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International Frequency Sensor Association (IFSA) Celebrates the 10th Anniversary

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Abstract: Written by the International Frequency Sensor Association (IFSA) president, this 10 years IFSA activity report describes in details all type of association's activities, including research and development, training, publications, sponsorship, awards and information dissemination. IFSA membership benefits are outlined. Some IFSA historical facts and future perspectives are indicated.
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1. About Us

The year 2009 is a significant one in the IFSA's history. We are proud to announce the 100th jubilee volume of Sensors & Transducers journal, which has been published in January 2009 and to note continued interest in our activities. In addition, we are going to celebrate the 10th IFSA anniversary in August 2009. It is my great pleasure to congratulate heartily all our IFSA members, readers, authors, editors and editorial board members.

IFSA was founded in 1999 as non-profit, world's leading professional association focused on the advancement of sensors technologies. Its main goals are promotion of international interchange of scientific and technical information in the field of sensor instrumentation, smart sensors and transducers with digital, frequency, period, duty-cycle, time interval, phase-shift, PWM and pulse number output, and the enhancement of international co-operation among scientist and engineers from research and industry. IFSA membership offers exclusive access to the latest research and advances in sensing technologies. IFSA provides a unique forum for the exchange of information and cooperation between top researchers and industry all over the world in the highly interdisciplinary field of smart sensors and sensor systems and stimulates innovative solutions in a variety of application scenarios. The initiative taken up by IFSA is of key importance for the implementation of modern research approaches in the field of novel sensors and transducers.

The main IFSA objectives are:

- Bring together the key players in industries and R&D working on mentioned scientific topics and provide platform for the mutual exchange of information within those communities and end-users;
- Stimulate cooperation and research by providing an appropriate infrastructure;
- Increase the number of practitioners and users by stimulating effective links between customers, R&D providers, manufacturers and supplies to help IFSA members improve the market profitability of their existing products and develop new ones;
- Establish strong link between R&D in instrumentation, sensors and modern technologies including nanosensors, as well as working partnerships between industry and academia;
- Convert new technology or ideas into industrial design and productions processes;
- The rapid dissemination of important results in the multidisciplinary fields of smart sensors and transducers, including but not limited to:
 - modern microelectronics technologies;
 - soft sensors;
 - novel processing algorithms;
 - advanced methods of measurements;
 - wireless sensor technologies;
 - new physical effects and principles;
 - smart sensors and sensor systems with intelligent functions as self-validation, self-adaptation and self-identification.

2. IFSA Membership

The International Frequency Sensor Association membership is open to all companies, universities, organizations and individuals worldwide that are able to contribute expertise in sensor-relevant areas. Our 563 members represent today 63 countries. 59 % of our members are from the industry, 35 % - from universities and 6 % from research institutions (Figure 1) and we are proud to note continued growth of their number. Among IFSA members there are big corporations as *ABB, Analog Devices, Bell Technologies, Bosch, General Electric Global Research, Honeywell, IMEC, Infineon Technologies, John Deere, Keller, Mazda, Melexis, Memsis, Motorola, PCB Piezotronics, Philips Research, Sandia Labs* and *Yokogawa* as well as government institutions as *NASA, US Navy, National Research Councils*, etc. The number of members per continent is shown in Figure 2 and Table 1.

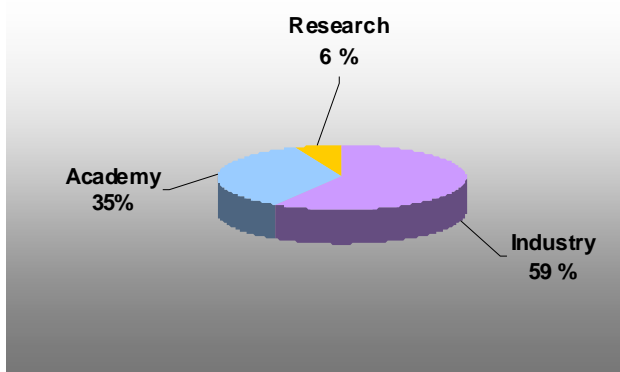


Fig. 1. IFSA members.

