

IFSA Activity Report

Connecting Academy and Industry





'IFSA is one of six organizations that either focus entirely on sensors or sensors provide a major thrust for their activities'.

*Design News
Randy Frank, Contributing Editor*

Foreword – IFSA President



The year 2019 is a significant one in the International Frequency Sensor Association (IFSA)'s history. In this year we are going to celebrate the 20th IFSA anniversary. 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 a non-profit, professional association focused on the advancement of sensors technologies. Today IFSA is one of the major, world's leading professional, association serving for sensor industry and academy during 20 years. 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. Sensors are being used across a wide variety of industries, including automotive, medical, entertainment, security, and defense due to increased usage of process controls and sensing elements in different sectors. In the last decade, the need for sensors is increasing dramatically with the ongoing boom in smart mobile communication technologies, IoT and Industry 4.0.

As IFSA enters its 20th anniversary, we are proud to stand out as the leading representative of the sensor industry and academy focusing on innovation and industrial implementation. IFSA builds links between industry and academy by providing services that they ask and which are beneficial to them.

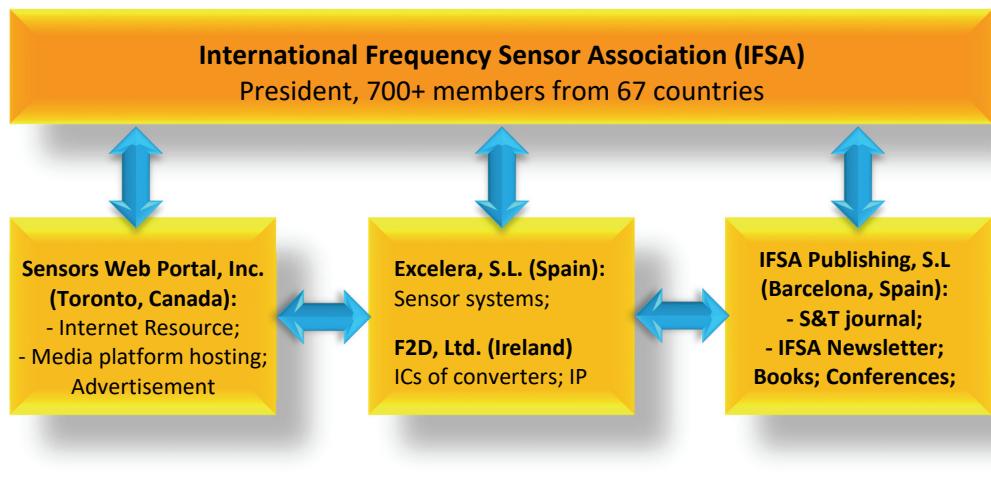
I express my sincerely appreciation to all members and to all individuals of sensors community who have enabled the creation of IFSA and supported its prosperous development. Happy 20th anniversary to IFSA !

A handwritten signature in black ink, appearing to read "Yurish -".

Prof., Dr., Sergey Y. Yurish,
IFSA President

IFSA - Association

International Frequency Sensor Association (IFSA) – is a professional, non-profit association serving for sensor industry and academy. IFSA publishes *Sensors & Transducers* journal and magazine (e-digest), *IFSA Newsletter*, sensor and measurements related monographies and open access books; organizes research conferences, roundtables and panel discussions during the appropriate events (conferences, workshops, symposiums and trade exhibitions) over the World; promotes education and training activities by *organizing* training courses, tutorials and seminars for PhD students and engineers; participates in standardization initiatives. There are several IFSA Group's companies such as *Sensors Web Portal, Inc.* (Canada), *IFSA Publishing, S.L.* (Spain), *Excelera, S.L.* (Spain) and *F2D, Ltd.* (Ireland), which are helping to IFSA in various commercialization activities.



IFSA Group's Companies:



International Frequency Sensor Association (IFSA) structure.

IFSA is an ideal partner for many joint European Research Projects due to its outstanding abilities for project results dissemination over the World and transfer research results to industry as an exploitation partner.

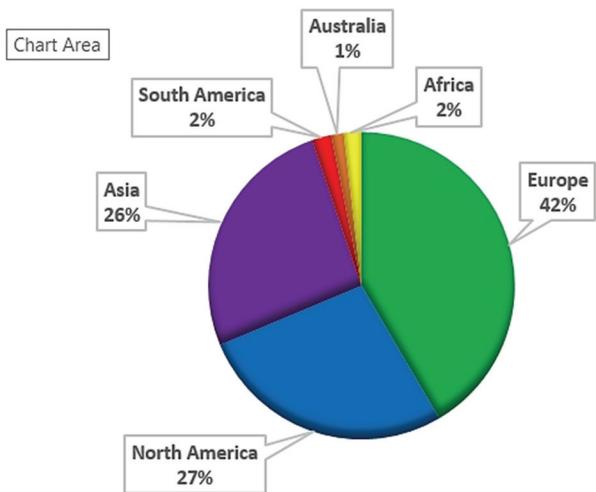
IFSA Membership

IFSA membership offers exclusive access to information about 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 with the next ensuing commercialization.

