



NEWSLETTER

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Editorial

This is the 18th issue of the EUSAS Newsletter, but the first one in a new format. In this new version of the Newsletter we essentially like to include in a more compressed form information on recent or upcoming events, workshop reports, information from the EUSAS Executive Committee, and just any kind of news about other EUSAS activities.

We have chosen a simpler format compared to the last issues of the Newsletter in order to speed up the printing and thus to inform the EUSAS members a bit quicker.

Please also do not forget to visit the EUSAS homepage now and then. In short you will find information about another EUSAS workshop which will take place on June 20th/21st in Brussels. Topic will be the CPD, and as usual a workshop about this time of the year will be combined with the EUSAS General Assembly.

I. Willms, EUSAS officer

1 Report of the EUSAS Workshop
Multiple Sensor Based (Fire-) Detectors; Design, and Testing
Lübeck, 14/15 June 2004

M. Schnell, VdS Schadenverhütung

In 2004 EUSAS continued its tradition in organizing specialized workshops in the fields of fire detection/extinguishing systems and electronic burglary and theft detection.

Specialists were invited to attend the

Workshop on “Multiple Sensor Based (Fire-) Detectors; Design, and Testing”
in the Radisson SAS Senator Hotel in Lübeck/Germany on June 14th and 15th, 2004.

Prof. Heinz Luck opened the workshop with special thanks to the sponsors, i.e.: Detectomat, Ahrensburg and Minimax, Bad Oldesloe

Rainer, Siebel, University Duisburg-Essen: Multi Sensor Detection Algorithms In order to realize good detection and safety against false alarms, modern multisensor detectors are using special algorithms. Fuzzi logic algorithms using neural layers nodes in neural nets, with self learning properties were explained.

G. Roepke, Detectomat, Ahrensburg: Condensation in (Multi-) Fire sensors

In practice condensation in multisensor fire detectors is a big problem in unfavourable environments like unheated storage halls which are cooling down in the night. Measurements using a dew point mirror (Peltier element to cool the mirror) were presented. Temperature was measured outside and inside the detector by 2 devices. Automatic detection of condensation was realized by a fuzzy algorithm.

Dr. K. Lenkeit et al, Minimax, Bad Oldesloe:
Multi Sensor Aspirating Fire Detection Systems

The potential for the inclusion of gas sensors in aspirating fire detection systems was presented. Selected results from systematic examinations with a 10-sensor channel aspirating system for TF2-TF5 test fires and for fires with PC hardware pieces as well as measurements with different materials in a pyrolytic measurement chamber were presented. These results confirm that the additional connection of smoke detector signals with combustion gas signals can enable an extension of possible uses for very early fire detection. This also applies to extremely sensitive aspiration systems. Such multi-sensor aspiration systems permit very early detection with reduced sensitivity to false alarms. The early stage of a fire and its development are detectable with the help of combustion gas and aerosol measurements.

Prof. A. Schütze, Saarland University: Gas Sensors for Fire Detection - Basic Principles and Considerations for Multi-Sensor Systems

Gas sensors are used traditionally in explosion warning and monitoring of hazardous substances. Also non-industrial appliances are very common, e.g. air quality in modern upperclass cars, CO₂ monitoring in pubs and other special applications. In such systems, semiconductor sensors, electrochemical cells and mass sensitive devices are used. IR absorption is often used for gases like CO, CO₂ and Nox.

“Low cost” metal oxide gas sensors can now be made selective with multi-sensor arrays or with “virtual multi sensor” (1 gas sensor at different temperatures!). Miniaturisation, using micro system technology (80 mW at 450 °C) allows changes in 10 ms!

Even the application of nano technology for gas sensors is considered. (Nanocrystalline gas sensitive layers with catalytic additives and molecular filters!)

Prof. I. Willms, University Duisburg-Essen: Mobile Multi-Sensor Detection

Recently mobile robots for different applications are introduced: Mobile robots for e.g. greens cutting, vacuum cleaning, service of elderly or handicapped people, window washing, supervision of museums, exhibitions, fairs etc. Such robots can additionally be equipped with fire detectors. PIR and Doppler motion sensors, smoke and gas sensors, video fire detection and aspiration systems can be discussed. The main new aspect is the motion of the detector during operation. Computer simulations with different detection principles using different test fires were presented.

Th. Brupbacher, Siemens, Männedorf: Standardising Multi Phenomena Fire Detectors - Status CEN TC 72 WG 12 (the author is convenor of WG 12!)