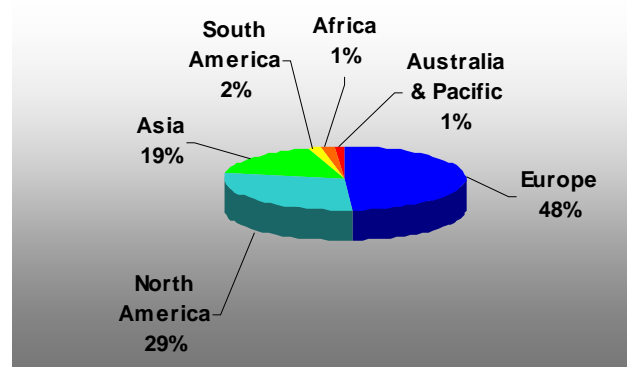


Fig. 2. IFSA members per continent.

Table 1. Number of IFSA members per continent.

Continent	Number of Members
Europe	266
North America	160
Asia	110
South America	11
Australia and Pacific	9
Africa	7
Total Number:	563

In comparison with 2005, the growth of number of members (%) from Asia is observed. The members' interest in sensors types is shown in Table 2.

Table 3. Members interest in sensors types.

Sensor Type	Number of Members	%
Sensor Instrumentation	252	44.8
Temperature	195	34.6
Pressure	190	33.7
Optical	190	33.7
Biosensors	183	32.5
Gas	172	30.6
Chemical	169	30.0
Magnetic	159	28.2
Flow	157	27.9
Mechanical	156	27.7
Humidity	147	26.1
Ultrasonic	139	24.7
Rotation Speed	136	24.2
Acoustic	133	23.6
Proximity	132	23.4
Others	132	23.4
Resonant	107	19.0

All IFSA members have the following benefits:

- Opportunities to participate in research and collaborative joint R&D projects;
- Unlimited online access to a wide variety of latest sensors related information and IFSA Members Area;
- 10 % discount for all Sensors Web Portal services including advertising and e-commerce;
- An exclusive 20 % discount for all books published by John Wiley & Sons publisher;
- Discount 60 % for *Sensors & Transducers Journal* (ISSN 1726-5479) subscription
- Quick publication in *Sensors & Transducers Magazine* (e-Digest), and *IFSA Newsletter* (ISSN 1726-6017);
- Discount registration fee for sensor related events (conferences, workshops and courses) organized or sponsored by IFSA;
- Discount for sensors related books published by IFSA.

3. Recent IFSA Activities

3.1 Researches and Development

During the last years, due to IFSA's research and development activities the revolution ICs family of universal frequency-to-digital converters UFDC-1 [1] and its high speed version UFDC-1M-16 [2] were designed and introduced to the market by SWP, Inc. (Toronto, Canada) for the first time in the world. All ICs are available in 28-lead PDIP, 32-lead TQFP and 32-pad MLF packages (Fig. 3). These universal ICs give a unique opportunity to work with any frequency-time parameters of signal as frequency, period, their difference and ratio, duty-cycle, duty-off factor, time interval, pulse width, pulse space, phase-shift, pulse number in the same manner as a standard ADC works with analog (voltage or current) signals. The innovation is based on four novel patented measuring methods for frequency (period), their ratio, duty-cycle and phase-shift. This simple, low-cost alternative approach to analog-to-digital conversion lets to use in full measure the main advantages of frequency as the informative parameter of sensors' and transducers' outputs. In addition, these ICs have a wide functionality and high metrological performances such as programmable and constant relative error up to 0.001 % in the whole frequency range from 0.05 Hz to 7.5 (120) MHz; non-redundant conversion time from 6.25 μ s to 0.2 s; scalable resolution from 2.5×10^{-7} to 45 Hz, etc. These functionality and performance are comparable (and even better) with a good desktop universal frequency counter. The ICs introduce in different smart sensors and sensor systems unique intelligent features as self-adaptation and self-identification. Many sensor systems where and will be designed based on these novel ICs [3-28]. Perspective applications of such ICs are numerous: from desktop measuring instruments to hand-held and pen-size measuring instruments; data acquisition systems for frequency-time parameters of signals; tachometer and tachometric systems; digital, smart sensors and sensor systems, etc.