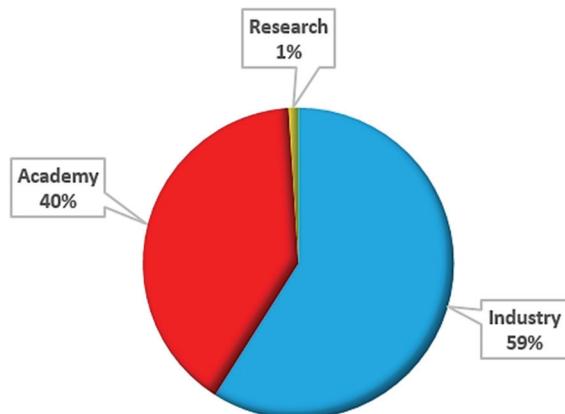
The main IFSA objectives are the following:

- Bring together the key players in industries and R&D working on sensor related 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;
- The rapid dissemination of important results in the multidisciplinary fields of smart sensors and transducers for physical and chemical, electrical or non-electrical quantities.

IFSA membership is open to all companies, universities, organizations and individuals worldwide that are able to contribute expertise in sensor-relevant areas. Today our 751 members represent today 71 countries and 6 continents. 59 % of our members are from the industry, 40 % - from academy and 1 % from research institutions and we are proud to note continued growth of their number, especially from academy. 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, Texas Instruments and Yokogava* as well as government institutions as *NASA, US Navy, National Research Councils*, etc.



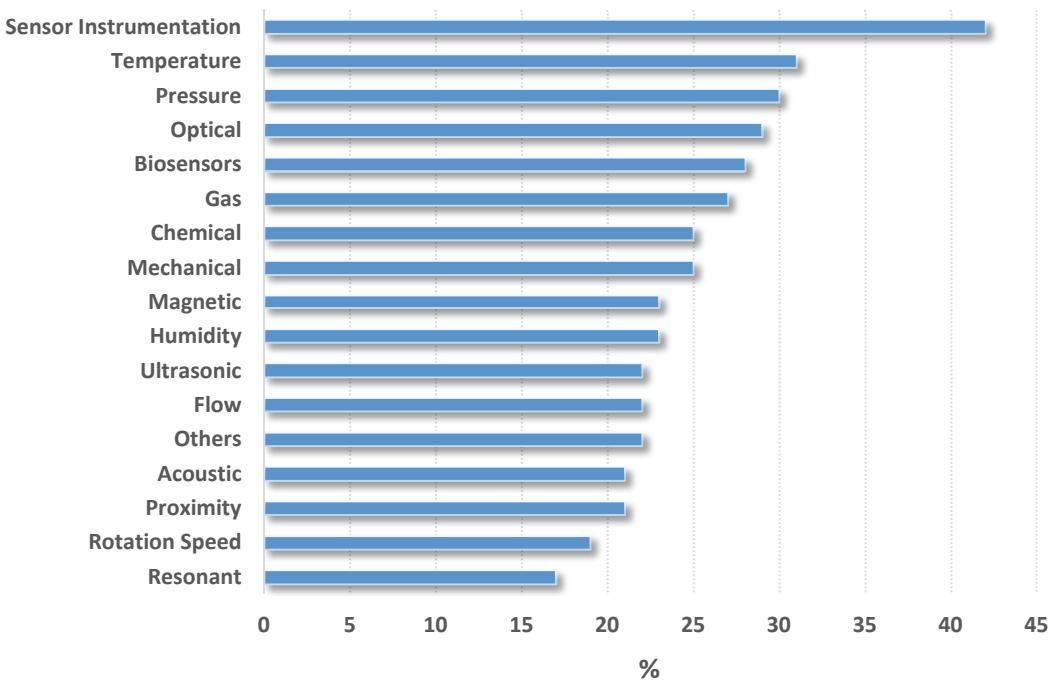
IFSA Members per continents.



IFSA Members per institutions.

Continent	Number of Members	%
Europe	312	42
North America	204	27
Asia	196	26
South America	15	2
Australia	10	1
Africa	14	2
Total Number:	751	100

In comparison with 2009, the growth of number (%) of members from Asia is observed. The number of members from academy is also continuing to growth.



IFSA Members interest in sensor types.

Sensor Type	Number of Members	%
Sensor Instrumentation	341	42
Temperature	229	31
Pressure	225	30
Optical	216	29
Biosensors	211	28
Gas	202	27
Chemical	187	25
Mechanical	185	25
Magnetic	174	23
Humidity	169	23
Flow	166	22
Ultrasonic	166	22
Others	164	22
Acoustic	159	21
Proximity	154	21
Rotation Speed	144	19
Resonant	124	17

IFSA Membership Benefits

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;
- 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;
- 20 % discount for publication in open access *Sensors & Transducers Journal* (ISSN 1726-5479)
- Quick publication in *Sensors & Transducers Magazine* (e-Digest), and *IFSA Newsletter* (ISSN 1726-6017);

- Discount registration fee for events (conferences, workshops and courses) organized or sponsored by IFSA;
- 20 % discount for books published by IFSA Publishing, S.L.;
- 20 % discount for open access books and chapters publication;
- 15 % discount for advertisement on Sensors Web Portal and IFSA Media.



There are 4,000+ members
in our LinkedIn professional
Sensors Group:

<https://www.linkedin.com/groups/3974892/>

IFSA Annual Membership fee:

- Company: 2000 EUR
- Start-up company (< 5 years old): 1000 EUR
- University or Research Organization: 1500 EUR
- Individuals: 100 EUR

Research, Development & Standardization

IFSA Group companies (*F2D, Ltd* and *Excelera, S.L.*) introduce new Series of ICs of Frequency-to-Digital Converters (UFDC), Universal Sensors & Transducers Interfaces (USTI) and development boards with the best-in-class features, metrological performances, wide functionality and low cost for easy development of smart and digital sensors and various sensor systems. IFSA Group companies' smart technologies (IP) can be easily implemented also as a firmware, ASIC, ASIP and SoC.