Definition of Multi Phenomena Fire Detectors (EN 54-15, for point type multi sensor fire detectors): A detector which incorporates in one mechanical enclosure sensors which detect more than one physical or chemical phenomenon of a real fire. The overall fire performance is determined utilising a combination of the detected phenomena. Examples of physical or chemical phenomena of a real fire are:

Aerosol, i.e. smoke, heat, combustion gases, electromagnetic radiation, sound.

For other types of multi-sensor fire detectors, this standard is intended to be used only for guidance. Multi-sensor fire detectors with special characteristics and developed for specific risks are not covered by this standard. The draft standard is expected to be published at the end of 2005.

Dr. O. Linden, Wagner, Hannover: Low Cost Approach to a Function-Based Testing Procedure for Multi Sensor Fire Detectors

For decades, testing technology has been lagging behind the technological evolution in the field of fire detection. While fire detection technology is characterised by an increasing use of multi-sensor technologies and more and more sophisticated data processing, the current testing concept is still basing on antiquated standards. However, the EN 54 [EN 54-7] was an adequate solution for being able to test fire detectors according to the state of the art thirty years ago. But it did also put up barriers for future developments due to its technology-based concept. Also the new testing approach of the CEA 4021 guideline [CEA 4021] for multi sensor fire detectors did not show any fundamental changes, as it mainly was an instruction how to combine parts 5 and 7 of EN 54. Although if up to now not everybody involved is willing to support a fundamental change of testing philosophy there is an unambiguous directive of ISO/IEC concerning the "Rules for the structure and drafting of International standards" [ISO/IEC 2001], explicitly demanding a "Performance Approach": "Whenever possible, requirements shall be expressed in terms of performance rather than design or descriptive characteristics. This approach leaves maximum freedom to technical development." Following this directive the new European standard for multi sensor fire detectors shall base on a concept which is almost open to future demands. In this spirit the responsible CEN working group (TC72/WG12) intends to go a new way by establishing a non-technology based testing standard which shall be applicable to all kinds of fire sensors.

U. Müller, University Duisburg-Essen:

Design and Functionality of a New "Test Duct for Multi Sensor Fire Detectors

Explanation of the of the development of a new test duct:

The new test tunnel should allow:

- to carry out a function based stability test of fire detectors
- to test smoke detectors according to EN 54 – 7 by use of paraffin-oil
- to test multi sensor fire detectors with gas sensor as one system, including the influence of data processing
- to make non-fire test with a dust-generator
- to remove charged dust particles after a fire test by opening up to six windows.
- to test gas sensors including electronic noses using real smoke
- to approach fire detectors as a black box
- a test-method where the test results include all influences of signal processing
- a test-method with no need for separation of the sensor signals
- a full-view on smoke distribution inside the duct
- later introduction of additional tests.

R. Phillips, LCBC/BRE, UK: Testing and Assessment of Multiple Sensor Fire Detectors - Black Box, White Box or some Shade of Grey?

Purpose of testing and standards and aspects of the paper:

- Adequate resistance to false alarms.
- Stability of sensitivity with respect to the conditions experienced in the service environment.
- Robust design & construction able to withstand the service environment for a reasonable time.
- Adequate sensitivity to Fire parameter.
- Involved assessment of the sensitivity to the fire parameter being monitored (e.g. heat tunnel tests, fire sensitivity tests).
- Concentrated on checking the response to specific conditions known to influence the prevalent sensor technologies.
- Sensitivity assessment (e.g. Fire sensitivity tests).
- Comparative sensitivity test - measurement of sensitivity to the chosen fire parameter.
- Basic response tests. (e.g. direction, reproducibility).
- Operational Environmental & EMC tests.
- Endurance / Durability tests.
- Response to sensor specific conditions
- Constructional requirements

M. Hesels, VdS, Köln: Multi Sensor and Multiple Criteria Fire Detectors – Current and Future Test Procedures in the VdS Fire Test Lab.

Currently established test methods and requirements in the VdS test laboratory:

- Multisensor smoke detectors according to CEA 4021
- Fire gas detectors according to VdS 2806
- Smoke detectors with more than one smoke sensor according to EN 54-7:2000 / prA2:2003

Future test methods for multiple sensor fire detectors:

- New European EN 54 standard for point type multi-sensor fire detectors

Prof. Dr.-Ing. H. Luck:

Multi-Dimensional Thresholds; A Problem for Design and Testing?

(This paper was only given because 2 papers from industry about latest developments of multiple-sensor detectors were missing – speakers did not agree to present the new development!)