Fig. 3. ICs UFDC's packages.

The marked study of frequency-time domain or so-called quasi-digital sensors (with frequency, period, their difference and ratio, duty-cycle, duty-off factor, time interval, pulse width, pulse space, phase-shift, pulse number, PWM output) is also important task of IFSA. During the last 10 years this market segment was increased approximately on 16-20 % and now quasi-digital sensors and digital sensors and transducers on its basis become more available. Such sensors are rather interesting from a technological and fabrication compatibility point of view, because of their metrological performances, simplifications of the signal conditioning circuitry and measurand-to-digital converter.

3.2 Training Courses and Sensors Related Events

The International Frequency Sensor Association is continue to up-date the developed advanced training courses on *Data Acquisition and Signal Processing for Smart Sensors and MEMS*; and *Smart Sensors Systems Design*. The last one - an advanced engineering course has become annual and is given in Barcelona (Spain) with the support from EC, Technical University of Catalonia (UPC-Barcelona) and Fundació UPC. Online course version is available at Sensors Web Portal

(<http://www.sensorsportal.com>), Training Courses section, and IEEE Sensors Council web site, Tutorials section (<http://www.ewh.ieee.org/tc/sensors/tutorials.htm>). Short courses of the same name were given numerous times in different European universities in Austria, Germany, Italy and Spain during 2001-2008. All attendees have received the IFSA certificates.

The IFSA also sponsored or co-sponsored many sensors and measurements related technical conferences, symposiums, workshops and exhibitions including *Sensors Expo & Conference* in the USA (2005-2009); *SensorsGOV Conference & Expo* in Hampton Roads, USA (6-8 December 2005); *Frontiers of NanoEngineering – 2003*, Brazil, (2-3 October 2003), *International Symposium on Interdisciplinary Electromagnetic, Mechanic & Biomedical Problems (ISEM' 2005)*, Bad Gastein (Salzburg), Austria (12-14 September, 2005); *17th Optical Fibre Sensors Conference (OFS-17)*, Bruges, Belgium (23-27 May 2005), *Image Sensors Europe 2009*, London, UK, 24-26 March 2009, *3rd International Conference on Smart Materials, Structures, Systems (CIMTEC' 2008)*, Acireale, Sicily, Italy, (8-13 June 2008), numerous conferences organized by the Institute of Defense and Government Advancement (IDGA), etc.

3.3 Publications

Published since October 2000 a peer review international *Sensors & Transducers* journal (ISSN 1726-5479) provides an advanced forum for the science and technology of physical, chemical sensors and biosensors. It publishes research and application specific papers, technical and market reviews, cover story, feature, special reports, case studies, sensors related books reviews, etc. Articles rapidly published in *Sensors & Transducers* journal receive very high publicity. Today *Sensors & Transducers* is among most popular journals and magazines related to sensors, transducers, MEMS, instrumentation and DAQ systems.

The international editorial board of journal includes 9 editors and 299 editorial advisory board members from 47 countries. Every year, 12 regular and some special issues including sponsored issues are published.

The 100th jubilee volume was published in January 2009. The *Sensors & Transducers* journal is indexed and abstracted very quickly by Chemical Abstracts, Index Copernicus Journals Master List, Open J-Gate, Google Scholar, etc. The *Sensors & Transducers* was the first journal in the world for which an *e*-impact factor was calculated [29]. In 2007 the journal's *e*-impact factor was 156.504, and in 2008 it was increased in 1.32 times and is 205.767.