UFDC-1
universal frequency-to-digital converter



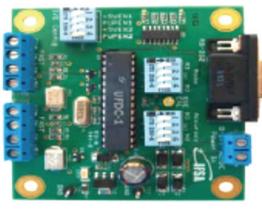
UFDC-1M-16
32x faster than UFDC-1



USTI
(high performance sensors & transducers interface)



Development boards
(fully functioning DAQ system)



USTI-EXT
for extreme conditions

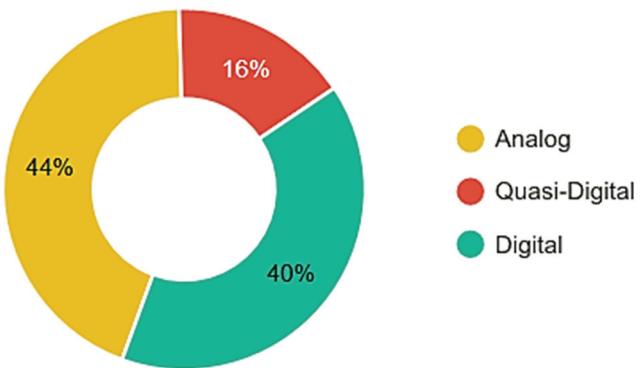


USTI-MOB
for mobile devices

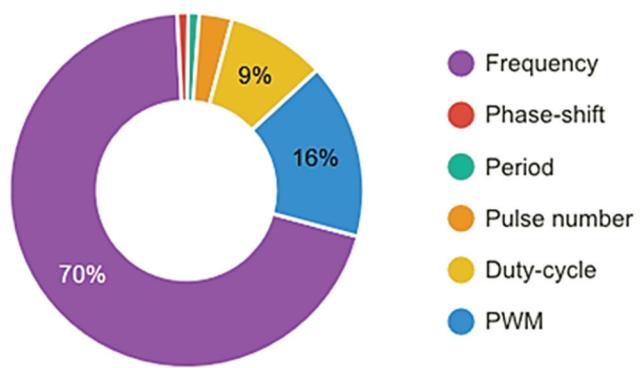


IFSA Group company's sensor related products available on the market.

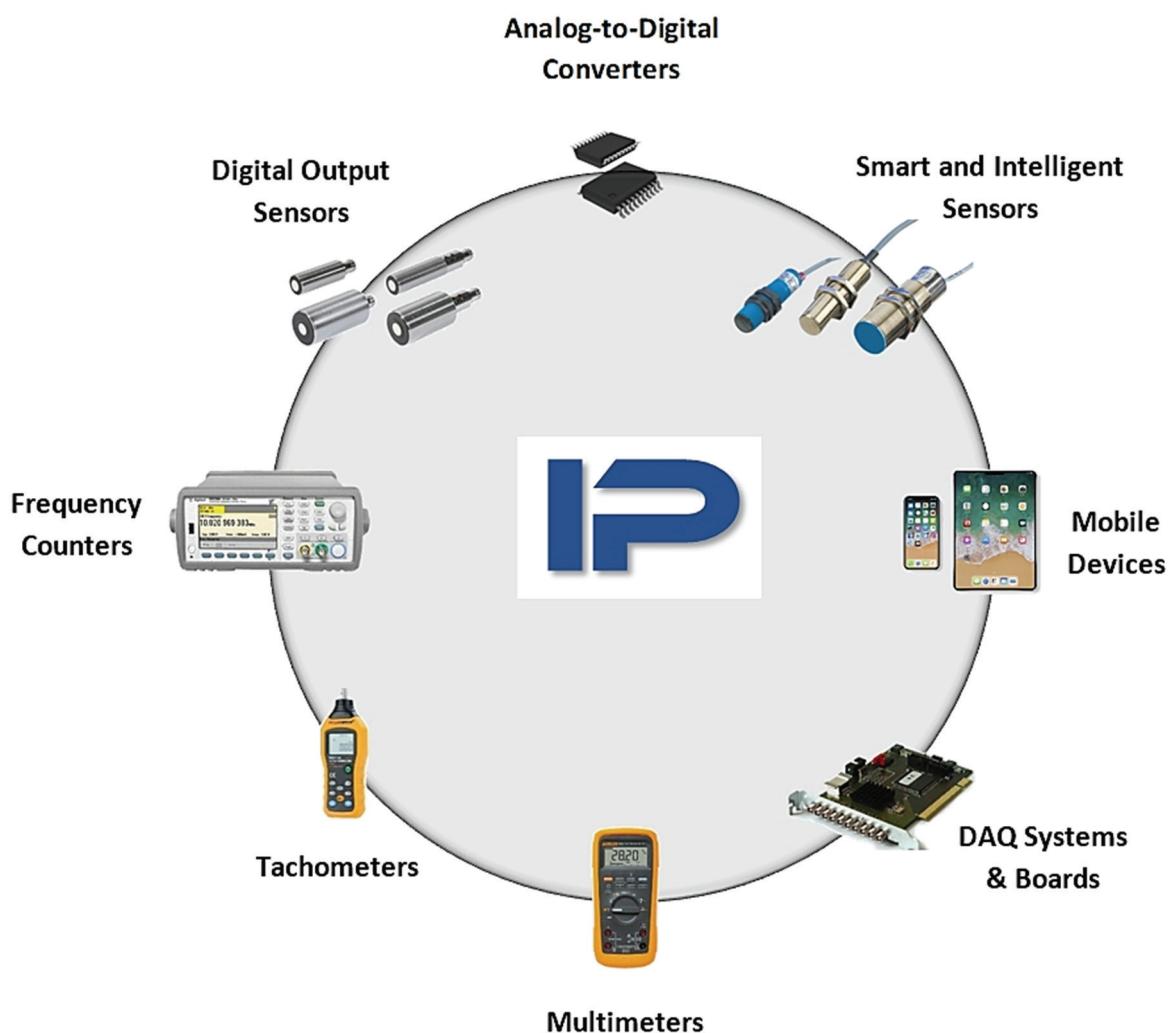
The marked study of frequency/time output sensors and transducers or so-called quasi-digital sensors is also an important task of IFSA. During the last 10 years this market segment has increased approximately by 16-20 % and now quasi-digital sensors and digital sensors and transducers on its basis have 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.



