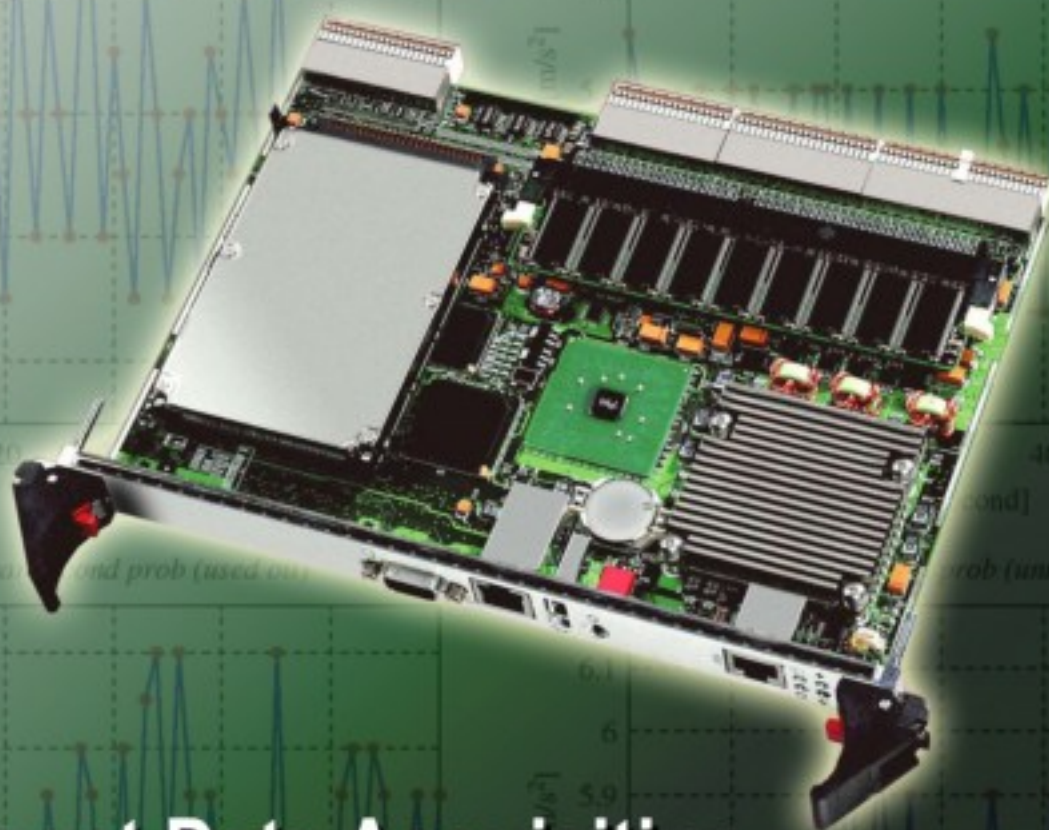


ISSN 1726-5479

SENSORS & TRANSDUCERS

11

vol. 16
Special
/12



**Intelligent Data Acquisition
and Information Process Technologies
and Their Applications**

International Frequency Sensor Association Publishing



Guest Editors: Gongfa Li, Tinggui Chen and Hegen Xiong

Editors for Western Europe

Meijer, Gerard C.M., Delft University of Technology, The Netherlands
Ferrari, Vittorio, Università di Brescia, Italy

Editors for North America

Datskos, Panos G., Oak Ridge National Laboratory, USA
Fabien, J. Josse, Marquette University, USA
Katz, Evgeny, Clarkson University, USA

