

Ivan Maric

Laboratory for information Systems
Department of Electronics
Rudjer Boskovic Institute
Bijenička c. 54
10000 Zagreb
Croatia

E-mail: ivan.maric@irb.hr
Office Phone: +385-1-4561191
Fax: +385-1-4680114

Personal data:

Name: Ivan Maric
Title: Dr. sc., Senior Scientist
Date of birth: December 24, 1951, Knin, Croatia
Citizenship: Croatian
Marital Status: Married, three children

Education:

- **Ph.D. in Electrical Engineering**
Faculty of Electrical Engineering, University of Zagreb, Croatia, 1989: Thesis: "*Digital procedures for the compensation of measurement system nonlinearities and temperature drifts*" (in Croatian).
- **M.S. in Computer Science**
Faculty of Electrical Engineering, University of Zagreb, Croatia, 1981: Thesis: "*Possibility of BCD code application in the floating point arithmetic algorithms*" (in Croatian).
- **B.S. in Electrical Engineering**
Faculty of Electrical Engineering, University of Zagreb, Croatia, 1974: Diploma work: "*Application of dynamic programming in the design of the telephone networks*" (in Croatian).

Appointments:

- **Senior scientist**, Rudjer Boskovic Institute, 2004.
- **Senior scientific associate**, Rudjer Boskovic Institute, 1998.
- **Scientific associate**, Rudjer Boskovic Institute, 1990.
- **Assistant professor**, Faculty of Electrical Engineering, University of Zagreb, 1983.
- **Research assistant**, Rudjer Boskovic Institute, Zagreb, 1981.

Employment:

- Since 1979 *Rudjer Boskovic Institute*, Zagreb, Croatia.
- From 1975 to 1979 *Ericsson - Tesla*, Zagreb, Croatia

Biography

Ivan Maric was born on December 24, 1951 in Knin, Croatia where he finished the primary- and the grammar-school. In 1970 he begins the study of electrical engineering at the Faculty of Electrical Engineering, University of Zagreb. After graduation in 1974 he was employed at "Ericsson-N.Tesla" company in Zagreb. He started with his research and scientific work in 1979 after he had joined Rudjer Boskovic Institute in Zagreb.

In 1981. he received the M.S. degree with the thesis "*Possibility of BCD code application in the floating point arithmetic algorithms*" and in 1989 the Ph.D. degree with the thesis "*Digital procedures for the compensation of measurement system nonlinearities and temperature drifts*" both from the Faculty of Electrical Engineering, University of Zagreb. Ivan Maric has been appointed to research assistant (1981), assistant professor (1983), scientific associate (1990), senior scientific associate (1998) and senior scientist (2004).

In the Rudjer Boskovic Institute Ivan Maric participated in numerous research and development projects. Currently he is leading the research project "Computational Intelligence Methods in Measurement Systems" financed by the Croatian Ministry of Science Education and Sports.

In the frame of the bilateral German/Croatian scientific co-operation he was a visiting scientist at the Institute of applied physical chemistry at the Kern Forschungs Anlage, Jülich, where he participated in the projects "*Radio-coulomb-voltammetry*", and "*Environmental research in aquatic systems*" dealing with the automation of the procedures for physical and chemical characterization of heavy metals traces in natural and polluted waters.

Scientific activity of Ivan Maric is devoted to research and development of numerical algorithms in the floating point arithmetic and in digital processing of speech signals as well as to the research and development of digital measurement techniques and measurement system models that are applicable to the measurements of low frequency analog signals in environments characterized by the high variations of ambient conditions. Considerable effort was directed to experimental realization of measurement procedures and algorithms particularly in the field of flow measurements. He developed n-point automatic calibration, which enables the compensation of the nonlinearities and temperature drifts of the measurement system characteristics. Automatic n-point calibration proved to be very useful in increasing the measurement accuracy. He was also investigating and developing the measurement algorithms, 'smart' measuring instruments and measurement system models. He developed a distributed flow measurement system model based on the software implementations of the internationally recognized flow measurement standards. He also participated in the research on time series analysis.

Currently, he holds the position of Senior Scientist for Instrumentation and Measurement Systems in the Division of Electronics of the Rudjer Boskovic Institute, Zagreb. His research interests include modeling and meta-modeling of complex systems, computational intelligence, numerical algorithms, embedded and distributed real-time measurement and control systems, intelligent instrumentation and fluid flow measurement.

Besides his research and scientific activities I. Maric was also engaged in the projects dealing with practical application of scientific methods and know-how to industry. He participated in various projects dealing with real-time measurements. He was leading the development of numerous software packages and measuring instruments controlled by the microprocessors. The developed products have been successfully applied to industry.