Automatic fire detectors based on more than one sensors, s.c. multiple-sensor-based detectors, increasingly come into use in the field today. The paper discusses the advantages that are offered by the multiple-sensor techniques and shows that – already for the most simple form of such a multiple-sensor-detector, the s.c. threshold detector – more sophisticated methods of technical description and for verification by measurement as well are required compared to the simple one-sensor device. Multiple-sensor-detectors can be described in an approximate way only. A so far not yet sufficiently solved problem arises if testing is considered. The paper discusses the problem of measuring a multivariate detector threshold in a test situation and tries to show, that the definition of a suitable tolerance area for use in the s.c. stability test needs an agreed solution.

Annex 1: Programme of the workshop

Multi-Sensor Detection Algorithms - A comparison of Different Design Approaches -

R. Siebel, Univ. Duisburg – Essen / Germany

Condensation in (Multi-) Fire sensors

G. Roepke, detectomat GmbH, Ahrensburg / Germany

Multi Sensor Aspirating Fire Detection Systems

K. Lenkeit et al, Minimax GmbH&Co. KG, Bad Oldesloe / Germany

Gas Sensors for Fire Detection: Basic Principles and Considerations for Multi-SensorSystems

Prof. A. Schütze, Univ. des Saarlandes / Germany

Mobile Multi-Sensor Detection

I. Willms, Univ. Duisburg – Essen / Germany

Standardising Multi-Phenomena Fire Detectors - Status Report from CEN TC72 WG12

Th. Brupbacher, Siemens Fire and Security Products, Männedorf / Switzerland

Low-Cost Approach to a Function-based Testing Procedure for Multi Sensor Fire Detectors

O. Linden, Univ. Duisburg – Essen / Germany

Design and Functionality of a New “Test Duct for Multi Sensor Fire Detectors”

U. Mueller et al, Univ. Duisburg – Essen / Germany

Testing and Assessment of Multiple Sensor Fire Detectors - Black Box, White Box or some Shade of Grey? -

R. Phillips, BRE, Borehamwood Herts. / UK

Multi Sensor and Multiple Criteria Fire Detectors; Current and Future Test Procedures in the VdS Fire Test Lab.

M. Hesels, VdS Cologne / Germany

Multi-Dimensional Thresholds; A Problem for Design and Testing ?

H. Luck, Univ. Duisburg – Essen / Germany

2 Report of the 13th International Conference on Automatic Fire Detection; AUBE 2004

H. Luck, Universität Duisburg – Essen & EUSAS

1. General

The 13th International Conference on Automatic Fire Detection, AUBE'04, was held from September 16th – 18th, 2004, at the Universität Duisburg - Essen in Duisburg, Germany. Traditionally, this conference is held every four years at the University in Duisburg. After the pleasure to follow the invitation of NIST already two years after the last conference 1999 the original periodicity was re-established in order to meet the rapid pace of developments in sensing, signal processing, international standards and the coming up of new challenges in several parts of the application, e.g. in aircraft cargo protection, in the use of gas detection facilities and in the modelling / simulation field. So the next conference was organised in Duisburg again in fall 2004.

The background of the organisation was formed by the Department of Telecommunication of the Universität Duisburg - Essen and the Duisburg AWT associated by EUSAS (European Society for Automatic Alarm Systems), NIST, the vfdb (Vereinigung zur Förderung des Deutschen Brandschutzes) and the VdS Schadenverhütung / Cologne. The conference was controlled by an international steering committee with the following members:

Richard W. Bukowski, Co-chair,

National Institute of Standards and Technology (NIST), MD, USA

Thomas Cleary,

National Institute of Standards and Technology (NIST), USA

Franco Dischi, Notifier Italia, Italy

Reinhard Grabski, Institut der Feuerwehr Sachsen-Anhalt, Germany

Hiromitsu Ishii, Nihon University Tokyo, Japan

Tony Lamb, EURALARM

Li Jian, Shenyang Fire Research Inst., P.R. China

Heinz Luck, Co-chair, Universität Duisburg - Essen, Germany

Yoshiyuki Matsubara, National Institute of Fire and Disaster, Tokyo, Japan

Gustav Pfister, Siemens Building Technologies AG, Switzerland

Andreas Scheidweiler, EUSAS

Michael Schnell, VdS Schadenverhütung, Köln, Germany

Wolfgang Steinkellner, Prüfstelle für Brandschutztechnik, Wien, Austria

Ingolf Willms, Universität Duisburg – Essen, Germany

2. Organisation and Performance

The conference consisted of 12 sessions. A short introductory part was followed by 12 sessions dedicated to specific subjects which were run in two parallel session programs. Each session was chaired by two chairmen coming from different countries.

The number of accepted papers was 94, presented by 92 different speakers. These numbers are different because some of the presentations had the same authors.

18 of the presentations came from the US, the majority of 63 from Europe (43 from Germany) and 19 from Asia.