Editor South America

Costa-Felix, Rodrigo, Inmetro, Brazil

Editor for Eastern Europe

Sachenko, Anatoly, Ternopil State Economic University, Ukraine

Editor for Asia

Ohyama, Shinji, Tokyo Institute of Technology, Japan

Editor for Africa

Maki K.Habib, American University in Cairo, Egypt

Editor for Asia-Pacific

Mukhopadhyay, Subhas, Massey University, New Zealand

Editorial Advisory Board

- Abdul Rahim, Ruzairi, Universiti Teknologi, Malaysia
Ahmad, Mohd Noor, Northern University of Engineering, Malaysia
Annamalai, Karthikeyan, National Institute of Advanced Industrial Science and Technology, Japan
Arcega, Francisco, University of Zaragoza, Spain
Arguel, Philippe, CNRS, France
Ahn, Jae-Pyoung, Korea Institute of Science and Technology, Korea
Arndt, Michael, Robert Bosch GmbH, Germany
Ascoli, Giorgio, George Mason University, USA
Atalay, Selcuk, Inonu University, Turkey
Atghiaee, Ahmad, University of Tehran, Iran
Augutis, Vygtas, Kaunas University of Technology, Lithuania
Avachit, Patil Lalchand, North Maharashtra University, India
Ayes, Aladdin, De Montfort University, UK
Azamimi, Azian binti Abdullah, Universiti Malaysia Perlis, Malaysia
Bahreini, Behraad, University of Manitoba, Canada
Baliga, Shankar, B., General Motors Transnational, USA
Baoxian, Ye, Zhengzhou University, China
Barford, Lee, Agilent Laboratories, USA
Barlingay, Ravindra, RF Arrays Systems, India
Basu, Sukumar, Jadavpur University, India
Beck, Stephen, University of Sheffield, UK
Ben Bouzid, Sihem, Institut National de Recherche Scientifique, Tunisia
Benachiba, Chellali, Université de Bechar, Algeria
Binnie, T. David, Napier University, UK
Bischoff, Gerlinde, Inst. Analytical Chemistry, Germany
Bodas, Dhananjay, IMTEK, Germany
Borges Carval, Nuno, Universidade de Aveiro, Portugal
Bouchikhi, Benachir, University Moulay Ismail, Morocco
Bousbia-Salah, Mounir, University of Annaba, Algeria
Bouvet, Marcel, CNRS – UPMC, France
Brudzewski, Kazimierz, Warsaw University of Technology, Poland
Cai, Chenxin, Nanjing Normal University, China
Cai, Qingyun, Hunan University, China
Calvo-Gallego, Jaime, Universidad de Salamanca, Spain
Campanella, Luigi, University La Sapienza, Italy
Carvalho, Vitor, Minho University, Portugal
Cecelja, Franjo, Brunel University, London, UK
Cerdà Belmonte, Judith, Imperial College London, UK
Chakrabarty, Chandan Kumar, Universiti Tenaga Nasional, Malaysia
Chakravorty, Dipankar, Association for the Cultivation of Science, India
Changhai, Ru, Harbin Engineering University, China
Chaudhari, Gajanan, Shri Shivaji Science College, India
Chavali, Murthy, N.I. Center for Higher Education, (N.I. University), India
Chen, Jiming, Zhejiang University, China
Chen, Rongshun, National Tsing Hua University, Taiwan
Cheng, Kuo-Sheng, National Cheng Kung University, Taiwan
Chiang, Jeffrey (Cheng-Ta), Industrial Technol. Research Institute, Taiwan
Chiriac, Horia, National Institute of Research and Development, Romania
Chowdhuri, Arijit, University of Delhi, India
Chung, Wen-Yaw, Chung Yuan Christian University, Taiwan
Corres, Jesus, Universidad Publica de Navarra, Spain
Cortes, Camilo A., Universidad Nacional de Colombia, Colombia
Courtois, Christian, Université de Valenciennes, France
Cusano, Andrea, University of Sannio, Italy
D'Amico, Arnaldo, Università di Tor Vergata, Italy
De Stefano, Luca, Institute for Microelectronics and Microsystem, Italy
Deshmukh, Kiran, Shri Shivaji Mahavidyalaya, Barshi, India
Dickert, Franz L., Vienna University, Austria
Diegue, Angel, University of Barcelona, Spain
Dighavkar, C. G., M.G. Vidyamandir's L. V.H. College, India
Dimitropoulos, Panos, University of Thessaly, Greece
Ding, Jianning, Jiangsu Polytechnic University, China
Djordjevic, Alexander, City University of Hong Kong, Hong Kong
Donato, Nicola, University of Messina, Italy
Donato, Patricio, Universidad de Mar del Plata, Argentina
Dong, Feng, Tianjin University, China
Drljaca, Predrag, Intersema Sensoric SA, Switzerland
Dubey, Venketesh, Bournemouth University, UK
Enderle, Stefan, Univ. of Ulm and KTB Mechatronics GmbH, Germany
Erdem, Gursan K. Arzum, Ege University, Turkey
Erkmen, Aydan M., Middle East Technical University, Turkey
Estelle, Patrice, Insa Rennes, France
Estrada, Horacio, University of North Carolina, USA
Faiz, Adil, INSA Lyon, France
Fericean, Sorin, Balluff GmbH, Germany
Fernandes, Joana M., University of Porto, Portugal
Francioso, Luca, CNR-IMM Institute for Microelectronics and Microsystems, Italy
Francis, Laurent, University Catholique de Louvain, Belgium
Fu, Weiling, South-Western Hospital, Chongqing, China
Gaura, Elena, Coventry University, UK
Geng, Yanfeng, China University of Petroleum, China
Gole, James, Georgia Institute of Technology, USA
Gong, Hao, National University of Singapore, Singapore
Gonzalez de la Rosa, Juan Jose, University of Cadiz, Spain
Granel, Annette, Goteborg University, Sweden
Graff, Mason, The University of Texas at Arlington, USA
Guan, Shan, Eastman Kodak, USA
Guillet, Bruno, University of Caen, France
Guo, Zhen, New Jersey Institute of Technology, USA
Gupta, Narendra Kumar, Napier University, UK
Hadjiloucas, Sillas, The University of Reading, UK
Haider, Mohammad R., Sonoma State University, USA
Hashsham, Syed, Michigan State University, USA
Hasni, Abdelhafid, Bechar University, Algeria
Hernandez, Alvaro, University of Alcala, Spain
Hernandez, Wilmar, Universidad Politecnica de Madrid, Spain
Homentcovschi, Dorel, SUNY Binghamton, USA
Horstman, Tom, U.S. Automation Group, LLC, USA
Hsiai, Tzung (John), University of Southern California, USA
Huang, Jeng-Sheng, Chung Yuan Christian University, Taiwan
Huang, Star, National Tsing Hua University, Taiwan
Huang, Wei, PSG Design Center, USA
Hui, David, University of New Orleans, USA
Jaffrezic-Renault, Nicole, Ecole Centrale de Lyon, France
James, Daniel, Griffith University, Australia
Janting, Jakob, DELTA Danish Electronics, Denmark
Jiang, Liudi, University of Southampton, UK
Jiang, Wei, University of Virginia, USA
Jiao, Zheng, Shanghai University, China
John, Joachim, IMEC, Belgium
Kalach, Andrew, Voronezh Institute of Ministry of Interior, Russia
Kang, Moonho, Sunmoon University, Korea South
Kaniusas, Eugenijus, Vienna University of Technology, Austria
Katake, Anup, Texas A&M University, USA
Kausel, Wilfried, University of Music, Vienna, Austria
Kavasoglu, Nese, Mugla University, Turkey
Ke, Cathy, Tyndall National Institute, Ireland
Khelfaoui, Rachid, Université de Bechar, Algeria
Khan, Asif, Aligarh Muslim University, Aligarh, India
Kim, Min Young, Kyungpook National University, Korea South
Ko, Sang Choon, Electronics. and Telecom. Research Inst., Korea South
Kotulski, Malgorzata, Wroclaw University of Technology, Poland
Kockar, Hakan, Balikesir University, Turkey
Kong, Ing, RMIT University, Australia
Kratz, Henrik, Uppsala University, Sweden