He participated also in data mining project "*Data Mining Server*" (<http://dms.irb.hr>), open source project "*wGMDH - Weka addon featuring GMDH*" (<http://wgmdh.irb.hr>) and was leading the project "*International Standards for Flow Measurements – Active Network Objects*" (<http://isano.irb.hr>). All projects had been sponsored by the Croatian Ministry of Science Education and Sports and resulted in free WEB-based services.

Ivan Maric is a member of IEEE, IEEE/IES, IEEE/CIS IEEE/SPS and ISA and a member of the Editorial Advisory Board of the ISA Transactions. He is a reviewer of academic programmes and scientific, technological and other projects sponsored by the Croatian Ministry of Science Education and Sports. He serves as a reviewer for the international journals *IEEE Transactions on Industrial Electronics*, *ISA Transactions* and *Flow Measurement and Instrumentation* and for a couple of

conferences. He was a member of the Technical Committee "Measuring Instrumentation" at the Croatian State Office for Standardization and Metrology.
He avails himself of English and German language.

Bibliography

1. Papers published in journals and in monographs:

- 1.1. Maric, Ivan; Ivek, Ivan: Self-Organizing Polynomial Networks for Time-Constrained Applications. // *IEEE Transactions on Industrial Electronics*, 58, (2011), 5; 2019-2029
- 1.2. Maric, Ivan; Ivek, Ivan: Compensation for Joule–Thomson effect in flowrate measurements by GMDH polynomial. // *Flow measurement and instrumentation*. 21 (2010), 2; 134-142
- 1.3. Maric, Ivan; Ivek, Ivan. Natural gas properties and flow computation // *Natural Gas / Potočnik, Primož (Ed.)*. Rijeka : SCIYO, 2010. Str. 501-529. (book chapter)
- 1.4. Maric, Ivan, A procedure for the calculation of the natural gas molar heat capacity, the isentropic exponent, and the Joule-Thomson coefficient. // *Flow Measurement and Instrumentation*. 18 (2007) , 1; 18-26
- 1.5. Maric, Ivan: The Joule–Thomson effect in natural gas flow-rate measurements, *Flow Measurement and Instrumentation*, Volume 16, Issue 6 , December 2005, pp. 387-395
- 1.6. Maric, Ivan; Galović Antun; Šmuc, Tomislav: Calculation of natural gas isentropic exponent, *Flow Measurement and Instrumentation*, Volume 16, Issue 1 , March 2005, pp.13-20
- 1.7. Maric, Ivan: "Software objects in distributed flow measurements", *ISA Transactions*, Vol 42, 2003, pp. 497-504.
- 1.8. Maric, Ivan: "Flow measurement system model with distributed resources", *Flow Measurement and Instrumentation*, Vol 12/4, 2001, pp 283-289.
- 1.9. Maric, Ivan: "Smart Flow Computer with Auto-Calibration and Advanced Communication", *Microcomputer Applications*, Vol. 18, No. 3, 1999, pp. 113-118.
- 1.10. Maric, Ivan: "Derivation of Natural Gas Isentropic Exponent From AGA-8 Equation of State", *Strojarstvo*, STROJ - 1090, 39 (1997) 1,2, pp. 27-32.
- 1.11. Maric, Ivan: "Tracking Real Characteristics by Multiple Point Auto-Calibration and the Tangent Method Applied to Ideal Characteristics", *Review of Scientific Instruments*, Vol. 67, No. 12, December 1996, pp. 4392-4396.
- 1.12. Maric, Ivan: Autocalibration Procedures in Computer Controlled Measurements, *Microcomputer Applications*, 11:102-107, 1992.
- 1.13. Pižeta, Ivanka; Maric, Ivan; Branica, Marko: The System for Physico-Chemical Characterization of Heavy Metals Traces in Natural and Polluted Waters, M. Branica (Ed.), *Environmental Research in Aquatic Systems*, Scientific Series of the International Bureau, Vol. 3, Forschungszentrum Juelich, ISSN 0938-7676, ISBN 3-89336-053-0, Jülich 1990.
- 1.14. Maric, Ivan: Automatic Digital Correction of Measurement Data Based on M-point Autocalibration and Inverse Polynomial Approximation, *IEEE Transactions on Industrial Electronics*, Vol. 35, No. 2, May 1988, pp. 317-322.
- 1.15. Maric, Ivan, Gamberger, Dragan; Bogunović, Nikola: A microprocessor controlled gas-flowmeter with autocalibration and nonlinearity compensation, T.Kemeny, K.Havrilla (Ed.), *Theoretical metrology*, Nova Science Publishers, 1987, (IMEKO - Selected papers).

