3th Intelligent Systems for Quality of Life information Services Workshop (ISQL 2012)
8th AIAI Conference, September 27- 30, 2012,
Halkidiki, Greece

TUTORIAL Session:
Environmental Sensors for Air Quality Control Applications

organized by the COST Action TD1105 **EuNetAir**
European Network on New Sensing Technologies for Air-Pollution Control and Environmental Sustainability

8th AIAI Conference - Artificial Intelligence Applications and Innovations Conference

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*Visit link: **http://delab.csd.auth.gr/aiai2012/workshops_intelligent_systems_quality_life_information_services.html***

TUTORIAL SESSION PROGRAM
Tutorial Chair(s): Dr. Michele Penza (Action Chair) and Prof. Kostas Karatzas (MC Member)

Environmental Sensors for Air Quality Control Applications
Two-hour Session on 29 September 2012 (Tentatively)

AIM of TUTORIAL

The **Tutorial** aims to provide to the scientific community of Computational intelligence and Quality of Life Information Services, as well as to anyone else interested, with information on the current state of play in new sensor technologies and new sensing concepts. The tutorial will be based on research results achieved by members of the COST Action TD1105 **EuNetAir** and is part of the Action's efforts for dissemination of results and for cross-domain scientific collaborations.

Current trend in the solid-state sensing technology is the development of nanomaterials and nanostructures with novel functionalities and innovative properties at the nanoscale for high-performance chemical sensing. In this direction, great efforts in the ongoing research have been doing to fabricate environmental sensors with advanced sensing nanostructures and high-resolution transducers coupled to proper electronic interfaces and new algorithms of pattern recognition and signal processing.

The key role for high-performance environmental sensors and sensor-systems is the engineering of sensing devices, ICT hardware, ad-hoc software/firmware, emerging transducers and sub-systems to develop air quality control applications with ubiquitous and mobile sensor-systems, including participating sensing and wireless sensor networks.

This **Tutorial** will be completely devoted to ***Environmental Sensors for Air Quality Control Applications***. This event is based on Tutorial Session focussing environmental hot-issues from at least 3 Speakers from COST Action TD1105 EuNetAir and an Overview of the COST Action TD1105 from Chair (or a MC Delegate) towards large and specialized target audience with high benefit for COST Action TD1105.

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Call for papers:

This **Tutorial** openly calls for perspective and original contributions in the field of environmental sensors, sensor-systems, sensor technology and applications, from science and technology worldwide community, *over COST Action* and move towards new interested researchers and stakeholders working in the field of Action core-themes. These contributions related to Action-issues from extra-Action scientists would be submitted free of charge to the new open-access **Journal of Sensors and Sensor Systems (JSSS)** (www.journal-of-sensors-and-sensor-systems.net). The regular issue JSSS accepts contributions to cover a full range of sensors and sensor-systems such as theory, basic properties, design, fabrication, processing, calibration, measurements, integration, characterization, applications. We invite the submission of the manuscripts related to the fundamental and applied aspects for the environmental sensory, sensors science, gas sensors, air quality control sensor-systems applications, measuring systems, sensor technologies, environmental smart systems, sensing solutions, environmental ICT applications, mobile sensing, participatory environmental sensing, etc.

Topics of interest include, but not limited to:

- environmental sensors
- outdoor/indoor air quality monitoring
- mobile sensing
- participatory sensing
- sensor networks
- gas sensors
- sensor arrays
- pattern recognition and signal processing
- modelling of sensors
- electronic interfaces for sensors
- applications of sensor systems

Authors should follow the Journal of Sensors and Sensor Systems (JSSS) manuscript format described at the open-access journal site www.journal-of-sensors-and-sensor-systems.net. Prospective authors should submit an electronic copy of their complete manuscript. Papers should be submitted either in a doc or in a pdf form and they will be peer reviewed by at least 2 academic referees. Notice of submission from authors should be emailed to Tutorial Session Chairs.

Tutorial Session Chairs

Michele Penza, ENEA - Italian National Agency for New Technologies, Energy, and Sustainable Economic Development, Technical Unit of Technologies for Materials Brindisi, Italy; michele.penza@enea.it

Kostas Karatzas, Aristotle University of Thessaloniki, Greece; kkara@eng.auth.gr

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Environmental Sensors for Air Quality Control Applications
Two-hour Session on 29 September 2012 (Tentatively)

30 minutes (10.00 - 10.30)
Tentative Title: *Overview of COST Action TD1105 EuNetAir*
Speaker: Dr. Michele Penza, ENEA, IT - michele.penza@enea.it (Chair Delegate or MC Member)
CONFIRMED

