Ivan Stojmenović

Curriculum vitae (November 2008), Medium size

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Personal data:
Born in 1957. Married, has two children. Citizen of Canada and Serbia.

Education:
B.S. degree in mathematics from the University of Novi Sad, Serbia,1979.
M.S. degree in mathematics from the University of Novi Sad, Serbia, 1983.
Ph.D. degree in mathematics from the University of Zagreb, Croatia, 1985.

Professional experience:

School of Information Technology and Engineering (Computer Science Department until 1997), University of Ottawa, Ottawa, Canada, 1988 (Full professor, tenure, since May 1995) - 2007.
Chair in Applied Computing, Electronic, Electrical & Computer Engineering, The University of Birmingham, Birmingham, UK, 2007/08.

Held also regular and visiting positions in Serbia (Institute of Mathematics, University of Novi Sad, 1980-1987), Japan (Electrotechnical Laboratory, Tsukuba, 1985/86), USA (Washington State University, Pullman, WA, and University of Miami, FL, 1987/88), Canada, France (Amiens 1998, Lille 2002-2008, Orsay 2008), Spain (Murcia, 2005) and Mexico (DISCA, IIMAS, Universidad Nacional Autonoma de Mexico, 2000/02).

Awards, Honours and Recognitions:

Handbook of Sensor Networks (I. Stojmenovic, ed.), *Sold as Curriculum tool as part of WSN Classroom Kit by Crossbow, http://www.xbow.com/Products/productdetails.aspx?sid=233* .
h-index (Publish and Perish; number of papers with ≥25 citations): ***30*** (August 2008)
IEEE Fellow, Communications Society, effective 1 January 2008, for contributions to data communication algorithms and protocols for wireless sensor and ad hoc networks.
Best Paper Award, IARIA International Conference on Sensor Technologies and Applications SENSORCOMM 2007, October 14-20, 2007, Valencia, Spain.

Royal Society Wolfson Research Merit Award, UK, 2006.

Citeseer August 2006: **I. Stojmenovic in the top 0.56% most cited authors in Computer Science**

http://citeseer.ist.psu.edu/allcited.html .

Donald E. Knuth included our integer partition generator in his historical The Art of Computer Programming, Volume 4, Fascicle 3, Errata Oct. 25, 2005

Listed among top 19 most prolific authors on WLAN articles 2004 – mid 2005 in:

Ronald N. Kostoff, Rene Tshiteya, Jesse Stump, Guido Malpohl, George Karypis, SCIENCE AND TECHNOLOGY TEXT MINING: WIRELESS LANS, 2005.

Senior Member, IEEE, January 2005.

Faculty of Engineering's 2004-2005 George S. Glinski Award for Excellence in Research, University of Ottawa.

Profile for December 2004, Science Arena, Physical Sciences Newsletter, Taylor & Francis Group, *http://www.sciencearena.com/sciencearena/about/about.htm* .

Best Paper Award, 9th IFIP Int. Conference on Personal Wireless Communications PWC, September 21-23, 2004, Delft, The Netherlands.

Plaques, **Guest Editor With Appreciation,** *IEEE Network,* September 2004; *IEEE Communications Society,* August 2004.

Fast Breaking Paper, October 2003 (the only one in October for the entire computer science, and one out of four papers awarded to computer science field for the whole year 2003; awarded bimonthly to 12-15 highly cited papers from 22 broad fields of science), ***Thomson ISI Essential Science Indicators*** .

Certificate of Appreciation, *IEEE Computer Society*, 'for his outstanding contribution as a founding Managing Editor of Multiple-Valued Logic, An International Journal', May 2002.

Third degree prize at the International Mathematics Olympiad for secondary schools, Lienz, Austria, 1976.

Teaching experience:

Had taught the following courses at the University of Ottawa:

Undergraduate

Computer graphics, Introduction to formal languages, Introduction to Computer Science I, Computing concepts and data structures, Data transmission and computer networks, Design and analysis of algorithms, Computational methods for numerical problems, Basic logic functions and their implementations, Computing systems design and implementation, Computer programming for engineers, Computing concepts for business.

Graduate

Wireless Ad Hoc Networking, Wireless networks and mobile computing, Parallel algorithms and their VLSI implementation, Combinatorial algorithms.

Undergraduate course designed

CSI 4140 Introduction to parallel computing (1994); changed course descriptions of four courses.