Krishnamoorthy, Ganesh, University of Texas at Austin, USA
Kumar, Arun, University of Delaware, Newark, USA
Kumar, Subodh, National Physical Laboratory, India
Kung, Chih-Hsien, Chang-Jung Christian University, Taiwan
Lacnjevac, Caslav, University of Belgrade, Serbia
Lay-Ekuakille, Aime, University of Lecce, Italy
Lee, Jang Myung, Pusan National University, Korea South
Lee, Jun Su, Amkor Technology, Inc. South Korea
Lei, Hua, National Starch and Chemical Company, USA
Li, Fengyuan (Thomas), Purdue University, USA
Li, Genxi, Nanjing University, China
Li, Hui, Shanghai Jiaotong University, China
Li, Sihua, Agiltron, Inc., USA
Li, Xian-Fang, Central South University, China
Li, Yuefa, Wayne State University, USA
Liang, Yuanchang, University of Washington, USA
Liawruangrath, Saisunee, Chiang Mai University, Thailand
Liew, Kim Meow, City University of Hong Kong, Hong Kong
Lin, Hermann, National Kaohsiung University, Taiwan
Lin, Paul, Cleveland State University, USA
Linderholm, Pontus, EPFL - Microsystems Laboratory, Switzerland
Liu, Aihua, University of Oklahoma, USA
Liu Changgeng, Louisiana State University, USA
Liu, Cheng-Hsien, National Tsing Hua University, Taiwan
Liu, Songqin, Southeast University, China
Lodeiro, Carlos, University of Vigo, Spain
Lorenzo, Maria Encarnacio, Universidad Autonoma de Madrid, Spain
Lukasiewicz, Jerzy Pawel, Nicholas Copernicus University, Poland
Ma, Zhanfang, Northeast Normal University, China
Majstorovic, Vidosav, University of Belgrade, Serbia
Malyshev, V.V., National Research Centre 'Kurchatov Institute', Russia
Marquez, Alfredo, Centro de Investigacion en Materiales Avanzados, Mexico
Matay, Ladislav, Slovak Academy of Sciences, Slovakia
Mathur, Prafull, National Physical Laboratory, India
Maurya, D.K., Institute of Materials Research and Engineering, Singapore
Mekid, Samir, University of Manchester, UK
Melnyk, Ivan, Photon Control Inc., Canada
Mendes, Paulo, University of Minho, Portugal
Mennell, Julie, Northumbria University, UK
Mi, Bin, Boston Scientific Corporation, USA
Minas, Graca, University of Minho, Portugal
Mishra, Vivekanand, National Institute of Technology, India
Moghavvemi, Mahmoud, University of Malaya, Malaysia
Mohammadi, Mohammad-Reza, University of Cambridge, UK
Molina Flores, Esteban, Benemérita Universidad Autónoma de Puebla, Mexico
Moradi, Majid, University of Kerman, Iran
Morello, Rosario, University "Mediterranea" of Reggio Calabria, Italy
Mounir, Ben Ali, University of Sousse, Tunisia
Mrad, Nezhil, Defence R&D, Canada
Mulla, Imtiaz Sirajuddin, National Chemical Laboratory, Pune, India
Nabok, Aleksey, Sheffield Hallam University, UK
Neelamegam, Periasamy, Sastra Deemed University, India
Neshkova, Milka, Bulgarian Academy of Sciences, Bulgaria
Oberhammer, Joachim, Royal Institute of Technology, Sweden
Ould Lahoucine, Cherif, University of Guelma, Algeria
Pamidighanta, Sayanu, Bharat Electronics Limited (BEL), India
Pan, Jisheng, Institute of Materials Research & Engineering, Singapore
Park, Joon-Shik, Korea Electronics Technology Institute, Korea South
Passaro, Vittorio M. N., Politecnico di Bari, Italy
Penza, Michele, ENEA C.R., Italy
Pereira, Jose Miguel, Instituto Politecnico de Seteбал, Portugal
Petsev, Dimiter, University of New Mexico, USA
Pogacnik, Lea, University of Ljubljana, Slovenia
Post, Michael, National Research Council, Canada
Prance, Robert, University of Sussex, UK
Prasad, Ambika, Gulbarga University, India
Prateepasen, Asa, Kingmoungut's University of Technology, Thailand
Pugno, Nicola M., Politecnico di Torino, Italy
Pullini, Daniele, Centro Ricerche FIAT, Italy
Pumera, Martin, National Institute for Materials Science, Japan
Radhakrishnan, S., National Chemical Laboratory, Pune, India
Rajanna, K., Indian Institute of Science, India
Ramadan, Qasem, Institute of Microelectronics, Singapore
Rao, Basuthkar, Tata Inst. of Fundamental Research, India
Raoof, Kosai, Joseph Fourier University of Grenoble, France
Rastogi Shiva, K., University of Idaho, USA
Reig, Candid, University of Valencia, Spain
Restivo, Maria Teresa, University of Porto, Portugal
Robert, Michel, University Henri Poincare, France
Rezazadeh, Ghader, Urmia University, Iran
Royo, Santiago, Universitat Politecnica de Catalunya, Spain
Rodriguez, Angel, Universidad Politecnica de Cataluna, Spain
Rothberg, Steve, Loughborough University, UK
Sadana, Ajit, University of Mississippi, USA
Sadeghian Marnani, Hamed, TU Delft, The Netherlands
Sapozhnikova, Ksenia, D.I.Mendeleyev Institute for Metrology, Russia
Sandacci, Serghei, Sensor Technology Ltd., UK
Saxena, Vibha, Bbhba Atomic Research Centre, Mumbai, India
Schneider, John K., Ultra-Scan Corporation, USA
Sengupta, Deepak, Advance Bio-Photonics, India
Seif, Selemeni, Alabama A & M University, USA
Seifter, Achim, Los Alamos National Laboratory, USA
Shah, Kriyang, La Trobe University, Australia
Sankarraj, Anand, Detector Electronics Corp., USA
Silva Girao, Pedro, Technical University of Lisbon, Portugal
Singh, V. R., National Physical Laboratory, India
Slomovitz, Daniel, UTE, Uruguay
Smith, Martin, Open University, UK
Soleimanpour, Amir Masoud, University of Toledo, USA
Soleymanpour, Ahmad, University of Toledo, USA
Somani, Prakash R., Centre for Materials for Electronics Technol., India
Sridharan, M., Sastra University, India
Srinivas, Talabattula, Indian Institute of Science, Bangalore, India
Srivastava, Arvind K., NanoSonix Inc., USA
Stefan-van Staden, Raluca-Ioana, University of Pretoria, South Africa
Stefanescu, Dan Mihai, Romanian Measurement Society, Romania
Sumriddetchka, Sarun, National Electronics and Comp. Technol. Center, Thailand
Sun, Chengliang, Polytechnic University, Hong-Kong
Sun, Dongming, Jilin University, China
Sun, Junhua, Beijing University of Aeronautics and Astronautics, China
Sun, Zhiqiang, Central South University, China
Suri, C. Raman, Institute of Microbial Technology, India
Sysoev, Victor, Saratov State Technical University, Russia
Szewczyk, Roman, Industr. Research Inst. for Automation and Measurement, Poland
Tan, Ooi Kiang, Nanyang Technological University, Singapore
Tang, Dianping, Southwest University, China
Tang, Jaw-Luen, National Chung Cheng University, Taiwan
Teker, Kasif, Frostburg State University, USA
Thirunavukkarasu, I., Manipal University Karnataka, India
Thumbavanam Pad, Kartik, Carnegie Mellon University, USA
Tian, Gui Yun, University of Newcastle, UK
Tsiantos, Vassilios, Technological Educational Institute of Kaval, Greece
Tsigara, Anna, National Hellenic Research Foundation, Greece
Twomey, Karen, University College Cork, Ireland
Valente, Antonio, University, Vila Real, - U.T.A.D., Portugal
Vanga, Raghav Rao, Summit Technology Services, Inc., USA
Vaseashta, Ashok, Marshall University, USA
Vazquez, Carmen, Carlos III University in Madrid, Spain
Vieira, Manuela, Instituto Superior de Engenharia de Lisboa, Portugal
Vigna, Benedetto, STMicroelectronics, Italy
Vrba, Radimir, Brno University of Technology, Czech Republic
Wandelt, Barbara, Technical University of Lodz, Poland
Wang, Jiangping, Xi'an Shiyong University, China
Wang, Kedong, Beihang University, China
Wang, Liang, Pacific Northwest National Laboratory, USA
Wang, Mi, University of Leeds, UK
Wang, Shinn-Fwu, Ching Yun University, Taiwan
Wang, Wei-Chih, University of Washington, USA
Wang, Wensheng, University of Pennsylvania, USA
Watson, Steven, Center for NanoSpace Technologies Inc., USA
Weiping, Yan, Dalian University of Technology, China
Wells, Stephen, Southern Company Services, USA
Wolkenberg, Andrzej, Institute of Electron Technology, Poland
Woods, R. Clive, Louisiana State University, USA
Wu, DerHo, National Pingtung Univ. of Science and Technology, Taiwan
Wu, Zhaoyang, Hunan University, China
Xiu Tao, Ge, Chuzhou University, China
Xu, Lisheng, The Chinese University of Hong Kong, Hong Kong
Xu, Sen, Drexel University, USA
Xu, Tao, University of California, Irvine, USA
Yang, Dongfang, National Research Council, Canada
Yang, Shuang-Hua, Loughborough University, UK
Yang, Wuqiang, The University of Manchester, UK
Yang, Xiaoling, University of Georgia, Athens, GA, USA
Yaping Dan, Harvard University, USA
Ymeti, Aurel, University of Twente, Netherlands
Yong Zhao, Northeastern University, China
Yu, Haihu, Wuhan University of Technology, China
Yuan, Yong, Massey University, New Zealand
Yufera Garcia, Alberto, Seville University, Spain
Zakaria, Zulkarnay, University Malaysia Perlis, Malaysia
Zagnoni, Michele, University of Southampton, UK
Zamani, Cyrus, Universitat de Barcelona, Spain
Zeni, Luigi, Second University of Naples, Italy
Zhang, Minglong, Shanghai University, China
Zhang, Quintao, University of California at Berkeley, USA
Zhang, Weiping, Shanghai Jiao Tong University, China
Zhang, Wenming, Shanghai Jiao Tong University, China
Zhang, Xueji, World Precision Instruments, Inc., USA
Zhong, Haoxiang, Henan Normal University, China
Zhu, Qing, Fujifilm Dimatix, Inc., USA
Zorzano, Luis, Universidad de La Rioja, Spain
Zourob, Mohammed, University of Cambridge, UK