- 1.16. Branica, Marko; Pižeta, Ivanka; Maric, Ivan: Application of ASV for Trace Metal Speciation, A Computerized Pseudopolarographic System, *J. Electroanal. Chem.* 214 (1986), pp. 95-102.
 - 1.17. Maric, Ivan, Cucančić, Ladislav: On the Possibilities of the BCD Code Application in the Floating Point Arithmetic Algorithms, *International Journal of Mini and Microcomputers*, Vol.5, No.2, 1983, pp. 19-22.
 - 1.18. Maric, Ivan: Algorithms for fast B/D conversion of integers, *Informatica*, No.3, 1983, p.p. 21-26.
 - 1.19. Bogunović, Nikola; Maric, Ivan: A method for the microcomputer memory emulation by a minicomputer, *Informatica 1* (1980), p.p. 18-21. (In Croatian)
2. Papers published in the proceedings of the international conferences:
- 2.1. Šmuc, Tomislav; Maric, Ivan; Bosanac, Gordan; Gamberger, Dragan; Bogunović, Nikola; Krstačić, Goran: *Dynamic Features of the Normal Heart Rate Variability*, Proceedings of the International Conference Computers in Cardiology 2002 / A. Murray (ed.): IEEE, 2002. pp. 241-244
 - 2.2. Maric, Ivan: *Object-oriented approach to flow measurements*, ISA TECH/EXPO Technology Update Conference Proceedings, ISA2001/IMEKO Special Millenium Sessions, Houston TX, Sep 10-12, 2001, v 417, p 65-74, ISSN: 1054-0032
 - 2.3. Maric, Ivan: *Transparent Autocalibration of Computer Controlled Measurement Systems*, Proceedings of the Sixt International Symposium on Networks, Systems and Signal Processing, ISYNT '89, Zagreb, Croatia, June 27-29, 1989, pp. 413-417.
 - 2.4. Maric, Ivan: *Linearization of the Measurement System Characteristics by Autocalibration and Polynomial Approximation*, Proceedings of the ISMM International Symposium Mini and Microcomputers and Their Applications, MIMI 87, Lugano, Switzerland, June 29 - July 1, 1987, (ISBN 0-88986-124-2), 146-150.
 - 2.5. Bogunović, Nikola; Cucančić, Ladislav; Gamberger, Dragan; Maric, Ivan: *On the Compensation of Nonlinearity Errors in Microprocessor Based Measuring and Control Systems*, 19th International Symposium on Mini and Microcomputers and their Applications, Paris, June 29, 1982, pp. 70-73. (ISBN 0-88986-035-1).
3. Other papers:
- 3.1. Papers published in conference proceedings
 - 3.1.1. Maric, Ivan: *Fluid flow measurement system*, Proceedings of CROSS, Opatija 1993., pp. 56-57. (In Croatian)
 - 3.1.2. Maric, Ivan: *Autocalibration of a measurement systems by means of the primary references*, Proceedings of CROSS, Zagreb 1992., pp. 37-42. (In Croatian)
 - 3.1.3. Žutić, Ivan; Maric, Ivan: *Steam flow computation algorithm using measuring orifices*, Proceedings of MIPRO, Rijeka 1991., pp. 2.154 - 2.159. (In Croatian)
 - 3.1.4. Gamberger, Dragan; Maric, Ivan; Matasović, Marijan: *Intrinsically safe systems with embedded microcomputers*, Proceedings of MIPRO, Rijeka 20. - 24. 05. 1991., pp. 2.33 - 2.38. (In Croatian)
 - 3.1.5. Maric, Ivan; Žutić, Ivan: *Steam flow computer with autocalibration*, Proceedings of JUKEM 90, Sarajevo 1990, pp. 559-564.

- 3.1.6 Maric, Ivan: *Compensation of temperature drifts and nonlinearities of the measuring instrument transfer function using N-point autocalibration*, Proceedings of ETAN in marine, Zadar 1988, pp. 368-371. (In Croatian)
- 3.1.7. Bogunović, Nikola; Gamberger, Dragan; Maric, Ivan: *Comparison of random-logic and microcomputer based measurement systems*, 5th Yugoslav symposium on microcomputers and process control, Rijeka 1986. pp. 4-249 to 4-253. (In Croatian)
- 3.1.8. Maric, Ivan: *Phoneme recognition using sequential autocorrelation vector analysis over limited number of consecutive frames*, Proceedings of Informatica 85, Nova Gorica, 1985, pp. 360-364. (In Croatian)
- 3.1.9. Maric, Ivan; Cucančić, Ladislav: *Floating point program*, 16. Informatica 82, Ljubljana, 1982., pp. 1 203. (In Croatian)
- 3.1.10. Cucančić, Ladislav; Gamberger, Dragan; Maric, Ivan: *A diagnostic method for some computer software break down causes*, Second Symposium on Technical Diagnostics, Proceedings JUREMA 26 (1981) Book 3, pp. 67-70. (In Croatian)

3.2. Professional papers

- 3.2.1. Maric, Ivan: *Single Precision Floating Point Program for an LSI-11 without EIS and FIS Options*, International DECUS Program Library, No. 11-621 (DA), April 1983.