Graduate courses designed:

Combinatorial algorithms (1988), Wireless networks and mobile computing (1999), Wireless Ad Hoc Networking (2004).

Computer science education: articles, textbooks, implementations

Ivan Stojmenovic, Recursive algorithms in computer science courses, **IEEE Transactions on Education,** Vol. 43, No. 3, August 2000, 273-276.

Stojkovic V., Tosic D., Stojmenovic I., **Programming Language PASCAL** (Serbian), Scientific Book (Naucna knjiga), Belgrade, Yugoslavia, 1984 (2nd edition 1986), pp. 259 (this textbook was used at University of Belgrade and University of Novi Sad, Serbia).

A **FORTRAN compiler for LISP language** (with. Lj. Jerinic and V. Stojkovic), used in undergraduate course on functional programming languages, University of Novi Sad, Serbia, 1983.

Recent grants:

ProSense ("Promote, Mobilize, Reinforce and Integrate Wireless Sensor Networking Research and Researchers: Towards Pervasive Networking of WBC and the EU"), EU-FP7-Cooperation/Support Action in the REGPOT-2007-3-01. March 1, 2008 – February 28, 2010. Total: 106.500 euros for the University of Birmingham, UK. Scientific Coordinator for University of Birmingham.

"Maintaining fault-tolerant networks of robots for supporting wireless sensor networks", NSERC Strategic Grant STPSC356913-2007B, March 2008-February 2010; A. Nayak (PI) and I. Stojmenovic; $99,000+$99, 500.

"Data Communication in Wireless Ad Hoc and Sensor Networks", Royal Society Wolfson Research Merit Grant, UK, 21.600GBP/year for five years, from 2007.

"Energy Conserving Coordination and Data Communication in Wireless Sensor Actuator Networks", NSERC Strategic Grant STPGP 336406-07, October 2006-September 2009, ≈$120,000/year for three years. Principal Investigator: Ivan Stojmenovic, co-investigator: Amiya Nayak. Partner companies: Eion Inc. and Cistel Technologies.

"Data Communication in Wireless Ad Hoc and Sensor Networks", Royal Society Wolfson Research Merit Grant, UK, 21.600GBP/year starting in 2007.

"Energy Conserving Coordination and Data Communication in Wireless Sensor Actuator Networks", NSERC Strategic Grant, October 2006-September 2009, ≈$120,000/year for three years. Principal Investigator: Ivan Stojmenovic, co-investigator: Amiya Nayak. Partner companies: Eion Inc. and Cistel Technologies.

"Infrastructure for Advanced Research in Wireless Sensor Networks with Realistic Physical Layer", NSERC Equipment Grant, April 2006- March 2007, $75,534. Principal Investigator: Ivan Stojmenovic, co-investigators: Miodrag Bolic, Amiya Nayak.

"Scalable, secure and localized data communication and topology control protocols for wireless ad hoc networks", NSERC Collaborative Research Development (CRD project # 319848); February 2005- February 2008, approx. $120,000/year for 3 years. Principal Investigator: Ivan Stojmenovic, co-investigators: Amiya Nayak, Nejib Zaguia. Partner companies: Eion Inc. and Cistel Technologies.

"*Data Communication in Wireless Ad Hoc and Sensor Networks*", NSERC Discovery grant, 2005-2009, $24.000 per year.

"3D Human motion analysis using UWB wireless network technology", Interfaculty Collaborative Research Initiative, University of Ottawa, April 2004-March 2006, $20,000, Principal

Investigator: Ivan Stojmenovic, co-investigators: Ed Lemaire (Faculty of Medicine), Sergey Loyka (Faculty of Engineering).

"Scalable wireless ad hoc, sensor and local area networks organization and data communication", Proyecto No.400316-5-37017-A, CONACYT, Mexico, 2001, 2002, 2003, approx. US $ 50.000/year; Principal Investigator: Ivan Stojmenovic, co-investigators: Fabian Garcia, Julio Solano (grant awarded to Ivan Stojmenovic as PI, and transferred to Julio Solano as new PI).

"Advanced mathematical methods for cryptographic security and modeling of information", Principal Investigator: Miodrag Mihaljevic (Mathematical Institute, Serbian Academy of Science and Arts), 21 co-applicants, Project 1625, Ministry of Science, Technology, and Development, Serbia, 2002, 2003, 2004, approx. US $ 60,000/year.

Published over 120 different articles jointly with graduate students.