Contents

Volume 16
Special Issue
November 2012

www.sensorsportal.com

ISSN 1726-5479

Research Articles

Foreword

Gongfa Li, Tinggui Chen, Hegen Xiong..... 1

Research of a Novel Attitude Regulating System of Autonomous Underwater Glider

Rong Liu, Jie Yu 1

Study on the Vibration of the 1700 Four Rollers Rolling Mill

Zehao Wu, Gongfa Li, Po Gao, Yuan He, Dawei Tan..... 11

The Design of Wireless Sensor Application System Based on Internet of Things

Zhang Ye, Zhang Feng, You Fei 18

Design and Simulation of the Air Compressor Control System

Yuan He, Gongfa Li, Po Gao, Zehao WU and Cunyuan Li..... 27

Precise Time Synchronization Technology for Distributed Automated Test System

Yan Xu, Ming Li, and Jiangtao Dong..... 35

FEM-based Simulation of Stress Distribution in U71Mn Heavy Rail during Quenching

Siqiang Xu, Jianyi Kong, Gongfa Li, Jintang Yang, Hegen Xiong and Guozhang Jiang 43

LTS: An Improved Self-Adaptive Data Replication Strategy for File Sharing in Grid

Liang Hu, Jia Zhao, Xiaodong Fu, Lin Lin, XJianfeng Chu 52

Influence of Expansion Joint of Bottom Lining in Ladle Composite Construction Body on Thermal Stress

Guozhang Jiang, Gongfa Li, Jianyi Kong, Liangxi Xie and Siqiang Xu..... 61

Numerical Simulation of the Gap Flow Field for CEDMMG Compound Machining Engineering Ceramics

Renjie Ji, Yonghong Liu, Chao Zheng, Fei Wang, Yanzhen Zhang, Yang Shen, Baoping Cai..... 68

Coke Oven Heating Model of Fuzzy Intelligent Control System

Guozhang Jiang, Gongfa Li, Jianyi Kong and Liangxi Xie 75

Three-Dimensional Model and Test Analysis of the 60t Converter

Po Gao, Gongfa Li, Zehao Wu, Yuan He, Ke Zhang 84

A Multi-pipe and Multi-address Switching Wireless Network for Distributed Seismic Data Acquisition System

Li Huailiang, Tuo Xianguo, Zhu Lili..... 92

Remote Monitoring and Diagnosis System of Rolling Mill Transmission System

Gongfa Li, Yuesheng Gu, Zehao Wu, Han Xiao, Guozhang Jiang, Jianyi Kong, Liangxi Xie and Siqiang Xu 101

Study on Frequency Division Technique of Photoelectric Encoder <i>Shi-xiong Zhang</i>	108
Job-shop Scheduling Problem Based on Particle Swarm Optimization Algorithm <i>Ying Sun and Hegen Xiong</i>	116
Wireless Sensor Network Data Fusion Algorithm Based on Neural Network in the Area of Agriculture <i>Yi Zhou, Gelian Song, Maohua Wang</i>	128
Optimal Design of Gear Based on Quantum Genetic Algorithm <i>Ying Sun and He-gen Xiong</i>	137
Independent Axiom-based Robust Design for Nonlinear System <i>Xianfu Cheng</i>	144
Development of a New Kind of Multihole Cylindrical Electrode Used for Electrical Discharge Milling <i>Fei Wang, Yonghong liu, Renjie Ji, Yanzhen Zhang, Zemin Tang, Xiangzhen Han</i>	152
Energy Efficiency Evaluation of Iron and Steel Enterprise <i>Guozhang Jiang, Gongfa Li, Jianyi Kong and Liangxi Xie</i>	161
Classification Model of Traffic Emergency Response to Urban Emergency <i>Yaqin He, Jie Li</i>	169
Modeling the Machining Parameters in End Electric Discharge Milling of Silicon Carbide Ceramic <i>Renjie Ji, Yonghong Liu, Yanzhen Zhang, Fei Wang, Chao Zheng, Yang Shen</i>	179
Testability Analysis of Inertial Measure Unit Based on Multi-signal Model <i>Xing He, Hongli Wang, Jinghui Lu</i>	188
Vibration Model of Pipe Conveying Fluid Considered Fluid Structure Interaction <i>Gongfa Li, Yuesheng Gu, Zehao Wu, Han Xiao, Jianyi Kong, Guozhang Jiang, Liangxi Xie, Li Hu and Siqiang Xu</i>	197
Optimization SVM Algorithm and it's Application in Agricultural Science and Technology Project Classification <i>Hui Feng Yan, Wei Feng Wang, Qin Mao, Ming Liang Zhou</i>	203
Accuracy of Experimental Platform of Controlled Five-bar Linkages <i>Li Pan</i>	210
Analysis on Sliding Velocity of Cycloid Gear Pair during Meshing <i>Shuyan. Wang, Guizhong Tian, Xujun Jiang</i>	218
Intelligent Diagnosis of Coke Oven Heating Production <i>Gongfa Li, Yuesheng Gu, Jianyi Kong, Guozhang Jiang and Liangxi Xie</i>	226
Adaptive Fuzzy Control of Aircraft ABS Based on Runway Identification <i>Hua-wei Wu, Te-fang Chen, Wei-ming Huang</i>	233
The Total Factor Productivity Growth of the Municipal Water Industry in China <i>Wang Fen</i>	243
Research on Attainable Moment Subset of Singular Over-actuated System <i>Shi Jingping, Qu Xiaobo</i>	252
Finite Element Analysis of Vane Seals <i>Guozhang Jiang, Li Zhao, Jianyi Kong, Gongfa Li, Liangxi Xie</i>	261
	269

Application of Multi-factor Fuzzy Comprehensive Evaluation in Stability of Surrounding Rock of Underground Engineering

Jinglong Li, Jiachun Li, Shuchen Li.....

Jackknife Control on Tractor Semi-trailer during High Speed Curve Driving

Shuwen Zhou and Siqi Zhang 277

Simulation and Experiment Research on Deforming Force of Slab Cold Roll-beating

Mingshun Yang, Yan Li, Jianming Zheng, Qilong Yuan..... 285

Research on Organizational Culture and Resources Integration Model Based on MICK-4FI

Yan Zhan, Jiansha Lu and Shiyun Li..... 295

Authors are encouraged to submit article in MS Word (doc) and Acrobat (pdf) formats by e-mail: editor@sensorsportal.com
Please visit journal's webpage with preparation instructions: <http://www.sensorsportal.com/HTML/DIGEST/Submition.htm>

International Frequency Sensor Association (IFSA).



International Frequency Sensor Association Publishing Call for Books Proposals

Sensors, MEMS, Measuring instrumentation, etc.



Benefits and rewards of being an IFSA author:

1

Royalties

Today IFSA offers most high royalty in the world: you will receive 50 % of each book sold in comparison with 8-11 % from other publishers, and get payment on monthly basis compared with other publishers' yearly basis.

2

Quick Publication

IFSA recognizes the value to our customers of timely information, so we produce your book quickly: 2 months publishing schedule compared with other publishers' 5-18-month schedule.

3

The Best Targeted Marketing and Promotion

As a leading online publisher in sensors related fields, IFSA and its Sensors Web Portal has a great expertise and experience to market and promote your book worldwide. An extensive marketing plan will be developed for each new book, including intensive promotions in IFSA's media: journal, magazine, newsletter and online bookstore at Sensors Web Portal.