Sensor types on the modern market (IFSA study 2018).



Quasi-digital sensor types (IFSA study 2018).



IFSA Group Companies' IP applications.

IFSA has taken part in standardization processes: reviewed a draft version of standard and proposed IEEE 1451 standard extension for frequency output transducers:

- IEEE 1241 Terminology and Test Methods for Analog-to-Digital Converters;
- IEEE 1451 Smart Transducer Interface.

IFSA Conferences, Training Courses & Tutorials

Conferences

During the last 5 years International Frequency Sensor Association has launched five series of annual international conferences on sensors, measurements, optics, photonics, lasers, microelectronics, artificial intelligence and signal processing related areas:

- International Conference on Sensors and Electronic Instrumentation Advances (SEIA): Dubai, UAE (2015); Barcelona, Spain (2016); Moscow, Russia (2017); Amsterdam, The Netherlands (2018) and Tenerife, Canary Islands, Spain (2019); <http://www.seia-conference.com>
- International Conference on Microelectronic Devices and Technologies (MicDAT): Barcelona, Spain (2018); Amsterdam, The Netherlands (2019) and Tenerife (Canary Islands), Adeje, Spain (2020); <http://www.micdat-conference.com>
- International Conference on Optics, Photonics and Lasers (OPAL): Barcelona, Spain (2017); Amsterdam, The Netherlands (2018) and Tenerife, Canary Islands, Spain (2019); <http://www.opal-conference.com>
- International Conference on Advances in Signal Processing and Artificial Intelligence (ASPAI): Barcelona, Spain (2018) Amsterdam, The Netherlands (2018) and Berlin, Germany (2020); <http://www.aspai-conference.com>
- IFSA Frequency & Time Conference (IFTC'): Tenerife, Canary Islands, Spain (2019); <http://www.iftc-conference.com>



SEIA' 2016 in Barcelona, Spain



OPAL' 2017 in Barcelona, Spain



ASPAI' 2019 in Barcelona, Spain



MicDAT' 2018 in Barcelona, Spain



MicDAT' 2019 in Amsterdam



OPAL' 2019 in Amsterdam

Training Courses and Tutorials

IFSA continues to up-date the developed advanced engineering training course on *Smart Sensors Systems Design*, which was given in Barcelona (Spain) with the support from EC, *Technical University of Catalonia (UPC-Barcelona)*, *Foundació UPC* and IFSA Group company – *Excelera, S.L.* Online course version is available at Sensors Web Portal (www.sensorsportal.com) and IEEE Sensors Council's archive (2011). Short courses of the same name were given numerous times in different European universities in Austria, Germany, Italy and Spain. All attendees have received the IFSA certificates.

IFSA has given pre-conference tutorials on sensor and measurement topics:

- ‘*Sensors & Sensor Systems: Design and Development for Smartphones, and IoT*’, InfoSys’ 2017 Conference Umbrella, Barcelona, Spain
- ‘*IoT 2.0 Sensor Innovations: Making Sense of Intelligent Sensors*’, NetWare’ 2016 Conference Umbrella, Nice, France
- ‘*Smart Sensor Systems Design for Smartphones, Tablets and IoT: New Advanced Design Approach*’ The 6th International Conference on Sensor Device Technologies and Applications (SENSORDEVICES’ 2015), Venice, Italy
- ‘*High Performance Digital Sensors Design: How to make it Smarter ?*’, The 5th International Conference on Sensor Device Technologies and Applications (SENSORDEVICES’ 2014), Lisbon, Portugal
- ‘*Smart Sensors Systems Design*’, Sensors Expo & Conference 2012, Rosemont, IL, USA
- ‘*Digital and Intelligent Sensors and Sensor Systems: Practical Design*’, NetWare’ 2012 Conference Umbrella, Rome, Italy
- ‘*New Technological Platform for Digital and Smart Sensor Systems Integration*’, The 1st International Conference on Sensor Device Technologies and Applications (SENSORDEVICES’ 2010), Venice/Mestre, Italy

Keynote & Invited Presentations

IFSA is frequently invited to join committees, boards and speak events worldwide.