Supervised or co-supervised 18 Ph.D. and 32 M.Sc. students

Supervision:

Ph.D. theses: 5 successfully completed, 47 published joint articles with them (including articles after their thesis's defenses)
at the University of Ottawa: Johnson Kuruvila (2006), Felipe Contreras (2002) and Alioune Ngom (1998)
at the Univ. Novi Sad, Serbia: Jovisa Zunic (1991)
at the Univ. Osaka (Japan): Masahiro Miyakawa (1988).

Master's theses: 25 successfully completed, 24 published articles with 18 of them (articles with Ngom and Zunic counted under Ph.D.)
at University of Ottawa (19):

Hanna Kalosha, Milenko Jorgic, Kaining Wang, Bosko Vukojevic, Francisco Javier Ovalle Martinez , Hong Guo, Xiejun Xu, Hong Zheng, Heyun Jia, Yanli Deng, Jamil Shaikh, Aleksandar Micic, Susanta Datta, Mahtab Seddigh, Xu Lin, Nidhi Kapoor, Mounir Belbaraka, Hassan Elhage, Alioune Ngom, Antoine Zoghbi.

at Univ. Novi Sad, Serbia (1): Jovisa Zunic (Math.), 1989.
at the Universidad National Autonoma de Mexico (1): Tania Pérez Martinez, 2005.
at the Technical University of Denmark (1): Zhendong Ma, 2005.

Undergraduate theses/projects and Directed studies: Approximately one each year at the University of Ottawa; three at the UNAM, Mexico. Published 5 articles with 4 such students.

Postdoctoral fellows: Stephan Ruehrup, Hai Liu, Arnaud Casteigts.

Joint research with graduate students, theses in progress and work outside their theses: 23 students, about 30 articles.

Co-supervision (joint articles are part of their theses, in each case): 14 Ph.D. and 7 M. Sc.

Ph.D.: Xu Li (Carleton University, 2008), Dandan Liu (Wuhan University, 2008), Alaa Eddien Awad Abdallah, (Concordia University, 2008), Antoine Gallais (France, 2007), Juan A. Sanchez (Spain, 2006), Francois Ingelrest (France, 2006), Anand Prakash Ruhil (India, 2005), Michael

Hauspie (France, 2005), Hui Liu (USA, 2005), Julien Cartigny (France, 2003), Guangbin Fan (USA, 2003), Jean Carle (France, 2000), Patrick Morin (Canada, 2000), Ke Qiu (Canada, 1992).

M.Sc.: Yassinne Dada (Ottawa, Canada, 2008), Adnan Khan (Ottawa, Canada, 2007), Geetali Dutta Vidyarthi (Windsor, Canada, 2003), Bing Wu (FAU, USA, 2002), Pedro Eduardo Villanueva Peña (Sheffield, UK, 2002), Ming Gao (Georgia, USA, 2001), John Calvert (Queen's, Canada 1991).

Joint publications with graduate students outside their theses: (28 students, not listed)

Joint research with peers: collaborated over 100 co-authors with Ph.D. and a number of their graduate students from 24 different countries (France, USA, Switzerland, Canada, Germany, India, Mexico, Japan, UK, Spain, China, Hong Kong, Turkey, Serbia, Czech Republic, Denmark, Australia, Norway, Hungary, Korea, Poland, Finland, Latvia, Slovenia).

Professional activities:

Books edited

E4. **Handbook of Applied Algorithms: Solving Scientific, Engineering and Practical Problems** (Amiya Nayak and Ivan Stojmenovic, eds.), Wiley-IEEE Press, March 2008; ISBN: 978-0-470-04492-6, hardcover, 560 pages.

E3. **Handbook of Sensor Networks: Algorithms and Architectures**, (I. Stojmenovic, ed.), John Wiley & Sons, September 2005; ISBN-13 978-0-471-68472-5; ISBN-10 0-471-68472-4, 550 pages, hardcover.

E2. **Mobile Ad Hoc Networking** (S. Basagni, M. Conti, S. Giordano, I. Stojmenovic, eds.), IEEE Press/Wiley, July 2004; ISBN 0-471-37313-3, hardcover, 480 pages.