4

Published Format: printable pdf (Acrobat).

When you publish with IFSA your book will never go out of print and can be delivered to customers in a few minutes.

You are invited kindly to share in the benefits of being an IFSA author and to submit your book proposal or/and a sample chapter for review by e-mail to editor@sensorsportal.com. These proposals may include technical references, application engineering handbooks, monographs, guides and textbooks. Also edited survey books, state-of-the art or state-of-the-technology, are of interest to us. For more detail please visit: http://www.sensorsportal.com/HTML/IFSA_Publishing.htm



The Fourth International Conference on Sensor Device Technologies and Applications

SENSORDEVICES 2013

25 - 31 August 2013 - Barcelona, Spain

Tracks: Sensor devices - Ultrasonic and Piezosensors - Photonics - Infrared - Gas Sensors - Geosensors - Sensor device technologies - Sensors signal conditioning and interfacing circuits - Medical devices and sensors applications - Sensors domain-oriented devices, technologies, and applications - Sensor-based localization and tracking technologies - Sensors and Transducers for Non-Destructive Testing

Deadline for papers: 30 March 2013

<http://www.iaria.org/conferences2013/SENSORDEVICES13.html>



The Seventh International Conference on Sensor Technologies and Applications

Deadline for papers:
30 March 2013

SENSORCOMM 2013

25 - 31 August 2013 - Barcelona, Spain

Tracks: Architectures, protocols and algorithms of sensor networks - Energy, management and control of sensor networks - Resource allocation, services, QoS and fault tolerance in sensor networks - Performance, simulation and modelling of sensor networks - Security and monitoring of sensor networks - Sensor circuits and sensor devices - Radio issues in wireless sensor networks - Software, applications and programming of sensor networks - Data allocation and information in sensor networks - Deployments and implementations of sensor networks - Under water sensors and systems - Energy optimization in wireless sensor networks

<http://www.iaria.org/conferences2013/SENSORCOMM13.html>



The Sixth International Conference on Advances in Circuits, Electronics and Micro-electronics

CENICS 2013

25 - 31 August 2013 - Barcelona, Spain

Deadline for papers: 30 March 2013

Tracks: Semiconductors and applications - Design, models and languages - Signal processing circuits - Arithmetic computational circuits - Microelectronics - Electronics technologies - Special circuits - Consumer electronics - Application-oriented electronics

<http://www.iaria.org/conferences2013/CENICS13.html>

Remote Monitoring and Diagnosis System of Rolling Mill Transmission System

¹ Gongfa Li, ² Yuesheng Gu, ¹ Zehao Wu, ¹ Han Xiao, ¹ Guozhang Jiang,
¹ Jianyi Kong, ¹ Liangxi Xie and ¹ Siqiang Xu

¹ College of Machinery and Automation,

Box 242, Wuhan University of Science and Technology, Wuhan, 430081, China

² Department of Computer Science, Henan Institute of Science and Technology,

Xinxiang 453003, Henan, China

Tel.: +86-027-68862283

E-mail: ligongfa@yahoo.com.cn

Received: 11 September 2012 /Accepted: 11 October 2012 /Published: 20 November 2012

Abstract: As the www technology that is commonly used on the Internet at present can't solve all remote fault diagnosis, a detailed solution to the remote monitoring and diagnosis system for a rolling mill is introduced. The hardware and software structure of remote monitoring and diagnosis system is presented. The structure of the system is made up of four subsystems: online monitoring subsystem, Data servo subsystem, Database service subsystem and www server subsystem. Software module of system includes seven parts: online monitoring module, data query module, fault information query module, trend analysis module, diagnosis analysis module, engineer station module and eigenvalue query module. The system adopts B/S model and integrates CORBA technology with SOAP/Web Service technology. It makes dynamic display and traversing for a great deal of on-line data and Firewall traversal possible. It has run a long time that proves that the system interface is friendly and easy to study. It has better security, well portability, well expandability and well stability. It can judge the running-condition of rolling mill in time. *Copyright © 2012 IFSA.*

Keywords: Rolling mill, Remote monitoring, CORBA, SOAP/Web service, Diagnosis.

1. Introduction

Mechanical equipments are monitored and diagnosed by using monitoring and fault diagnosis technology in order to find fault of mechanical equipment and avoid emergence of malignant accident of

equipment in time, thus personnel's injuries and deaths, environment pollution and enormous economic losses are avoided.

Remote fault diagnosis system is a typical distributed application program, and its structure and technology of realizing are very complicated. WWW technology, which is commonly used on Internet, can't solve all remote fault diagnosis affairs because of its' inherent defect at present. CORBA (Common Object Request Broker Architecture) is a kind of new distributed object computing technology and can solve the task that is difficult to develop or even can't be finished by traditional Web application. So it's an effective way to develop distributed application combining Web with CORBA technology.

2. Characteristics of System Based on CORBA Technology and SOAP/Web Service Technology

The system, which is developed by CORBA technology and SOAP/Web Service technology, has the following characteristics.

- 1) Good portability. The system is developed not aiming at a certain application, which is aimed at a series of questions, so it has good portability.
- 2) Maintainability. The system is designed with the module thought. It's very convenient to carry on the change and upgrade of the module and maintain system, so it is easy to operate.
- 3) Advance. The system is designed based on CORBA technology and SOAP/Web Service technology, so its advance is effectively ensured.
- 4) Expansibility. The characteristics of CORBA technology have determined its own strong expansibility of the system, which gives security for the system newly increased function module.
- 5) Real-time many tasks. In fact, a lot of tasks need finish at the same time in the process of signal collection, analysis and process.

3. Principles and Thought of System Design

Data collected are transmitted to database server through LAN in this system by using CORBA technology, which well solved the sharing problem of the data.

On the combination technology of CORBA and Web, SOAP / Web Service is a kind of very good combination scheme. CORBA developed as one of object-oriented distributed major standards is perfecting and maturing day by day, and widely used in every field, especially electronic bank, e-commerce. Because CORBA can't pass through the firewall, which has limited its development in a lot of fields, and SOAP / Web Service is based on HTTP agreement, combination of CORBA and SOAP / Web Service can fully utilize their advantages, realize remote diagnosis system with multi-layer architecture based on distributed B/S mode.

SOAP client program downloads from Web server and carries out in the system, communication with CORBA application object (diagnosis function) in application server is carried on through SOAP agreement, so appointed operation is designated on the browser. Customer's requests are authenticated and explained by CORBA application targets at first, then according to the content which the customer asks, the database is visited directly, or either the controlling data is displayed dynamically, or diagnosis analysis required by users is finished.

4. Architecture of System

The remote monitoring and fault diagnosis system is an opening multi-layer distributed system, and composed by four subsystems mainly, such as online monitoring subsystem, data servo subsystem, database service subsystem and WWW server subsystem. Its structure is shown in Fig. 1.

Online monitoring subsystem includes sensor system, signal acquisition system and real-time online monitoring software system, finishes real-time collecting sampling of hardware of the card, collection and process of signal, real-time data display, storage of alarm and sample data, and operation of SQL database.