4. Patents:

- 4.1. Maric, Ivan; Gamberger, Dragan: *Microprocessor based measuring instrument with autocalibration*, Patent No. 666/90, May 5, 1990, Patent office, Former Yugoslavia. (In Croatian)
- 4.2. Gamberger, Dragan; Maric, Ivan: *Electronic counters for gasoline stations with embedded data security*, Patent No. 978, May 11, 1989, Patent office, Former Yugoslavia. (In Croatian)
- 4.3. Gamberger, Dragan; Maric, Ivan; Bogunović, Nikola: *Gas flow computer with voltage to frequency converters for the orifice based systems*, Patent No. 14524, July 8, 1987, Patent office, Former Yugoslavia. (In Croatian)

5. Projects

5.1. Participation in selected research and development projects sponsored by the Croatian Ministry of science and technology

- 5.1.1. *Computational Intelligence Methods in Measurement Systems* (PI), 2007-2012
- 5.1.2. *Real Life Data Measurement and Characterization Systems*, 2007-2012
- 5.1.3. *Automated knowledge discovery and reasoning*, 2001-2006
- 5.1.4. wGMDH, Weka addon featuring GMDH, 2008-2009
- 5.1.5. *International Standards for flow measurements – Active Network Objects* (PI), 2002-2003
- 5.1.6. *Data Mining Server*, 2000-2001
- 5.1.7. *Automated reasoning in modeling, optimization and diagnostics of technical processes*, 1997-2001
- 5.1.8. *Process modeling by intelligent computing systems*, 1994-1995
- 5.1.9. *Intelligent instrumentation*, 1991-1996
- 5.1.10. *Expert systems in manufacturing*, 1989-1990
- 5.1.11. *Computer systems in special applications*, 1981-1988
- 5.1.12. *Automatic systems for measurement and data processing*, 1976-1980

5.2. Participation in international projects

- 5.2.1. *Environmental research in aquatic systems*, cooperation with the Institut für Angewandte Physikalische Chemie, Kernforschungsanlage Jülich (KFA), Germany, 1987.
 - 5.2.2. *Radio-coulomb-voltammetry*, cooperation with the Institut für Angewandte Physikalische Chemie, Kernforschungsanlage Jülich (KFA), Germany, 1986.
- 5.3. Selected projects sponsored by the industry
- 5.3.1. Maric, Ivan: PP-ISO12213-2, Software package, MS Windows, Rudjer Boskovic Institute, Zagreb 2004.
 - 5.3.2. Maric, Ivan: PP-ISO5167, Software package, MS Windows, Rudjer Boskovic Institute, Zagreb 2004.
 - 5.3.3. Maric, Ivan: *FECOM*, Dynamic Linking Library of flow engineering components, MS Windows, Rudjer Boskovic Institute, Zagreb 2001.
 - 5.3.4. Maric, Ivan: *Flow Engineering – FE-BS*, Software package with Manual and On-line Help, MS Visual Basic 3.0, MS Windows, Rudjer Boskovic Institute, Zagreb 1997.
 - 5.3.5. Maric, Ivan: *Flow Engineering – FE-ISO*, Software package with Manual and On-line Help, MS Visual Basic 3.0, MS Windows, Rudjer Boskovic Institute, Zagreb 1996.
 - 5.3.6. Maric, Ivan: *Gas flow computer "MPR94-RPP"*, Prototype with Manual and Technical documentation (hardware and software), Rudjer Boskovic Institute, Zagreb 1994.
 - 5.3.7. Maric, Ivan: *MPF - software package for the calculation of fluid flow parameters in pipes in which differential devices (orifices, nozzles and venturi tubes) are inserted perpendicular to the pipe centre line*, Manual and On-line Help, C language, MS DOS, Rudjer Boskovic Institute, Zagreb 1992. (In Croatian)
 - 5.3.8. Maric, Ivan: *Gas flow computer "RPP90E"*, Prototype with "User's guide" and "Technical documentation" (hardware and software), Rudjer Boskovic Institute, Zagreb 1990. (In Croatian)
 - 5.3.9. Maric, Ivan: *Steam flow computer "RVP88D"*, Prototype with "User's guide" and "Technical documentation" (hardware and software), Rudjer Boskovic Institute, Zagreb 1989. (In Croatian)
 - 5.3.10. Cucančić, Ladislav; Maric, Ivan: *Software support for the computer system of the oil field Žutica*, Rudjer Boskovic Institute, Zagreb 1982. (In Croatian)