E1. **Handbook of Wireless Networks and Mobile Computing** (I. Stojmenovic, ed.), John Wiley & Sons, February 2002; ISBN 0-471-41902-8, 630 pages, hardcover. *Editor's choice, IEEE networks column, July 2002, (Ioannis Nikolaidis, ed.).*

- **Journal editor-in-chief and founder:**

International Journal of Parallel, Emergent, and Distributed Systems (Taylor & Francis Group)
www.ijpeds.net

Ad Hoc & Sensor Wireless Networks: An International Journal (Old City Publishing)
www.oldcitypublishing.com/AHSWN/AHSWN.html

Journal of Multiple-Valued Logic and Soft Computing (Old City Publishing) (with Dan Simovici)
www.oldcitypublishing.com/MVLSC/MVLSC.html

- **Journal editor:**

IEEE Transactions on Parallel and Distributed Systems (since 2003),
ACM Wireless Networks (since 2005),
Telecommunication Systems (Springer), 2005-2008,
Parallel Processing Letters (World Scientific), since 1991,
International Journal of High Performance Computing and Networking (Inderscience),
International Journal of Wireless and Mobile Computing (Inderscience),
International Journal of Distributed Sensor Networks (Taylor & Francis),
International Journal of Computational Science (IJCS), Global Information, since 2006,
International Journal of Sensor Networks (Inderscience),

EURASIP Journal on Wireless Communications and Networking (Hindawi),
International Journal of Pervasive Computing and Communications (Troubador),
Journal of Internet Engineering (since 2006),
International Journal of Vehicular Technology, Hindawi, since 2006.
International Journal of Communication Networks and Distributed Systems (IJCNDS),
International Journal of Autonomous and Adaptive Communications Systems.

- **Journal Guest editor for special issues:**

Journal of Computer Science and Technology JCST, special issue on Mobile Ad Hoc and Sensor Systems (with Silvia Giordano), Vol. 23, No. 3, May 2008, 13 papers, 175 pages; preface 2p.
Ad Hoc & Sensor Wireless Networks, an International Journal, special issue on MSN Dec. 2005, Wuhan, (with Xiaohua Jia and Jie Wu), Vol. 3, no. 1, 2007, (4 articles 1-98); preface 1p.
IEEE Transactions on Parallel and Distributed Systems, (with Stephan Olariu and David Simplot-Ryl), vol. 17, no. 9, 2006 (7 articles, 897-986); preface 897-898.
IEEE Transactions on Parallel and Distributed Systems, (with Stephan Olariu and David Simplot-Ryl), vol. 17, no. 4, 2006 (7 articles, 289-388); preface 289-291.
International Journal of Distributed Sensor Networks (T&F), (with Stephan Olariu and David Simplot-Ryl), 1, 3-4, 2005 (5 articles, 91 pages).
Ad Hoc Networks (Elsevier), (with David Simplot-Ryl), 3, 5, Sept. 2005, (13 articles, 172 pages),
Cluster Computing (Kluwer), Volume 8, Numbers 2/3, April/July 2005 (12 articles, 113 pages),
IEEE Network, (with David Simplot), Vol. 18, No. 4, 2004 (8 articles plus introduction, 1-56),
IEEE Computer Magazine, (with Jie Wu), Vol. 37, No. 2, February 2004 (6 papers, 29-74),
Wireless Communications and Mobile Computing (Wiley), 3, 2, March 2003 (10 papers, 290 p.),
International Journal of Foundations of Computer Science (World Scientific), 14, 2, April 2003,
Telecommunication Systems (Kluwer), 22, 1-4, 2003 (19 papers, 354 pages),
Telecommunication Systems (Kluwer), 18, 1-3, 2001 (15 papers, 287 pages),
Parallel Algorithms and Applications, Vol. 2, Numbers 1-2, 1994 (9 papers, 148 pages).

- **Founder, workshops and conferences:**

Research Workshop on Wireless Computing and Sensor Networks, Havana, Cuba, April 23-May 4, 2007.
Workshop on Localized Algorithms and Protocols for Wireless Sensor Networks LOCALGOS in conjunction with the IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS 2007), Santa Fe, NM, USA, June 18-20, 2007.
Workshop on Localized Communication and Topology Protocols for Ad hoc Networks LOCAN, at the 4th IEEE International Conference on Mobile Ad-Hoc and Sensor Systems, MASS 2007, Pisa, October 12, 2007; Vancouver, Oct. 9-12, 2006.
Workshop on Wireless Ad hoc and Sensor Networks (WWASN2007), at the IEEE International Conference on Distributed Computing Systems ICDCS: Toronto, Canada, June 25, 2007; Lisboa, Portugal, July 4-7, 2006; June 10, 2005, Columbus, Ohio, USA, March 23-26, 2004, Tokyo, Japan.
First International Conference on ***Integrated Internet Ad hoc and Sensor Networks InterSense****, Nice, France, May 29-31, 2006,* http://www.intersense.org .
Research Workshop on Ad Hoc Networks, Cocoyoc, Mexico, February 15-21, 2003.