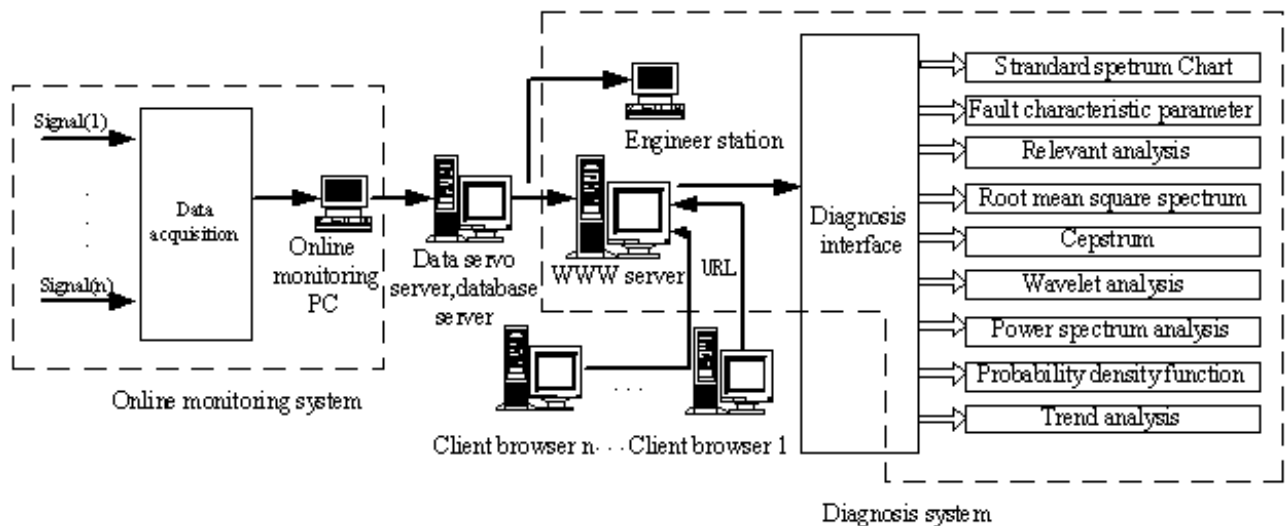


Fig. 1. Architecture of remote online monitoring and fault diagnosis system.

Tasks of data servo subsystem and database server subsystem is receiving and dealing with all data sent from data collection station, putting initial data into the primitive signal buffer memory area, then writing the treated data into the characteristic database and historical database. Characteristic value of the collected data and primitive signal route are stored regularly, all alarm signal characteristic value and alarm signal route are stored at the same time.

WWW server subsystem is a service website set up on Internet, it includes WWW server and application program mainly. It adopts browser work mode, all monitoring, analysis and diagnosis software is put at WWW server, and they are managed through WWW homepage. Engineer authorized utilize Web browser to have a look around through the authentication way of the password. The data servo subsystem and database service subsystem are installed on a server in this system.

5. Realization of System

The whole system is developed by C++ Builder language, and aims at test, analysis and diagnosis of vibration and status information of the rolling mill mainly.

Because this system adopts B/S mode, application programs are not need to install in client, the system is visited directly in different place through inputting IP address, only if URL of Web server is known. This system is mainly includes online monitoring module, data query module, fault information query module, trend analysis module, fault diagnosis module, engineer station module, eigenvalue query module.

The hardware is composed of sensors, adapters, computers and exchangers. These parts are linked by electric cable and netting wire. Some signals such as velocity, acceleration, displacement and temperature are processed by adapter in order to be saved.

The whole software system is made up of online monitoring system, network monitoring and diagnosis system. The online monitoring system finishes function of collection, processing, shows of the signal and alarm, is installed on gathering data server. The data servo subsystem finishes storage of regular data and alarm data. Network monitoring and diagnosis system includes remote monitoring system, trend analysis, relevant analysis, power spectrum analysis and wavelet analysis etc. The online monitoring system is responsible for gathering and transmitting the signal. SQL data server stores the characteristic value of the data, primitive signal route regularly, all alarm signal characteristic value and alarm signal route at the same time. Web server can offer remote online monitoring and remote diagnosis.

Communication among data gathering server, data servo subsystem, database service subsystem and WWW server subsystem is based on CORBA C/S model. Communication between WWW server subsystem and browser is adopted SOAP/Web Service technology based on HTTP agreement. Database is visited by every system adopting ADO linkage way. Software logic relationship diagram of system is shown in Fig. 2.

In this system, spot signals are gathered through industrial PC installed on the spot, which is CORBA client 1 (shown in Fig. 2 A). CORBA server deals with signal got by using multi-thread technology. One hand, data is transmitted to CORBA client 2 (CORBA client and Web Service is integrated in Fig. 2 D) to provide interface service thread integrated SOAP/ Web Service client. The other hand, the thread is stored according to storage rule of database. Browser shown in Fig. 2 F is a thin client realizing remote diagnosis service. It provides service to the outside through IIS releasing, can be visited by user through IP. Program E integrates CORBA client and Web Service server, provides interface service to the outside in the form of DLL through IIS releasing. So, once there is WebPage request, DLL will be activated, after this Webpage is closed, the DLL is still in the state of monitoring, thus the time of visiting is saved.

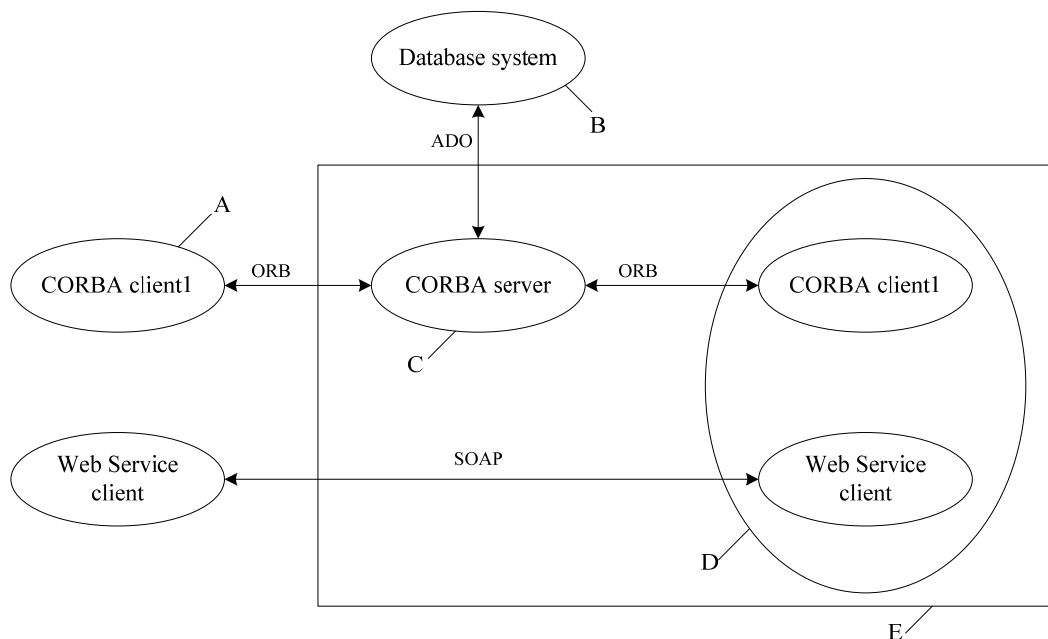


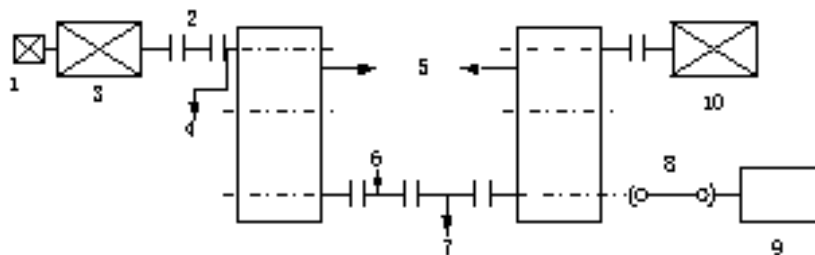
Fig. 2. Software logic relationship diagram of system.

