INNOVATION
Multi-level SOA (Service Oriented Architecture) that bridges the gap between high-level Command and Control applications and networks of low-level sensor/actuators.

WHO SHOULD BE INTERESTED IN
System designers of software integration architectures for sensor/actuator networks.

NEXT STEP
Deployable services
Addition of security and localisation functions.

Main Technological Contributions

**wsn-SOA: A Lightweight SOA for Wireless Sensor Networks**
- Brings the benefits of the SOA paradigm to multi-level sensor/actuator networks in an efficient manner.
- Features service discovery, network self-organisation, publish/subscribe mechanism and multicast invocation capabilities.
- Implemented under TinyOS (lightweight open-source component-based operating system) running on Crossbow MICAz. Provides services such as presence detection and ambient parameters retrieval.

Bridging wsn-SOA and Web Services
- DPWS (Devices Profile for Web Services) enables Web Service messaging, discovery, description, and eventing on resource-constrained devices.
- The gateway provides bidirectional wsn-SOA-DPWS service translation, aggregation, discovery and management. It has been implemented in JAVA CDC Foundation Profile using the OSGi framework.
- The graphical command and control unit enables automatic and dynamic management of all devices and services using this gateway.

Wireless sensor nodes: Crossbow MICAz motes
- Atmel ATmega128L microcontroller running TinyOS.
- 2.4 GHz Zigbee (IEEE 802.15.4) radio featuring high speed (250 kbps) and hardware security (AES-128).
- Various sensor boards hosting (Light, Temperature, Barometric, Pressure, Acceleration/Seismic, Acoustic, Magnetic, GPS...).

Gateway: Crossbow Stargate
- 400MHz Intel Xscale® Processor, 64MB RAM, 32MB Flash running Linux.
- Various connectors: PCMCIA, Compact Flash, USB, Ethernet, JTAG, Serial.
- Zigbee connectivity through MICAz hosting.

Camera: Axis 213 PTZ
- Pan, tilt, zoom network camera with built-in 26x optical zoom, auto focus lens + 12x digital zoom.
- Simultaneous Motion JPEG and MPEG-4.
- 100 MHz CPU, 32 MB RAM, 4 MB Flash running Linux.

Camera

**Gateway**

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<th>DPWS</th>
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Ad hoc

**Wireless sensors**

| wsn-SOA | Zigbee |

**Camera**

| DPWS  | Wi-Fi |

**Control Unit**

| DPWS  | Wi-Fi |