Every month our editorial board publishes the list of 25 Top Downloaded Articles published in *Sensors & Transducers* at journal's web pages [30], and every year our editorial board members select 10 best articles published in the past year, which are also listed in appropriate web pages [31].

Topics of interest include, but not restricted to:

- Digital, frequency, period, duty-cycle, time interval, PWM, pulse number output sensors and transducers;
- Theory, design, standardization and modeling;
- Smart sensors and systems;
- Sensor instrumentation;



Fig. 4. Journal's jubilee vol.100, issue 1, January 2009.

- Virtual instruments;
- Soft sensors;
- Sensors interfaces, buses and system issue;
- Signal processing;
- Frequency (period, time interval, duty-cycle)-to-digital converters, ADC;
- Technologies and materials;
- Microsystems;
- Nanosensors;
- TEDS (IEEE 1451), plug-and-play sensors;
- Wireless sensors;
- Sensor networks;
- Data acquisition systems;
- Applications.

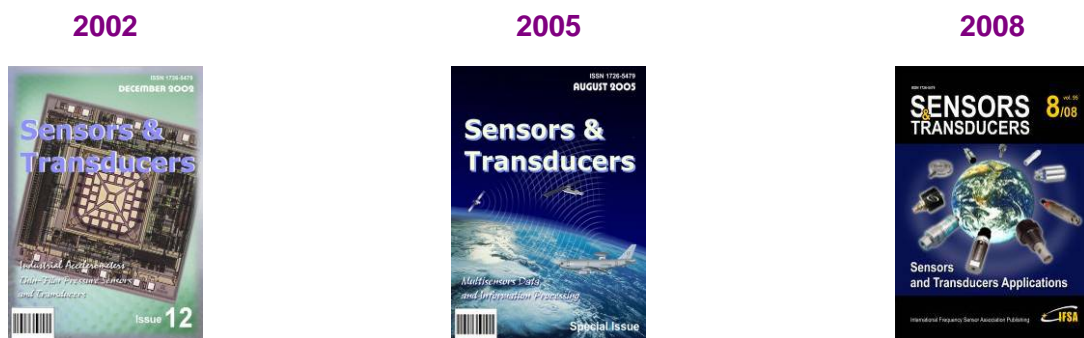


Fig. 5. *Sensors & Transducers* journal's covers.

By publishing in the *Sensors & Transducers*, not only will an article be seen by research across many different disciplines, but it is also be able to take advantage of a number of benefits as rapid publication; high *e*-impact factor; free to publish (no page charges and colour figures can be included in articles free of charge); quick e-mail submission of manuscript; statistics for articles downloads per month and per year(s), etc.

In additional to the *Sensors & Transducers* journal, the IFSA publishes also a monthly online *IFSA Newsletter* (ISSN 1726-6017), *Sensors & Transducers Magazine (e-Digest)* and *Sensors Industry News* feed (rss and xml formats). Published sine 2004 the news feed is syndicated by many web sites, news feeds catalogs, search engines and news aggregators (RSS readers) every week. Customers can now read the *Sensors Industry News* in their mobile phones.

The *IFSA Newsletter* is written by the editors of *Sensors & Transducers* and delivers the product, market and research news and updates readers on happenings in the sensor science and industry. The *Sensors & Transducers Magazine (e-Digest)* devoted mainly to new sensors related products. The newsletter and magazine are mailed to more than 40, 000 decision makers worldwide, twice per month, in ASCII (text format) and exists online at Sensors Web Portal (<http://www.sensorsportal.com>) in the HTML - format. Today both the *IFSA Newsletter* and *Sensors & Transducers Magazine (e-Digest)* are most informative online sensors related media in the Internet, and it is our great pleasure to cite our readers feedbacks: “*IFSA Newsletter provides consolidated information*”; “*It is very useful for us in the design of instruments*”; “*Biosensor section (Sensors and Transducers) publish current research and provide knowledge in recent development in the field of biosensors. Though, all sections are very good and this is the only journal, which provides all information in the field of sensors. One day it will be highest impact factor journal.*” “*Sensors & Transducers journal has potential to grow as highest impact factor publication*”...