6. Instance

6.1. Rolling Mill System

Rolling mill system is shown as Fig. 2. It includes speed generator, direct current generator, reducer, universal axis, torque distance apparatuses, rolling mill and so on. The type of speed generator is ZYS-1A, it's the largest rotation speed is 2000 rpm and power is 4.4 KW (shown as 1 in Fig. 3), which is used to measuring rotation speed of generator. There are two direct current generators (shown as 3 and 10 in Fig. 3). The type of generator is Z2-82, the largest rotation speed is 1500 rpm and power is 40 KW. There are two torsion sensors (shown as 2 and 6 in Fig. 3). The types of these two torsion sensors are JS-2 and JS-3 respectively, their tolerance torsion are 500 N·m and 5000 N·m respectively. They are used to measuring torque and rotation speed. There are two reducer, their types are JZQ650. There are two remote measurement torque sensors (shown as 4 and 7 in Fig. 3). Their types of sensors are JY, which are used to measuring torque.

Operation principle of the rolling mill system: main motor 3 drives reducer 5 and rolling mill 9 to run, motor 10 can already be regarded as the motor, or can be as the generator (as a load on the rolling mill system). It can be used to make performance test of component parts of mechanical transmission, fatigue test, parameters test of force and energy, online monitoring and fault diagnosis of equipment.



1. Speed generator; 2. 500 N·m torsion sensor; 3. Motor; 4, 7. Remote measurement torque sensor; 5. Reducer, 6. 5000 N·m torsion sensor; 8. Universal axis; 9. Rolling mill; 10. Motor (generator).

Fig. 3. Sketch map of rolling mill system.

6.2. Diagnosis of the Fault Signal

Motor 10 loads this system as a generator in Fig. 3. During operating and debuting the system, the vibration of bearings in motor 10 is unusual. An acceleration sensor is installed on the left bearings seat of motor 10 to pick up vibration acceleration signal. Because the fault frequency of the bearings is relatively low, the low-frequency fault signal of bearings can be isolated from vibration signal by using envelope spectrum analysis method. Rotation frequency of motor axle of rolling mill system is 7.7 Hz. Then the remote monitoring and fault diagnosis system based on CORBA and SOAP Web/Service is used to analyze the bearings. Envelope spectrum of vibration acceleration signal of motor bearings is got (shown as Fig. 4), after spectrum zooming, the corresponding frequency of three obvious peak value are 7.75 Hz, 15.43 Hz, 23.28 Hz, which separately are very close to 1 times, 2 times and 3 times of rotation frequency of motor axle.

The rolling bearings bears the load relying on elasticity touch between race and roller, has the characteristic of "spring", so its rigidity is very great. When the lubricated state of the bearings is bad, the characteristic of the non-linear spring is presented, so non-linear vibration is produced. There is high-order harmonic generation (2f, 3f...) in non-linear vibration except for the rotation frequency f. According to the characteristic of spectrum of vibration acceleration signal of bearing, the fault of

bearings is bad lubricated state. The actual conditions are that the lubricating grease in the bearings has not been changed for many years, has already dried up and gone bad, lubricated performance worsens seriously, which is in conformity with actual conditions.

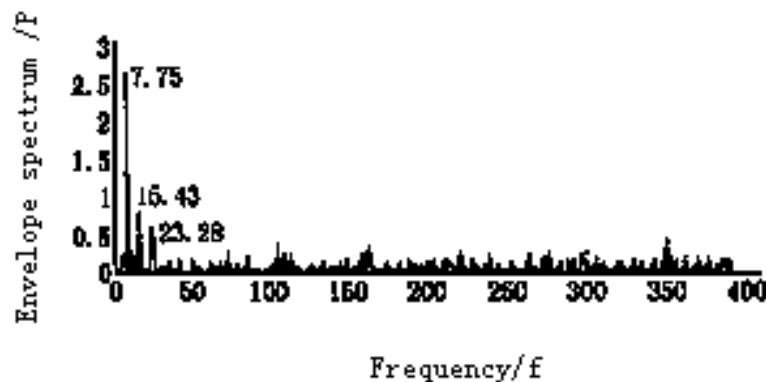


Fig. 4. Spectrum of bearings of motor.

7. Conclusions

The remote fault diagnosis system is based on B/S mode, adopts CORBA technology and SOAP / Web Service technology together. The system has good portability, maintainability, opening and expansibility, can realize the sharing of resources. It makes dynamic display and traversing for a great deal of on-line data and Firewall traversal possible. It has run a long time that proves this system can judge the operation state of the rolling mill in time. Some functions of the system are widely used in monitoring and diagnosis of a lot of equipments of metallurgical enterprise; the integrality, stability and dependability have already got users' affirmation.

Acknowledgements

This research was supported in part by National Natural Science Foundation of China (51105284).

References

- [1]. Li Gongfa, Liu Anzhong, Li Yourong, CORBA and SOAP/Web Service Technology-based Remote Fault Diagnosis System, *Chinese Journal of Jiangnan University*, Vol. 32, Issue 4, 2004, pp. 49-52.
- [2]. Li Gongfa, Kong Jianyi, Liu Anzhong, Remote Monitoring and Fault Diagnosis System Based on CORBA Technology for Rolling mill, *Chinese Journal of Machine Tool & Hydraulics*, Vol. 42, Issue 7, 2005, pp. 183-186.
- [3]. Li Gongfa, Liu Anzhong, Li Yourong, Research of Remote Fault Diagnosis System Based on Internet for Mill Drives, *Chinese Journal of Metallurgical Equipment*, Vol. 17 Issue 2, 2004, pp. 39-42.
- [4]. Li Gongfa, Liu Anzhong, Li Yourong, Application of the Equipment Based on B/S Model in the Remote On-Line Monitoring and Fault Diagnosis System, *Chinese Journal of Wuhan Polytechnic University*, Vol. 23, Issue 4, 2004, pp. 37-40.
- [5]. Li Gongfa, Kong Jianyi, Liu Anzhong, Research of Remote Fault Diagnosis System for Rolling Mill Drives, *Chinese Journal of Wuhan University of Science and Technology*, Vol. 27, Issue 3, 2004, pp. 267-270.
- [6]. Li Gongfa, Kong Jianyi, Liu Anzhong, Research of Remote Monitoring and Fault Diagnosis System Based on Web for Rolling Mill Drives, *Chinese Journal of Mechanical Transmission*, Vol. 29, Issue 3, 2005, pp. 59-62.
- [7]. Li Gongfa, Kong Jianyi, Liu Anzhong, Application of Remote Monitoring and Fault Diagnosis System

Based on the CORBA and SOAP/Web Service Technology for High-speed-wires Rolling Mill, *Chinese Journal of Machine Tool & Hydraulics*, Vol. 31, Issue 12, 2005, pp. 186-188.

- [8]. Li Gongfa, On-line Monitoring and Fault Diagnosis System Based on Internet for rolling Mill, *Wuhan University of Science and Technology*, Wuhan, China, 2004.