All contributions are carefully documented in the conference proceedings, edited by Peter Laws and Heinz Luck and printed by the Duisburg university. Most of the papers in the proceedings are written in English with two exceptions which are given in German, both of them with an English summary.

The oral presentations during the conference were mostly in English, only few in German with simultaneous translation.

A copy of the conference proceedings can be ordered from the Department of Telecommunication Systems, Universität Duisburg-Essen under the e-mail address: < luck@sent5.uni-duisburg.de > . A CD-version of the proceedings is also available.

The participation in the conference was comparably high. 240 participants from 15 different countries were registered, coming from research (universities) and development (industry, manufacturers) areas as well as from testing institutes, customers and insurance organisations. Many EUSAS members were under the European attendants.

3. Sessions

Introductory Session.

After the host's opening by Prof. Klaus Solbach, Pro-Rektor of the Universität Duisburg-Essen, H.J. Blätte, President of the German vfdb and Dr. H. Hiesinger, President and CEO of Siemens Building Technologies gave welcome addresses. Then the conference split up into two parallel program session lines.

Session : General Aspects.

The six papers presented in this session dealt with several different aspects like damage assessment and situational awareness, prediction of toxic potency, electromagnetic compatibility and esthetic viewpoint in the detector design.

Session : Multiple sensor & multiple criteria based detection

Six papers were presented in this section which reported about test methodology for multiple sensor / multiple criteria alarms as well as about several new solutions for detector concepts using different combinations, such as different wavelength and several scattering angles for optical smoke detection or audio-video sensors or photo-acoustic combinations. Most of the reported work is under further development.

Session : Fire detection algorithms: Theory, design and testing.

Eight papers in this session show the importance of this subject in today's development for automatic fire detection. Different aspects of signal processing means were presented from authors coming from various countries. Herewith also basic models and strategies for an effective testing of detection algorithms were discussed.

Session : Integrated Danger Detection, Wireless Detection & Alarm Systems.

In eight papers safety and security in communication standards for building automation and the progress in wireless detection and alarm systems were discussed during this session. Special topics were the market needs in the building automation world on the one hand and ultra-wideband techniques for fire and intrusion detection on the other. The contributions came from Germany, Italy and Switzerland.

Session : Test Methods, Standardisation and Certification.

During the whole long development of certification in the field of safety technology testing and the associated instrumentation have been one of the major topics in the international as well as in the national discussion. This doesn't have changed today. Seventeen conference contributions showed this fact very clearly. Testing methods and new ideas for performance assessment were presented. The obvious problem of reliable testing of multi-sensor and multiple-phenomena detectors was outlined in several papers and the attempt to solve it undertaken by the standards committees was reported. The first time on an AUBE'.. conference also other than European aspects were discussed in this context.

Session : Toxic Gas & Gas Detection.

Multi-Sensor based fire detection is one of the main topics of the last decade, because the combined use of different sensor-elements in fire detection is one of the most attractive measures to overcome the false alarm problem. One of the aspects in this context is the application of gas sensors as an additional element in combination with e.g. smoke sensing.

Nine papers presented technical aspects in the direction of gas component detection. Basic research results were outlined in this context as well as already applicable instrumentation. The discussion showed that gas and multi-sensor based fire detection did not at all reach it's final stage and will be an actual topic in the future, too.

Session : Modelling and Computer Simulation.

Simulation as an effective modern tool for research and development has an increasingly important significance in fire safety, and so in fire detection, too. It is clear that simulation has to be based on careful modelling of all parts in the physics of the whole process, incl. the fire and nuisance source, the temperature and smoke (and gas) distribution as well as the sensor performance and the signal processing / detection part. Seven papers were presented discussing general aspects as well as several detail problems in the context of modelling different parts of the fire detection process.

The discussion showed that some work has to be done in the future to make modelling & simulation a really useable tool in the development for fire detectors and the associated testing. Modelling becomes interesting also for special application like aircraft cargo compartment protection.

Session : Fire Detection in Aircraft.

Fire detection in aircraft, in particular in aircraft cargo compartments is of ongoing interest. The false alarm problem has major importance in this application compared to industrial or residential fire detection because any alarm has the tendency to force the pilot to an immediate landing irrespective how far away from the final destination.

So, certification and testing are significantly different from the "normal" procedure.

Six papers dealt with this subject again and continued the discussion started during the last AUBE'01 conference in Gaithersburg. The progress in this matter became visible and in addition new aspects, e.g. for the application of fire gas detectors for aircraft applications were presented.

Session : Fire Detection in Tunnels.