3.4 Information Dissemination

Information dissemination is one of the main IFSA activities. The IFSA's web site was launched on 23 August 1999. In 2001, Sensors Web Portal, Inc. was registered in Canada, Toronto in order to host this biggest Internet vertical specialized recourse devoted to sensors, transducers, MEMS, sensor instrumentation and DAQ systems. Today Sensors Web Portal (<http://www.sensorsportal.com>) is a primary Internet resource in this high technological area with free regularly up-dating content.



The Sensors Web Portal was awarded twice by the Golden Web Award from the International Association of Web Masters and Designers (IAWMD) in recognition of creativity, integrity and excellence on the Web and presented to those sites whose web design, originality and content have achieved levels of excellence deserving of recognition.

This specialized vertical portal offers an opportunity to place here information about new products, papers, articles, patents, projects, standards, courses and sensors related events. It is a snap-short of what is happening now in the field of sensors and measuring instruments. Edited from international printed and electronic media, using research, application, novelty and innovation as key words, it gives the best. This web portal is a concentrator of knowledge, ideas, engineering solutions, new physical effects and principles of smart sensors and sensor systems based on modern technologies.

Today, Sensors Web Portal is one of the world's most effective industrial and scientific online B2B and B2C publisher with continuously growing number of members and visitors from 160 countries with more than 2 million annual web page views, and most effective sensors related advertising online recourse.

Sensors Web Portal contains a variety of useful information:

- Reports on sensor related projects;
- Publications (including full pages papers and articles), references, patents, press releases, thesis annotations, etc.;
- List of sensors manufacturers including links and products specifications;
- Standardization initiatives;
- Marketplace;
- Tools;
- Calendar of sensors related events;
- Training courses;
- Bookstore;
- B2B and B2C sensor online store;
- Sensor wish list;
- Sensor Jobs section;
- Forums and polls;
- Links to other sensor related web sites;
- IFSA members' area.

The sensors section divided into the following subsections: Accelerometers, Acoustic, Biosensors, Chemical, Displacement, Flow, Gas, Inclination, Humidity, Level, Load, Magnetic, Mechanical, Moisture, Nanosensors, Optical, Oxygen, Plug-and-Play (TEDS), pH, Position, Pressure, Proximity,

Resonant, Rotation speed, Temperature, Tilt, Torque, Ultrasonic, Vacuum, Yaw and Others subsections, including DAQ, MEMS and Sensor Instrumentation.

Based on the Sensors Web Portal' survey 2009 most visited sections are the following: Sensors Industry News (29 %), Sensors & Transducers Journal and Magazine (20 %), All mentioned sections (18 %), IFSA Newsletter (10 %), Projects Section (8 %), Calendar of Events (4 %), Forum and sensors wish list (4 %), Lists of Manufacturers (3 %), Training Courses (3 %), Other sections (2 %), Figure 6.

