



ES3 group works in the industrial application field since its birth, thanks to the industrial experience acquired in the '80s by some group components. The group participates to standardization groups (IEC, CEI), manages the Profibus and Profinet Competence Center c/o CSMT (<https://www.csmt.it/centro-di-competenza-mission.asp?ID=10>), and developed patented solutions for industrial real-time Ethernet (RTE) in early 2000s. Now, attention is focused on RTE (see AIRnet project) and sensor networks for process control (e.g., Wireless HART, ISA100). Particular attention has been given to synchronization challenges (the group participates to the IEEE1588 study group and has many contract and projects about this topic (see website).

The group is involved in research activities with software defined radio, in order to better study and exploit new low power technologies as LoRaWAN, for Smart Cities and industrial applications.



Instrumentation for Health and Environment



ES3 group designed instruments and solutions for health-care and environments.

Electronic noses with new electronic circuits for sensor interface (large-value sensor resistance measurement - from kΩ to over 100GΩ- small -pF- sensor capacitance) Electronic nose (SWaRM-Net project).

ES3 group has a lot of activities in the health care and ambient assisted living, especially for elderly. Smart ECG <http://es3.unibs.it/SmartECG/> and Smart Aging are two financed projects concerning these topics. Same technologies have been used to monitor vital parameters and stress conditions of amateur racecar drivers.