2012 Copyright ©, International Frequency Sensor Association (IFSA). All rights reserved.
(<http://www.sensorsportal.com>)

Sensors & Transducers Journal (ISSN 1726-5479)

Open access, peer review
international journal devoted to research,
development and applications of sensors,
transducers and sensor systems.
The 2008 e-Impact Factor is 205.767

Published monthly by
International Frequency Sensor Association (IFSA)



Submit your article online:
<http://www.sensorsportal.com/HTML/DIGEST/Submition.htm>

Universal Sensors and Transducers Interface (USTI)

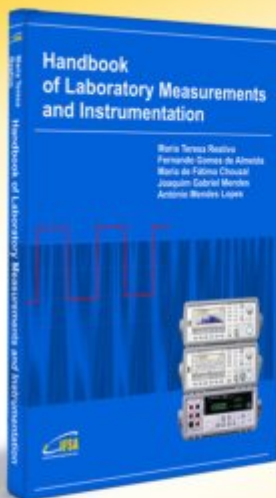
for any sensors and transducers with frequency, period, duty-cycle, time interval,
PWM, phase-shift, pulse number output



- * Input frequency range:
0.05 Hz ... 9 MHz (144 MHz)
- * Selectable and constant relative error:
1 ... 0.0005 % for all frequency range
- * Scalable resolution
- * Non-redundant conversion time
- * RS232, SPI, I2C interfaces
- * Rotational speed, *rpm*
- * Cx, 50 pF to 100 μ F
- * Rx, 10 Ω to 10 M Ω
- * Pt100, Pt1000, Pt5000, Cu, Ni
- * Resistive Bridges
- * PDIP, TQFP, MLF packages

Just make it easy !

<http://www.techassist2010.com/> info@techassist2010.com



Handbook of Laboratory Measurements and Instrumentation

Maria Teresa Restivo
Fernando Gomes de Almeida
Maria de Fátima Chouzal
Joaquim Gabriel Mendes
António Mendes Lopes

The Handbook of Laboratory Measurements and Instrumentation presents experimental and laboratory activities with an approach as close as possible to reality, even offering remote access to experiments, providing to the reader an excellent tool for learning laboratory techniques and methodologies. Book includes dozens videos, animations and simulations following each of chapters. It makes the title very valued and different from existing books on measurements and instrumentation.



International Frequency Sensor Association Publishing

Order online:

http://www.sensorsportal.com/HTML/BOOKSTORE/Handbook_of_Measurements.htm



International Frequency Sensor Association (IFSA) Publishing

Digital Sensors and Sensor Systems: Practical Design

Sergey Y. Yurish



The goal of this book is to help the practitioners achieve the best metrological and technical performances of digital sensors and sensor systems at low cost, and significantly to reduce time-to-market. It should be also useful for students, lectures and professors to provide a solid background of the novel concepts and design approach.

Book features include:

- Each of chapter can be used independently and contains its own detailed list of references
- Easy-to-repeat experiments
- Practical orientation
- Dozens examples of various complete sensors and sensor systems for physical and chemical, electrical and non-electrical values
- Detailed description of technology driven and coming alternative to the ADC a frequency (time)-to-digital conversion

Formats: printable pdf (Acrobat)
and print (hardcover), 419 pages

ISBN: 978-84-616-0652-8,
e-ISBN: 978-84-615-6957-1

Digital Sensors and Sensor Systems: Practical Design will greatly benefit undergraduate and at PhD students, engineers, scientists and researchers in both industry and academia. It is especially suited as a reference guide for practitioners, working for Original Equipment Manufacturers (OEM) electronics market (electronics/hardware), sensor industry, and using commercial-off-the-shelf components

http://sensorsportal.com/HTML/BOOKSTORE/Digital_Sensors.htm

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 of it is a peer reviewed international journal, papers rapidly published in *Sensors & Transducers Journal* will receive a very high publicity. The journal is published monthly as twelve issues per year by International Frequency Sensor Association (IFSA). In addition, some special sponsored and conference issues published annually. *Sensors & Transducers Journal* is indexed and abstracted very quickly by Chemical Abstracts, IndexCopernicus Journals Master List, Open J-Gate, Google Scholar, etc. Since 2011 the journal is covered and indexed (including a Scopus, Embase, Engineering Village and Reaxys) in Elsevier products.

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;
- Nanosensors;
- Microsystems;
- Applications.

Submission of papers

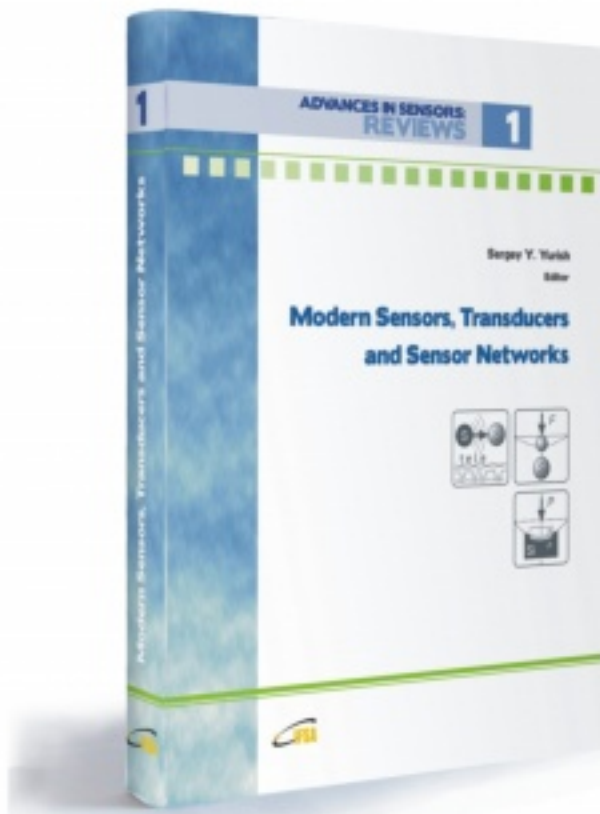
Articles should be written in English. Authors are invited to submit by e-mail editor@sensorsportal.com 8-14 pages article (including abstract, illustrations (color or grayscale), photos and references) in both: MS Word (doc) and Acrobat (pdf) formats. Detailed preparation instructions, paper example 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.

Advertising Information

Advertising orders and enquires may be sent to sales@sensorsportal.com Please download also our media kit: http://www.sensorsportal.com/DOWNLOADS/Media_Kit_2012.pdf

**ADVANCES IN SENSORS:
REVIEWS****1****Sergey Y. Yurish**
Editor

Modern Sensors, Transducers and Sensor Networks



Modern Sensors, Transducers and Sensor Networks is the first book from the Advances in Sensors: Reviews book Series contains dozen collected sensor related state-of-the-art reviews written by 31 internationally recognized experts from academia and industry.

Built upon the series Advances in Sensors: Reviews - a premier sensor review source, the *Modern Sensors, Transducers and Sensor Networks* presents an overview of highlights in the field. Coverage includes current developments in sensing nanomaterials, technologies, MEMS sensor design, synthesis, modeling and applications of sensors, transducers and wireless sensor networks, signal detection and advanced signal processing, as well as new sensing principles and methods of measurements.

Modern Sensors, Transducers and Sensor Networks is intended for anyone who wants to cover a comprehensive range of topics in the field of sensors paradigms and developments. It provides guidance for technology solution developers from academia, research institutions, and industry, providing them with a broader perspective of sensor science and industry.

Order online:

http://sensorsportal.com/HTML/BOOKSTORE/Advance_in_Sensors.htm



www.sensorsportal.com