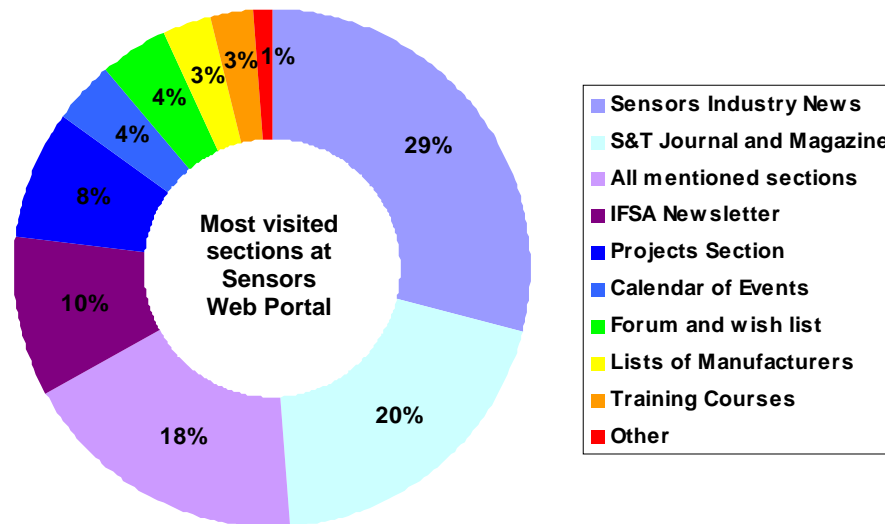


Fig. 6. Most visited Sensors Web Portal's sections (based on the Sensors Web Portal's survey 2009).

Sensors Web Portal's visitors give us very good feedbacks. Here some of them:

- *Sensors portal is the best sensors related resource in the Net. Thank you !*
- *Please take my appreciation of www pages and information. They are clearly and professionally prepared. I do not remember the first visit on your portal but from this time it is still present in my mind.*
- *Extremely technical website designed to share information throughout the world in relation to sensors of all kinds. I was absolutely impressed with the level of technical information on this site. I will definitely be visiting this site again.*
- *Easy to navigate. Loads real fast.*
- *A good site if you are interested in sensors, transducers, MEMS and sensor instrumentation because this site can offer the latest up-to-date educational information at your fingertips.*
- *Wow, great resource! Thanks.*
- *A very interesting site well done.*
- *A well presented site and easy to navigate.*
- *Very informative, useful and easy to navigate web portal. Good job ...*
- *I have checked your website and found it very interesting from professional point of view.*
- *I was advised of your sensor site by a colleague and am really impressed by the technical information on it. I have therefore instructed my webmaster to link to it.*
- *You have some wonderful information on your website. You have done a nice job. Congratulations.*
- *I have found the Sensors Web Portal very interesting (I learned of it in the current issue of Design News, by the way).*
- *One of the best web sites I visit.*

4. IFSA Awards

In 2006 IFSA has established two prestigious awards: Best Article Awards for ten best articles published in *Sensors & Transducers* journal during one year and Top Sensors Product Awards for sensors related products, information about which was published in *Sensors & Transducers Magazine (e-Digest)*.

The ten best articles are selected by editorial advisory board members from 47 countries in two stages on the majority basis. The criterion is the following: novelty, innovation, outstanding new research and current importance. Results for the each of year are published on journal's web page [31].



IFSA Members – exhibitors of Sensors Expo 2008: Endevo Corporation and VTI Technologies with the 10 Top Sensors Products of 2007 certificates.

Top Sensors Products are chosen every year by our editors. All these products have passed a two-stage selection: the first - for publication in the *Sensors & Transducers Magazine* as most interesting and relevant products; the second - as most innovative products among all published in the *Magazine* during 2008. Results for the each of year selection are published on journal's web page [32].

Authors of the best articles published in *Sensors & Transducers* journal and companies, whose products were selected among ten top products, receive the IFSA certificates.

5. The Future

The IFSA will continue its research and development in the area of sensors interfacing circuits, digital and smart sensors and sensor systems. New integrated circuits family – the Universal Sensors and Transducers Interfaces (USTI) will be introduced to the market soon [33-35].

In the nearest future, the IFSA going to publish a sensor related book in application specific and design fields to help engineers and developers to create novel digital sensor systems and smart sensors based on new technologies and design concepts.

We are planning also new sections at Sensors Web Portal, and our members and visitors will see results through the next coming years of our activities.

New conferences and courses will be organized and sponsored by IFSA again. And, of course, we are expecting a growing number of IFSA members.

