

Report of the 12th International Conference on Automatic Fire Detection; AUBE 2001.

H. Luck, Gerhard-Mercator-Universität Duisburg & EUSAS

1. General.

The 12th International Conference on Automatic Fire Detection, AUBE'01, was held on March 26th – 28th, 2001, at the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland, USA, as part of the Institute's centennial celebration.

Traditionally, this conference is held every four years at the Gerhard-Mercator-Universität Duisburg, Germany. This time it was a pleasure to follow the invitation of NIST already after two years since the last conference 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. NIST was a perfect host for this AUBE2001-conference and carried the main burden of the organisation.

The background of the organisation was formed by the National Institute of Standards and Technology (NIST), the Gerhard-Mercator-Universität Duisburg and EUSAS (European Society for Automatic Alarm Systems) and was controlled by an international steering committee with the members:

Dr. W. Grosshandler, Co-chair,
National Institute of Standards and Technology (NIST), USA
Mr. R. Bukowski,
National Institute of Standards and Technology (NIST), USA
Prof. Dr. H. Luck, Co-chair,
Gerhard-Mercator-Universität Duisburg, Germany
Prof. Dr. H.-I. Willms,
Gerhard-Mercator-Universität Duisburg, Germany
Dr. M. Loepfe,
Siemens Building Technologies AG, Switzerland
Prof. Dr. H. Ishii,
Nihon University, Japan
Dr. Y. Matsubara,
National Institute of Fire and Disaster, Japan.

2. Organisation and Performance.

The conference consisted of 10 sessions. An introductory one was followed by nine sessions dedicated to specific subjects. Each session was chaired by two chairmen, one from America and another from Europe or Asia respectively.

The number of technical papers was 56, presented by 51 different speakers. These numbers are different because some of the presentations had the same authors. 20 of the presentations came from the US and Canada, 27 from Europe (21 from Germany) and 9 from Asia. All contributions are carefully documented in the conference proceedings, edited by Kelly Beall, William Grosshandler and Heinz Luck and printed by NIST. Most of the papers in the proceedings are written in English with two exceptions which are given in German, one of them with an English summary.

A copy of the conference proceedings can be ordered from NIST under the e-mail address: 'wgrosshandler@nist.gov'

The European participation in the conference was comparably high. 117 participants from 16 different countries were registered, 46 coming from America, 59 from European countries, 10 from Asia and 2 from Australia. Many EUSAS members were under the European attendants.

3. Sessions.

Introductory Session.

After the host's welcome address delivered by James Hill, Deputy Director of NIST's Building and Fire Research Laboratory, surveys were given over the AUBE'...-conferences history by H. Luck and the history of NBS / NIST's research on fire detection by R. Bukowski. The session closed with a general view on "European Standards and Certification Procedures" read by H. Schüngel.

Session A : Smoke Characterisation.

The three papers presented in this session dealt with the improvement of the smoke particle measurement techniques and their extension to smaller (nano-meter) particle size ranges. The contributions came from NIST and from the Gerhard-Mercator-Universität Duisburg.

Session B : Detection by Radiated Emission.

Two papers in this session dealt with image processing of pictures from infra-red and video pictures, which e.g. is used for early smoke detection in tunnels. Furthermore the measurement of spectral radiation intensities from standard test fires were reported, completing a work of the Aachen Technical University from the early 1970th (W. Kirsch & R. Portscht), which is only available in German language and therefore not very well known. Furthermore distributed optical fiber temperature detection was discussed and the attempt to use microwave radiation for fire detection was reported.

Session C : Detection Systems and Algorithms.

Eight papers in this session show the importance of this subject in the 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 development of detection algorithms were discussed.

Session D : Wireless Systems & Electromagnetic Compatibility.

Electromagnetic compatibility and the use of radio-linked systems for automatic fire detection have become important items in the discussion about automatic safety techniques, at least in Europe. Five papers from France and Germany discussed this subject including the use of internet facilities in the context of automatic fire alarm systems.

Session E : Test Methods and Instrumentation.

During the whole long development of certification in the field of safety technology automatic fire detection testing and the associated instrumentation has been one of the mayor topics in the international as well as in the national discussion. This doesn't have changed today. Seven conference contributions showed this fact very clearly. Testing methods and new ideas for instrumentation were presented. Partly – e.g. in the field of gas detection – they were introduced by the new technical development that has taken place in the last time period. New or improved application – such as new aspects in tunnel protection – also create new necessities for testing facilities and instrumentation. Seven papers presented different aspects of this subject.

NIST's Fire Emulator / Detector Evaluator was presented as a testing facility for general use and new testing methods for gas sensor based fire detectors were discussed. Other contributions dealt with testing of fire protection systems for traffic tunnels and future concepts for volumetric fire detector testing.

Session F : Gas & Multi-Element 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 new aspects in this context is the application of gas sensors as an additional element in combination with e.g. smoke sensing.

Eight papers presented technical efforts in this direction. They discussed topics like the use of gas detection in residential fire detection systems as well as – more basic – the requirements for gas sensors for the use in this context. The discussion has shown that multi-sensor based fire detection has not at all reached it's final stage and will be an actual topic in the future, too.

Session G : 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 also. 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. Eight 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 next future to make modelling & simulation a really useable tool in the development for fire detectors and the associated testing. Schifiliti's paper expressed this aspect in an impressive way.

Session H : Integrated Fire Detection / Building Control Systems.

Four papers were presented in this session which outlined different aspects of integrated detection in connection with building control systems. The integration of safety aspects into the general control of a building is not yet agreed among experts and will remain a subject of discussion for the next future. On the other hand features like early warning of system malfunctions, hazardous environments, in situ monitoring for building managers as well as real-time assessment of fire fighter conditions were mentioned and proposed during this session.

Session I : Fire Detection in Aircraft, Transport Systems and Special Hazards.

Fire detection in aircraft, in particular in aircraft cargo compartments, was a new subject not yet discussed in the AUBE'... conference series before. The false alarm problem has mayor 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.

Seven papers dealt with this subject. They were accompanied by an additional contribution that reported a work concerning rapid UV/IR-flame sensing for automatic fire suppression in engine compartments and other hazardous cases. This contribution could not be incorporated in the printed version of the proceedings.

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

4. Acknowledgement.

The idea to organise this conference the first time outside the European area came from William Grosshandler, Chief of the Fire Research Division in the Building & Fire Research Laboratory within NIST, Gaithersburg, MD, USA. His invitation was accepted with pleasure by the Gerhard-Mercator-Universität Duisburg and by EUSAS. The hospitality of NIST was the important background for the conference's success. The steering committee as well as Mrs. Kellie Beall from NIST and 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 Hughes Associates, Inc., Baltimore, MD, USA; the Factory Mutual Global, Norwood, MA, USA and the National Electrical Manufacturers Association, USA who also hosted several events during the conference. The financial contributions of these organisations to the success of the conference are gratefully acknowledged.