- ‘*Novel, High Resolution Analog-to-Digital Converters Base on Voltage-to-Frequency Conversion*’, 2nd International Conference on Microelectronic Devices and Technologies (MicDAT ’2019), Amsterdam, The Netherlands
- ‘*High-End Sensors: Challenges for the Future*’, Joint IMEKO TC1-TC7-TC13-TC18 Symposium 2019, St. Petersburg, Russia
- ‘*High-End Sensors & Sensor System: How to Achieve High Metrological Performances ?*’, High End Sensors (HSE) 2018 International Conference, Brussels, Belgium;
- ‘*Smartphones as a Sensor Platforms: from Gadget to Measuring System*’, AsiaSense’ 2018, Manila, Philippines

IFSA CONFEENCES WEB SITES:

The image displays a vertical column of six conference websites, each featuring a blue header with the IFSA logo and a banner image of electronic components or a landscape. The websites are:

- SEIA' 2018**: Fourth International Conference on Sensors and Electronic Instrumentation Advances (SEIA' 2018), 15-17 September 2018, Eindhoven, The Netherlands.
- SEIA' 2019**: Fifth International Conference on Sensors and Electronic Instrumentation Advances (SEIA' 2019), 10-12 September 2019, Canary Islands (Tenerife), Spain.
- OPAL' 2019**: Second International Conference on Optics, Photonics and Lasers (OPAL' 2019), 10-12 April 2019, Amsterdam, The Netherlands.
- MicDAT' 2018**: First International Conference on Microelectronic Devices and Technologies (MicDAT' 2018), 20-22 June 2018, Barcelona, Catalonia, Spain.
- MicDAT' 2019**: Second International Conference on Microelectronic Devices and Technologies (MicDAT' 2019), 10-12 May 2019, Amsterdam, The Netherlands.
- ASPAI' 2019**: First International Conference on Advances in Signal Processing and Artificial Intelligence (ASPAI' 2019), 20-22 March 2019, Bangkok, Thailand.
- IFTC' 2019**: First IFSA Frequency & Time Conference (IFTC' 2019), 20-22 November 2019, Darmstadt, Germany.

- 'Emerging Smart Sensors: from Technologies to Applications', International Conference on Intelligent & Advanced Systems (ICIAS' 2016), Kuala Lumpur, Malaysia
- 'Smart Chemical and Biochemical Sensors: Modern Trends, Challenges and Solutions', The 15th International Meeting on Chemical Sensors (IMCS' 2014), Buenos-Aires, Argentina
- 'Biosensors for Smartphones: How to Make it Smarter ?', The 2nd International Conference and Exhibition on Biosensors & Bioelectronics, 2013, Chicago, USA
- 'Smartphone Sensing: What Sensors Would we Like to Have in the Future Smartphones' ? NetWare' 2012 Conference Umbrella, Rome, Italy
- 'Smart Sensor Systems Integration: New Challenges', the 6th International Conference on Systems (ICONS' 2011), St. Maarten, The Netherlands Antilles
- 'Self-Adaptive Intelligent Sensors and Systems: From Theory to Practical Design', IEEE International Workshop on RObotic and Sensors Environments (ROSE' 2008), Ottawa, Ontario, Canada



*Keynote presentation at IMCS' 2014,
Buenos -Aires, Argentina*

*Keynote presentation at HES' 2018,
Brussels, Belgium*



*Keynote presentation at AsiaSense' 2018,
Manila, Philippines*

*IFSA booth at EUROSENSORS XXXIII,
2019, Berlin, Germany*

Panel Discussions

- Moderate panel discussion on 'High-end Sensors', The 4th International Conference on Sensors and Electronic Instrumentation (SEIA' 2018), Amsterdam, The Netherlands
- Moderate panel discussion on 'Achievements and Challenges in Environmental Sensing' NetWare' 2016 Conference Umbrella, Nice, France
- Moderate panel discussion on 'IoT: do we need a novel smart sensors and networks ?' The 5th International Conference on Sensor Device Technologies and Applications (SENSORDEVICES' 2014), Lisbon, Portugal
- Moderate panel discussion on 'Advances in Sensor-based Applications and Systems:Next Challenges' The 4th International Conference on Sensor Device Technologies and Applications (SENSORDEVICES' 2013), Barcelona, Spain

- Moderate panel discussion on '*Challenges in Applying Nano/Micro Technologies to Sensor Devices*', 3rd International Conference on Sensor Device Technologies and Applications (SENSORDEVICES' 2012), Nice, France;
- Moderate panel discussion on '*Ubiquity for Everyone; Are we There ?*', The 6th International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies (UBICOMM' 2012), Barcelona, Spain
- Moderate panel discussion on '*Advances in Sensors Networks and Services*', The 6th International Conference on Sensor Technologies and Applications (SENSORCOMM' 2012), Rome, Italy

IFSA Sponsorships

As a media sponsor and publishing partner the IFSA also sponsored or co-sponsored many sensors and measurements related technical conferences, symposiums, workshops and exhibitions including:

- Smart Electronics for Connected Communities (SECC-2019), a short term course (Varanasi, India)
- International Conference on Sensor Device Technologies and Applications (SENSORDEVICES), 2010-2019
- International Conference on Sensor Device Technologies and Applications (SENSORCOMM), 2010-2019
- International Conference on Advances in Sensors, Actuators, Metering and Sensing (ALLSENSORS), 2016-2019
- International Conference on Advances in Circuits, Electronics and Micro-electronics (CENICS), 2010-2019
- International Conference on Quantum, Nano/Bio, and Micro Technologies (ICQNM), 2014, 2017-2019
- International Conference on Advances in Signal, Image and Video Processing (SIGNAL), 2016-2019
- International Conference on Sensor Networks (SENSORNET), 2016-2020
- International Conference on Technological Advances of Sensors and Instrumentation(ICTASI) 2018, 2019
- Sensors Expo & Conference in the USA (2005-2019)
- NanoTech Conference & Expo, USA (2013-2018)
- TechConnect World Innovation Conference & Expo, USA (2015-2018)
- High-end Sensors (HES) 2018
- Sensor Solutions International Conference (SSI), Belgium, 2019-2020
- 17th International Symposium on Electromagnetic Fields in Mechatronics, Electrical and Electronic Engineering (ISEF' 2015)
- Conference on Sensors and Networks (CSN), 2014
- IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS), 2009, 2013
- 4th International Conference on Intelligent & Advanced Systems (ICIAS' 2012)
- Maghreb-Europe Meeting on Materials and their Applications for Devices and Sensors (MADICA' 2012)
- Annual NSTI Nanotech Conference and Trade Show, 2007-2011
- Image Sensors Europe 2009
- SENSOR+TEST, Germany 2009
- IEEE International Workshop on Robotic and Sensors Environments (ROSE' 2008)
- International Conference on Sensing Technology (ICST) 2007-2009
- NATO Advanced Study Institute (ASI) on '*Multisensor Data and Information Processing for Rapid and Robust Situation and Threat Assessment*', Albena, Bulgaria, 2005
- SensorsGOV Conference & Expo 2005
- Frontiers of NanoEngineering 2003
- International Symposium on Interdisciplinary Electromagnetic, Mechanic & Biomedical Problems (ISEM' 2005)
- 17th Optical Fibre Sensors Conference (OFS-17), 2005
- 3rd International Conference on Smart Materials, Structures, Systems (CIMTEC' 2008),
- 3rd Global Plastic Electronics Conference & Showcase
- 1st Asian Plastic Electronics Conference and Showcase 2008 ;
- 17th IEEE International Conference on Micro Electro Mechanical Systems (MEMS' 2004)
- NATO Advanced Study Institute (ASI) on 'Smart Sensors and MEMS', Povoa de Varsim, Portugal, 2003

and numerous conferences organized by the Institute of Defense and Government Advancement (IDGA), etc. Many special issues of open access *Sensors & Transducers* journal with extended papers from conferences have published by *IFSA Publishing, S.L.*

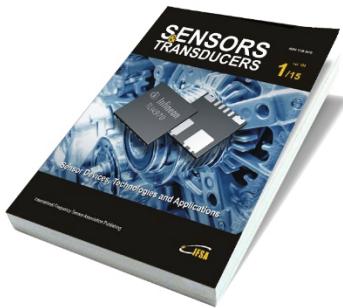
IFSA Publications

IFSA published Sensors & Transducers journal (ISSN: 2306-8515, e-ISSN 1726-5479) in both: electronic and print formats; Sensors & Transducers magazine (e-Digest); IFSA Newsletter (ISSN 1726-6017), sensors and measurements related monographs; open access books and conference proceedings. The books and conference proceedings are also published in electronic and print formats.

Sensors & Transducers journal

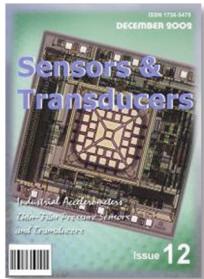
'Though, all sections are very good and this is the only journal, which provides all information in the field of sensors. One day it will be highest impact factor journal'.

(Reader's feedback)

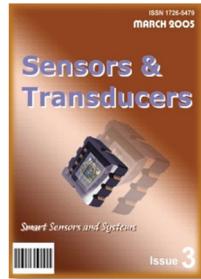


Published since October 2000 a blind peer reviewed international *Sensors & Transducers* journal provides an advanced forum for the science and technology of physical, chemical sensors and biosensors. It publishes research and application specific articles, technical and market reviews, cover story, 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, established journals and magazines related to sensors, transducers, MEMS, instrumentation and DAQ systems. Today's journal circulation is 140,000+ persons.

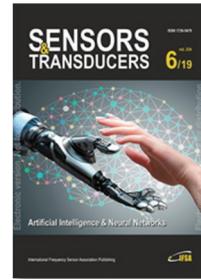
2002



2005



2008 till now



Sensors & Transducers journal's covers.

IFSA Publishing Books

IFSA publishes scientific and technical works related to various engineering areas including sensors, transducers, MEMS, NEMS, sensor instrumentation, sensor networks, metrology, signal processing, measurements, etc. reaching around the globe to collect essential reference material and the latest advances and make them available to researchers, academics, professionals, and students in an accessible formats. In 2014 IFSA has started to publish Open Access Books.

IFSA Publishing mission is to serve the needs of engineering and sensor community at large by working with capable researchers and professionals from across the world (including IFSA members) to produce the most accurate and up to date scientific and technical resources.

Together with sensors related monographs the IFSA is publishing several popular multivolume Book Series such as:

- Advances in Sensors
- Advances in Biosensors
- Advances in Measurements and Instrumentation
- Measurement of Physical and Chemical Quantities
- Sensors & Signals

Many books, published by IFSA Publishing are indexed in Web of Science.

IFSA Newsletter

*'IFSA Newsletter provides consolidated information';
'It is very useful for us in the design of instruments'.*

(Reader's feedback)

*'The Newsletter is very good, because you can see and know news articles to understand
more the environment about the sensors'*

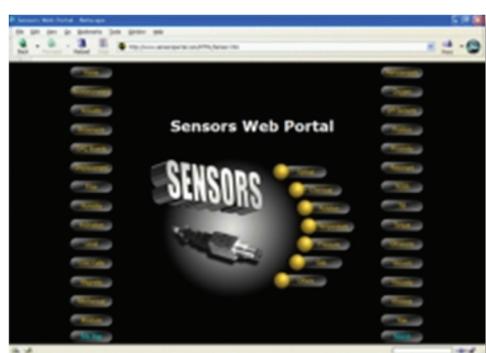
(Miguel E. Madrigal A.)