Minitrack on Mobile Computing and Wireless Networks: HICSS-33, Maui, Hawaii, Jan. 4-7, 2000, HICSS-35, Big Island of Hawaii, Jan. 2002: SSGRR, L'Aquila, Italy, July 31-August 6, 2000; ICPP, Toronto, Aug. 21-24, 2000.

Minitrack on Parallel Algorithms, HICSS-26 Kauai, Hawaii, Jan. 5-8, 1993.

- **Chairing conferences and workshops (with handling submissions):**
  (29 events; 26 of them since 2000; 7 in 2005; 4 in 2006; 3 in 2007; 4 in 2008)

Program vice-chair, 'wireless networks' track, at the 2008 Int. Conf. on Embedded and Ubiquitous Computing EUC, December 17-21, 2008, Shanghai, China http://epcc.sjtu.edu.cn/euc2008 .

Program co-chair, IFIP Conference on Wireless Sensors and Actor Networks (WSAN 08) July 14t-15, 2008, Ottawa, Ontario, Canada, www.site.uottawa.ca/WSAN08 .

Program co-chair, Mobile and Wireless Networks Track, 19th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), 14-18 September 2008, Cannes, French Riviera, France, www.pimrc2008.org .

Program co-chair, 7th International Conference on AD-HOC Networks & Wireless, Sept. 10-12, 2008, Nice, France, http://www-sop.inria.fr/mascotte/adhocnow .

Program co-chair, 4th IEEE International Conference on Mobile Ad-hoc and Sensor Systems, October 8-12, 2007, Pisa, Italy http://cnd.iit.cnr.it/mass2007 .

Program co-chair, Int. Symp. on Parallel and Distributed Processing and Applications ISPA, Niagara Falls, August 21-24, 2007 www.cs.umanitoba.ca/~ispa07 .

Program co-chair, The IEEE 20th International Conference on Advanced Information Networking and Applications AINA-07, Niagara Falls, May 21-23, 2007 www.aina-conference.org/2007/.

Program co-Chair of the 2nd International Conference on Mobile Ad-hoc and Sensor Networks (MSN), Dec.13-15 2006, Hong Kong www.comp.polyu.edu.hk/msn06 .

Program co-chair, Sixth International Workshop on Wireless Local Networks (WLN), Tampa, Florida, in conjunction with the 31st IEEE Conference on Local Computer Networks (LCN), Nov 14-17, 2006 www.cse.unsw.edu.au/~wln2006/.

Program co-chair, Workshop on Wireless Ad hoc and Sensor Networks WWASN2006, in conjunction with the IEEE 26th Int. Conf. Distrib. Comp. Syst. ICDCS, Lisboa, Portugal, July 4-7, 2006 http://www.cs.umanitoba.ca/~softart/WWASN2006.html .

Steering Committee Vice-Chair, and Program Committee Chair, First International Conference on Integrated Internet Ad hoc and Sensor Networks InterSense**,** Nice, France, May 29-31, 2006, http://www.intersense.org .

Program Vice Chair of the 1st International Conference on Mobile Ad-hoc and Sensor Networks (MSN), 13-15 Dec 2005, Wuhan, China http://www.cs.cityu.edu.hk/~MSN .

Program vice-chair (for Wireless Communication), International Conference on Embedded and Ubiquitous Computing EUC-05, Nagasaki, Japan, December 6-9, 2005, http://euc2005.he.nias.ac.jp.

Program co-chair, Workshop on Wireless Local Networks (WLN), in conjunction with IEEE Local Computer Networks conference, Sydney, Australia, November 2005.

Program vice-chair (for Algorithms), Int. Symp. on Parallel and Distributed Processing and Applications ISPA, Nanjing University, China, Nov. 2-5, 2005. http://keysoftlab.nju.edu.cn/ispa2005 .

Program co-chair, Symposium on Ad Hoc Networks, as part of IEEE WirelessCom 2005, Kaanapali Beach, Maui, Hawaii, USA, June 13-16th, 2005.