30 minutes (10.30 - 11.00)
Tentative Title: *New approaches in outdoor air quality monitoring: mobile sensing, participatory sensing and sensor networks*
Speaker: Dr. Jan Theunis, VITO, BE - jan.theunis@vito.be
CONFIRMED

30 minutes (11.00 - 11.30)
Tentative Title: *Applications of sensors for urban air quality monitoring*
Speaker: Dr. Christoph Hueglin, EMPA, CH - christoph.hueglin@empa.ch
CONFIRMED

30 minutes (11.30 - 12.00)
Tentative Title: *Standards for AQC Sensors, creating a more Healthy Environment*
Speaker: Prof. Ingrid Bryntse, SenseAir AB, SE - ingrid.bryntse@senseair.com
CONFIRMED

Closing Session

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TUTORIAL Session:

Environmental Sensors for Air Quality Control Applications

Tutorial 1

Overview of COST Action TD1105 EuNetAir

Michele Penza - ENEA, Italian National Agency for New Technologies, Energy and Sustainable Economic Development, PO BOX 51 Br-4, I-72100 Brindisi, Italy

This is a short overview of the COST Action TD1105 EuNetAir - *European Network on New Sensing Technologies for Air-Pollution Control and Environmental Sustainability* - funded in the framework *European Cooperation in the field of Scientific and Technical Research* (COST) during the period 2012-2016. The main objective of the Concerted Action is to develop new sensing technologies for Air Quality Control at integrated and multidisciplinary scale by coordinated research on nanomaterials, sensor-systems, air-quality modelling and standardised methods for supporting environmental sustainability with a special focus on Small and Medium Enterprises. This international Networking, coordinated by ENEA (Italy), includes over 60 big institutions from 21 COST Countries (EU-zone) and 5 Non-COST Countries (extra-Europe) to create a S&T critical mass in the environmental issues.

Tutorial 2

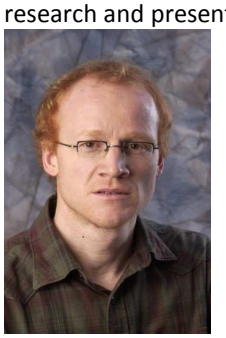
New approaches in air quality monitoring: mobile sensing, participatory sensing and sensor networks

Jan Theunis - VITO, Environmental Risk and Health Unit, Boeretang 200, 2400 Mol, Belgium

Traditionally outdoor air quality is monitored with (expensive) reference monitors. However, actual exposure of people to health-relevant pollutants is poorly described by the concentrations measured in the reference monitoring stations.

Mobile sensing, participatory sensing and sensor networks are often mentioned as possible solutions. Portable instruments are now available that can measure components such as UFP and black carbon. However, they are still quite expensive for large scale deployment, and representativity of the data is an important issue. Several projects have developed portable devices, integrating low-cost air quality sensors, GPS and mobile phones to enable large groups of people to collect air quality data. However, commercially available sensors face several issues, such as cross-interference, response time, sensor drift, and susceptibility to temperature or humidity.

We will present a state-of-the-art, illustrate the technical and methodological challenges with examples from recent research and present some new concepts that can be used to address the challenges.



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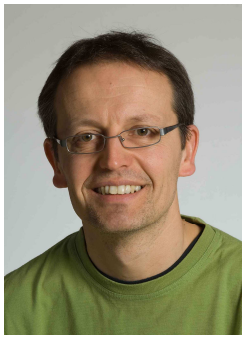
Tutorial 3

Applications of sensors for urban air quality monitoring

Christoph Hueglin, Swiss Federal Laboratories for Materials Science and Technology, Empa, 8600 Duebendorf, Switzerland

Small and low-priced sensors offer unique possibilities for long-term urban air quality monitoring. For example, they can be deployed in large numbers to form dense sensor networks and thus provide valuable information about the spatial variability of air pollutants in urban environments with high temporal resolution. However, securing the quality of data from sensor networks will be an important issue and adequate strategies for calibrating the sensor devices are needed. Possibilities and applications of sensors for urban air quality monitoring as well as concepts for quality assurance and quality control will be covered in this presentation.



Tutorial 4

Standards for AQC Sensors, creating a more Healthy Environment

Ingrid Bryntse, SenseAir SA, Stationsgatan 12, SE-82060 Delsbo, Sweden

Several studies show that indoor air quality (IAQ) is affecting health, performance and well-being for humans. There is a strong influence from air pollution caused by gases and particles, as well as high temperature or humidity. Some recent results in this area will be described. Corresponding topics concerning standards for gases and particles, now addressed within COST EuNetAir, are briefly mentioned for instance:

- Available sensor techniques for a certain species
- Calibration of sensors
- Acceptable levels for open-air and IAQ

Future actions in the COST group *Protocols and Standardisation Methods,* will be presented.