The IFSA Newsletter (ISSN 1726-6017) 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 newsletter is mailed online to more than 140, 000 persons from sensor community. Today, the IFSA Newsletter is the most informative newsletter in the sensor industry.

Sensors Wen Portal

Sensors portal is the best sensors related resource in the Net. Thank you !

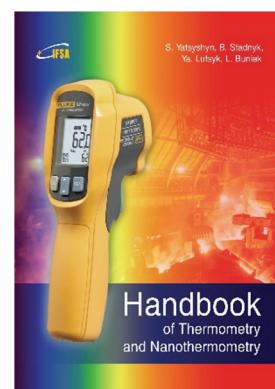
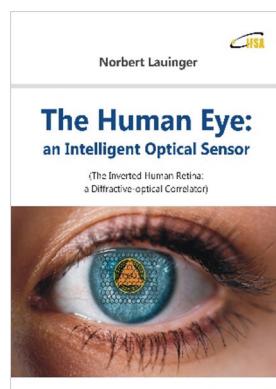
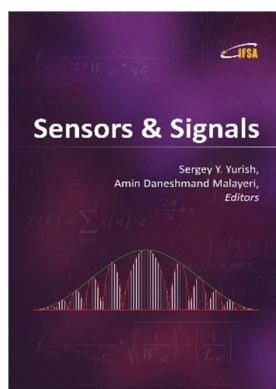
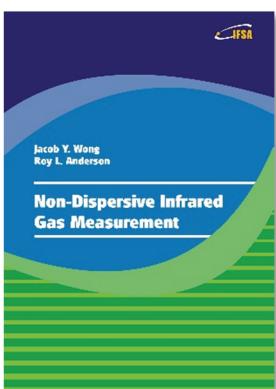
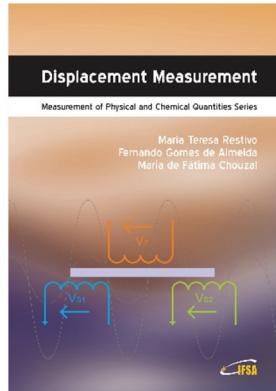
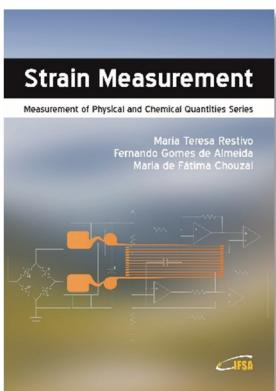
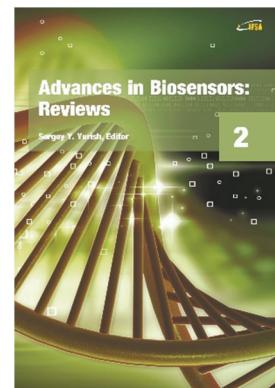
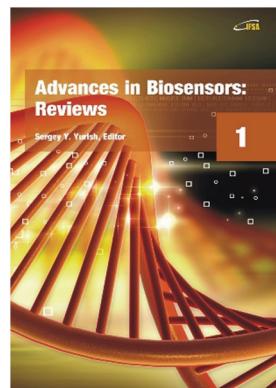
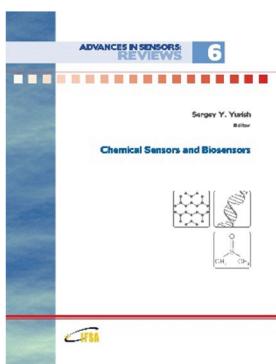
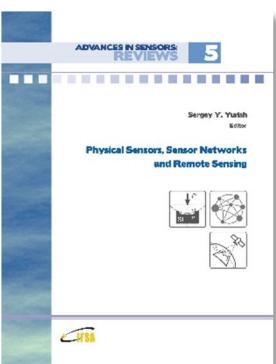
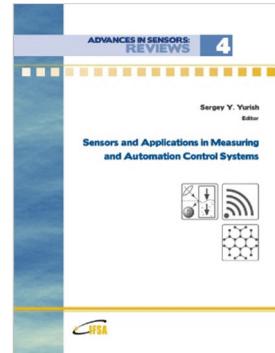
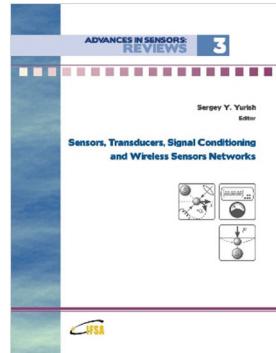
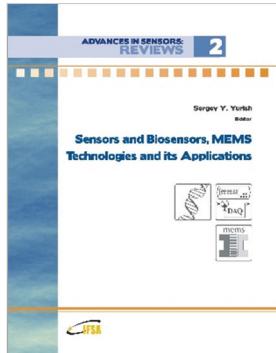
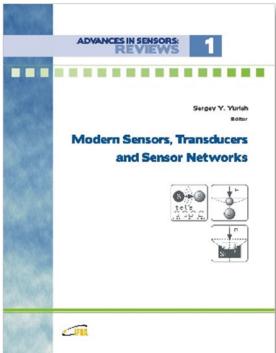
(Reader's feedback)

