

## Mondragon Unibertsitatea Lisboako ICT (Innovate, Connect, Transform) 2015 kongresuan

2015/10/23

Urban lighting-eko proiektu pilotu bat erakutsiko du, zeina Ulma Embeded Solutions-ek lideratzen duen Tecnalía, Tekniker eta Goi Eskola Politeknikoarekin batera. Proiektuaren helburua energetikoki eraginkorra den argiztapena lortzea da, argi kontsumoa murriztuz eta CO2 isurketak txikituz. Proba pilotua Donostiako kaleetan egingo da.





**ARROWHEAD**

## San Sebastian Urban Lighting Energy Consumption Optimization

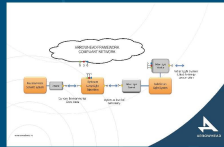
Pilot installation located in industrial area with more than 30 years of history and 300 companies. A revitalization plan is currently in place to attract new companies.

The pilot consists of a lighting system comprised of three LED based street lamps and a radar, provided by a local company, plus four wireless environmental sensors.

There are three interacting systems involved in the pilot offering Arrowhead framework compliant services:

- *Environmental Sensors*
- *Lighting optimization*
- *Urban Lighting System control and monitoring (C&M)*

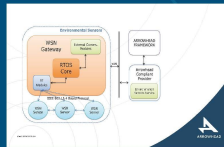
The environmental sensors collect data that the lighting optimization algorithm uses to provide a light level setpoint. The C&M uses this setpoint to drive the underlying commercial system, or monitor the energy savings that would be possible.



### ► ENVIRONMENTAL SENSORS

The system consists of self-powered wireless nodes that collect different type of environmental measurements: temperature, humidity and illuminance.

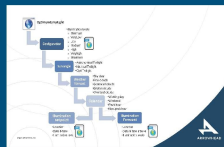
The wireless sensor network uses a proprietary communication protocol, based on IEEE 802.15.4 standard, and includes recommendations and methods identified under the Plug & Play & Forget paradigm created to achieve easy-exploitation and cost-feasible wireless solutions. The system implements the Environmental Sensors service that provides the Environmental Sensors data.



### ► LIGHTING OPTIMIZATION

This system provides a forecast for the lighting intensity of the street lamps for the next hours according to environmental parameters. It gathers data from one Arrowhead and two external services.

The Environmental Sensor Service provides current data of humidity, illuminance and temperature. Two external services provide information about the weather forecast and twilight times, sunsets and sunrises from 12 am to 12 pm. Real position of the street lamps is also needed to configure the system.



### ► URBAN LIGHTING SYSTEM CONTROL & MONITORING

The underlying lighting system provides TCP/IP services that are connected to a Raspberry Pi device. This provides an adapter that allows integrating the services of the local control system in the Arrowhead framework. It provides two services;

- *Urban Light Monitor Service*: it provides 4 methods to know the status of the urban lighting system; description, current status, consumption and maintenance needs.
- *Urban Light Control*: it provides one method for setting the operation mode to "Normal" or "Warn About Danger".