A special session dealt with fire detection in tunnels which is a serious problem worldwide. Four papers coming from Switzerland, Japan and Germany discussed different aspects of this problem together with examples for special solutions.

Session : Smoke Aerosol Characterisation.

The early detection of smoke has remained the main effective measure for fire detection. So the work on the improvement of reliable detection of smoke has by no means come to an end. Seven papers dealing with smoke and nuisance aerosol particle characterisation and measurement were presented.

Session : Detection of Radiated Emission and Video-Detection.

A fairly new field in the context of fire detection is the use of an enlarged range in wavelength and the use of video sequences. Nine papers were presented in this context with considerable distances to practical application. So the attempt to use the direct flame emission of microwave radiation is in an interesting research stage where the practical applicability is not yet in the focus. The use of video sequences from "normal" or special video cameras on the other hand has already reached the area of successful application for some special hazards, e.g. in tunnels. By no means the technical development in this field can be called complete or finished.

Session : Special Applications.

The conference was completed by a session that collected contributions which dealt with special cases and applications like residential fire detection in air conditioning systems, analyses and test for aspirating smoke detectors, experimental measurements and the associated modelling in thermally stratified environments, detection reliability of different fire detector principles or the validation testing of gas sensors in the dusty environment of a cement factory.



The chairmen, the speakers and the authors delivered a careful and engaged work which was gratefully accepted by the conference audience.

4. Acknowledgement.

The 13. International Conference on Automatic Fire Detection AUBE'04 relied very much on the kind hospitality of the Universität Duisburg – Essen. The possibility to use the university's facilities enabled the department "Nachrichtentechnische Systeme" to organise and to run this conference.

The steering committee as well as the team in the department together with Mrs. Petra Hoetger from the Duisburg university did a tremendous work during more than one year in preparing the conference. Their work is gratefully acknowledged.

The conference was sponsored by the EUSAS (European Society for Automatic Alarm Systems); the Siemens Building Technologies, Fire & Security Products, Männedorf; Detectomat GmbH, Brandmeldesysteme, Ahrensburg and Notifier Italia SRL, S. Donato Milanese. A great organisational support came from the Duisburg AWT (Akademie für Wissenschaft und Technik) and the VdS Schadenverhütung in Cologne. All the contributions of these organisations to the success of the conference are gratefully acknowledged.

3. Information on the upcoming EUSAS workshop "Modern trends in damage and residue free extinguishing solutions"

P. Stahl, Siemens Schweiz AG

Because of the worldwide restriction of the use of halons, the extinguishing industry concentrated more intensively on the introduction of alternative gases and on the enhanced development of water extinguishing technologies.

The aim of the new developments in water extinguishing technology is to provide both for room protection and local application solutions which can extinguish fires with a maximum efficiency and a minimum amount of water. A common method is to upgrade the existing water technology to systems with higher pressures and special nozzles, in order to control a fire with a droplet spectrum, which has a distribution of droplet diameters, significantly different from that produced by ordinary sprinkler nozzles. This should allow a homogeneous distribution of the so-called water mist in the risk area and be nearly residue-free and free of water damages. The workshop concentrates here on the existing technical and theoretical approaches and investigates the advantages and physical restrictions.

After the ban of halons gases with a much smaller ODP-level (ozone depletion potential) were introduced to the market. Most common are today the halon fluorocarbons (HFCs), which have an ODP of zero. They are widely used in nearly all countries of Europe and internationally, too. Nevertheless, their GWP (global warming potential) is not negligible. This stipulated recently the development and market introduction of a 3rd generation of gases, which show also here a more environmental friendly behavior. The workshop will address the latest developments, discuss the international market trends with regard to environment and address advantages and uncertainties.

4. New organization of the EUSAS work

I. Willms, University Duisburg-Essen

In order to better distribute the workload among the EUSAS EC, the functions of an EUSAS vice-chairman and the functions of EUSAS special officers were set-up due to decisions and corresponding elections in the EUSAS EC. The vice-chairman should accompany the chairman, represent EUSAS, and perform the strategic planning in advance of workshops. In addition to the tasks of Prof. Willms special officers for the following areas were set-up.

- Public relations
- Co-operation with EURALARM
- Co-operation with the CEA
- Preparation of trend reports

Dr. Pfister was willing to overtake the function of the vice-president for this working period.

M. Schnell will perform the function of the EUSAS special officer for public relations, Mr. van Langeveld will take care of the co-operation with EURALARM and Mr. Briers will do the same with respect to the CEA. Dr. Linden is going to prepare trend reports.

Thus the EUSAS EC expects within a short time a further improved work inside of the EUSAS EC and in the course of that a significantly increased benefit for the EUSAS community.