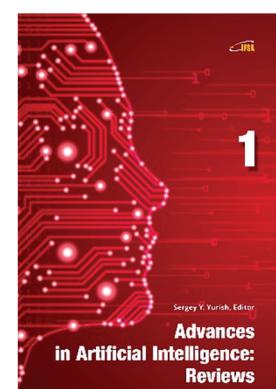
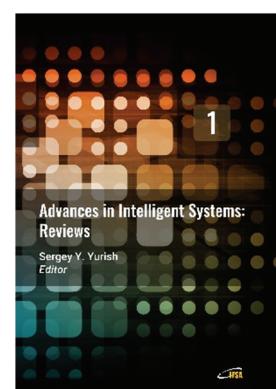
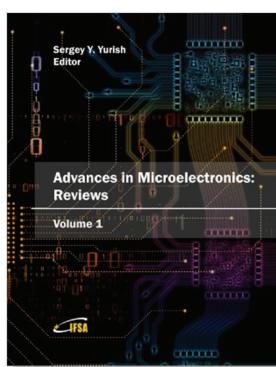
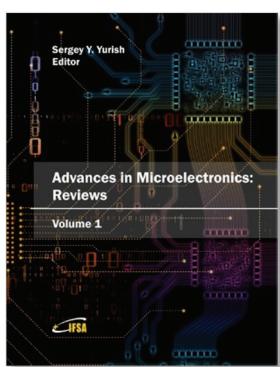
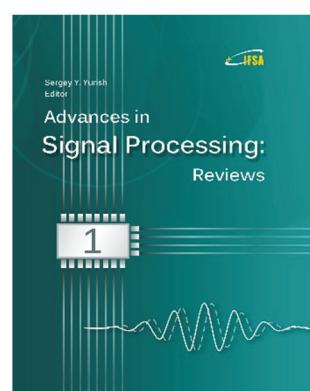
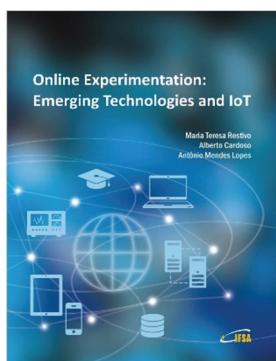
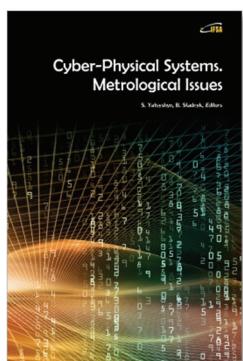
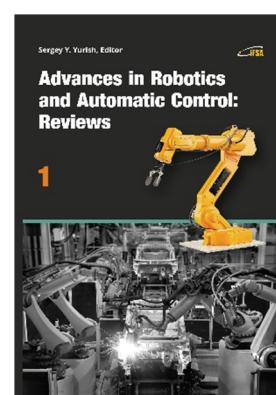
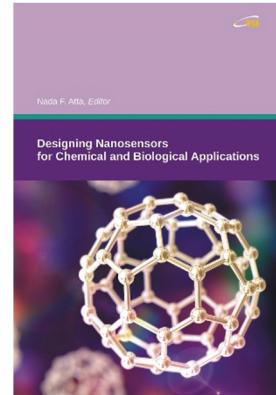
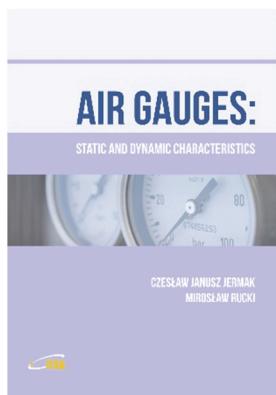
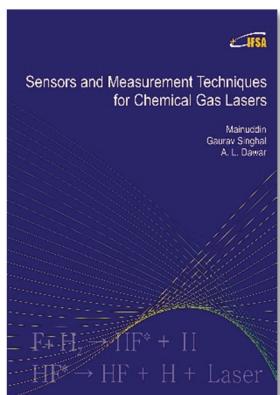
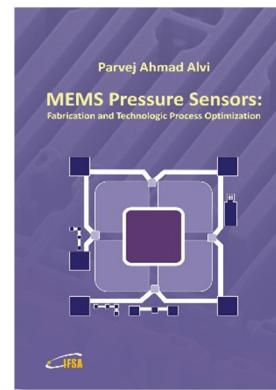
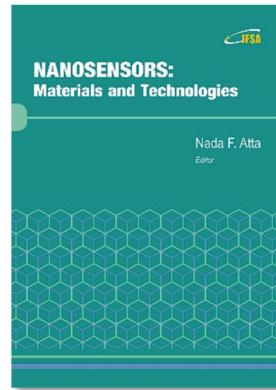
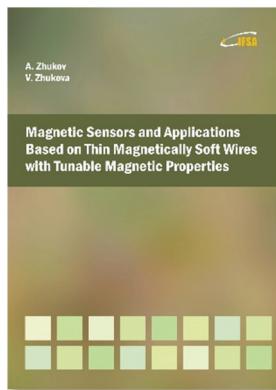
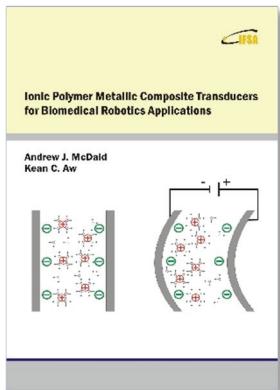


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