



# Fuzzy Diagnose Microcontroller Based System for Air Quality Surveillance

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## MAIN GOAL:

Surveillance and Control of air quality in an industrial site close to urban areas in Arganda del Rey (Madrid), by means of a flexible, open and configurable net.

\* **SURVEILLANCE AND MESSAGES DECISION:** Through a set of local units distributed at the industrial site that process sensor signals following a user protocol and make decisions on: 1) signals acquisition and 2) alarm messages transmission.

\* **CONTROL DECISION:** Derived at the central unit from a full diagnose based on either the received instantaneous sensors readings, the industries data (type and location) and the air quality history, previously recorded in a GIS format database.

INPUTS: SO2 Concentration and WSPEED Wind Speed  
 OUTPUTS: SRATE\_SO2 Sampling frequency and ALERT\_SO2 Pollution Level

Arganda del Rey: industrial area and urban areas

## CENTRAL UNIT FUNCTIONING

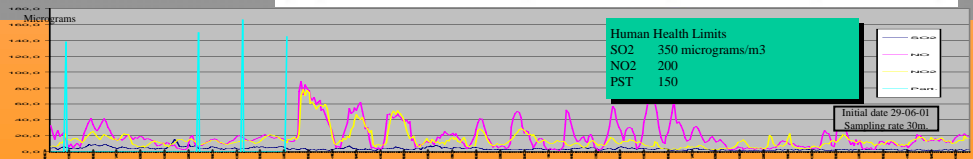
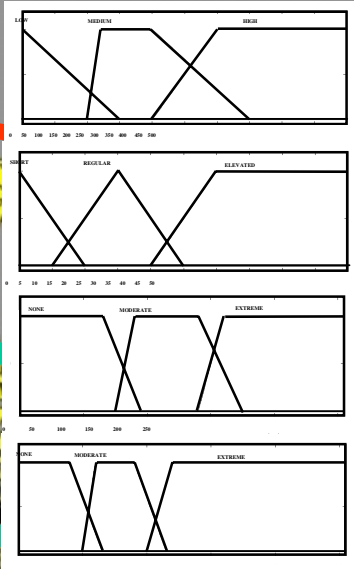
Conventional Processing System  
 Open and flexible software  
 Instantaneous Pollution & Meteo Data Monitoring  
 Remotely configure the Local Units  
 Records relevant information in a GIS format Data Base  
 Spatio-Temporal Reasoning to locate emission sources

## LOCAL UNIT STRUCTURE & FUNCTION

RISC Micro-controller based  
 Open and modular software design  
 Incremental sensors interfaces integration  
 Bi-directional Communication  
 Makes decision on:  
 1) acquisition and maintenance conditions  
 2) on messages transmission

Knowledge Base

		SO2		
		LOW	MEDIUM	HIGH
WSPEED	SHORT	SMALL NONE	NORMAL MODERATE	GREAT EXTREME
	REGULAR	SMALL NONE	NORMAL EXTREME	GREAT EXTREME
	ELEVATED	SMALL NONE	NORMAL EXTREME	GREAT EXTREME



## FUZZY REASONING SYSTEM

- 1) Is based on a performance criterion:  
To transmit pollution messages with minimum communication and maximum environment safety
- 2) Runs at the Local Units under a Client/Server Architecture
- 3) Users can remotely tune the sensors parameters and the fuzzy decision algorithm via GSM