Additional information about the IFSA, all mentioned activities and services can be found at Sensors Web Portal: <http://www.sensorsportal.com>



The IFSA Historic Facts

- **1999** - International Frequency Sensor Association (IFSA) was founded
- **23 August 1999** – Sensors Web Portal was launched
- **The 1st IFSA President 1999-2006:** Prof. Nikolay V. Kirianaki
- **The 2nd IFSA President 2007- present:** Prof. Sergey Y. Yurish
- **The 1st IFSA Member:** Motorola, Inc. was registered on 22 August 1999
- **The 1st press release** was published in *Sensors & Transducers Magazine*, Vol.1, October 2000 by Xemics
- **The 1st research article** was published in *Sensors & Transducers Magazine*, Vol.2, November 2000 by Zotov V. D., 'Z - Sensors'
- **The 1st research article** was published in *Sensors & Transducers Journal*, by Martin Kollár 'Measurement of Capacitances Based on a Flip-Flop Sensor', Vol. 35, Issue 8-9, August-September 2003, pp.1-7
- **2000** – the IFSA was registered by the Union of International Associations (UIA) in Brussels (Belgium)
- **2001** - Sensors Web Portal, Inc. was registered in Canada, Toronto
- **2002/2003** – the 1st Golden Web Award
- **2003/2004** – the 2nd Golden Web Award
- **2003** – the first sensors online store in the Internet was opened
- **2004** – the IC UFDC-1 was introduced to the market
- **2006** – the IC UFDC-1M-16 was introduced to the market

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International Frequency Sensor Association



International Frequency Sensor Association (IFSA) is a professional association, created with the aim to encourage the researches and developments in the area of quasi-digital and digital smart sensors and transducers.

IFSA Membership is open to all organizations and individuals worldwide who have a vested interest in promoting or exploiting smart sensors and transducers and are able to contribute expertise in areas relevant to sensors technology.

More than 500 members from 62 countries world-wide including ABB, Analog Devices, Honeywell, Bell Technologies, John Deere, Endevco, IMEC, Keller, Mazda, Melexis, Memsis, Motorola, PCB Piezotronics, Philips Research, Robert-Bosch GmbH, Sandia Labs, Yokogawa, NASA, US Navy, National Institute of Standard & Technology (NIST), National Research Council, etc.



For more information about IFSA membership, visit
<http://www.sensorsportal.com>

Guide for Contributors

Aims and Scope

Sensors & Transducers Journal (ISSN 1726-5479) provides an advanced forum for the science and technology of physical, chemical sensors and biosensors. It publishes state-of-the-art reviews, regular research and application specific papers, short notes, letters to Editor and sensors related books reviews as well as academic, practical and commercial information of interest to its readership. Because it is an open access, peer review international journal, papers rapidly published in *Sensors & Transducers Journal* will receive a very high publicity. The journal is published monthly as twelve issues per annual by International Frequency Association (IFSA). In addition, some special sponsored and conference issues published annually.

Topics Covered

Contributions are invited on all aspects of research, development and application of the science and technology of sensors, transducers and sensor instrumentations. Topics include, but are not restricted to:

- Physical, chemical and biosensors;
- Digital, frequency, period, duty-cycle, time interval, PWM, pulse number output sensors and transducers;
- Theory, principles, effects, design, standardization and modeling;
- Smart sensors and systems;
- Sensor instrumentation;
- Virtual instruments;
- Sensors interfaces, buses and networks;
- Signal processing;
- Frequency (period, duty-cycle)-to-digital converters, ADC;
- Technologies and materials;
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Submission of papers

Articles should be written in English. Authors are invited to submit by e-mail editor@sensorsportal.com 6-14 pages article (including abstract, illustrations (color or grayscale), photos and references) in both: MS Word (doc) and Acrobat (pdf) formats. Detailed preparation instructions, paper example and template of manuscript are available from the journal's webpage: <http://www.sensorsportal.com/HTML/DIGEST/Submission.htm> Authors must follow the instructions strictly when submitting their manuscripts.

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