Co-chair (with David Simplot), International Workshop on Wireless Ad Hoc Networking (WWAN 2005), in conjunction with IEEE Int. Conf. on Distributed Computing and Systems, June 10, 2005, Columbus, Ohio, USA, www.lifl.fr/RD2P/WWAN2005 .

Technical Program Committee Co-Chair, IEEE IFIP Second Annual Conference on Wireless On-demand Network Systems and Services WONS, St. Moritz, Switzerland, January 19-21, 2005.

Program Vice-Chair (for Algorithms and Topology), The 1st IEEE International Conference on Mobile Ad-hoc and Sensor Systems MASS-2004, October 25-27, 2004, Fort Lauderdale, Florida, USA http://www.ececs.uc.edu/~cdmc/mass .

Co-chair (with David Simplot), International Workshop on Wireless Ad Hoc Networking (WWAN 2004), in conjunction with IEEE Int. Conf. on Distributed Computing and Systems, March 23-26, 2004, Tokyo, Japan, www.lifl.fr/RD2P/WWAN2004 .

Co-chair (with Jingyuan Zhang), Workshop on Mobile and Wireless Networks, in conjunction with IEEE Int. Conf. on Distributed Computing and Systems, May 19-22, 2003, Providence, Rhode Island, USA.

Minitrack Coordinator (with Jie Wu) for specific topics: Routing in Wireless and Internet Networks, in: Software Technology Track of the 36th Hawaii International Conference on System Sciences HICSS-36, Big Island of Hawaii, Hawaii, Jan. 4-7, 2003.

Vice Program Committee chair, Wireless and Mobile Computing track, Int. Conf. on Parallel and Distributed Systems, Taiwan, Dec. 17-20, 2002.

Topic chairman, Mobile Computing and Wireless Networks track at the Int. Conf. on Advances in Infrastructure for Electronic Business, Science, and Education on the Internet, SSGRR, L'Aquila, Italy, July 31-August 6, 2000.

Wireless and Mobile Computing Workshop organizer (with Stephan Olariu) at Int. Conf. on Parallel Processing ICPP, Toronto, Aug. 21-24, 2000;

Minitrack Coordinator (with Stephan Olariu) for specific topics: Mobile Computing and Wireless Networks, in: Software Technology Track of the 33th Hawaii International Conference on System Sciences HICSS-33, Maui, Hawaii, Jan. 4-7, 2000, and HICSS-35, Big Island of Hawaii, Jan. 2002.

Conference co-chair for 10th Conf. on High Performance Computing, Ottawa, 5-7 June, 1996.

Minitrack Coordinator for specific topics: Parallel Algorithms, in: Parallel and Distributed Systems: from Theory to Practice, for the Software Technology Track of the 26th Hawaii International Conference on System Sciences HICSS-26 Kauai, Hawaii, Jan. 5-8, 1993.

Stream Chair (C: Concurrency and Parallelism) of International Conference on Computing and Information ICCI '92, Toronto, Ontario, Canada, May 28-30, 1992.

- **Conferences (organizing, advising, chairing without handling submissions):**

General co-chair of the 6th International Workshop on Wireless Ad hoc and Sensor Networking (WWASN 2009), at the IEEE Int. Conference on Distributed Computing Systems (ICDCS 2009), Montreal, Canada, June 22, 2009.

Vice General Chair, IEEE International Conference on Distributed Computing in Sensor Networks DCOSS, Marina Del Ray, California, USA, June 7-10, 2009 www.dcoss.org .

Workshop Chair, The 6nd IEEE International Conference on Mobile Ad-hoc and Sensor Systems MASS, Oct. 5-9, 2009, Macau, China. www.cs.cityu.edu.hk/mass09

Organizing Committee co-chair, ROGICS'08, International Conference on Relations, Orders and Graphs: Interaction with Computer Science, 12-17 May 2008, Mahdia, Tunisia, www.rogics.com .

General co-chair (and Advisory Committee member), The Second International Conference on Sensor Technologies and Applications, SENSORCOMM 2008, IARIA, August 25-31, 2008 - Cap Esterel, France, www.iaria.org/conferences2008/ComSENSORCOMM08.html

Advisory Committee, The Second International Conference on Sensor Technologies and Applications, SENSORCOMM 2008, August 25-31, 2008 - Cap Esterel, France.

General co-chair of the Fifth Workshop on Wireless Ad hoc and Sensor Networks (WWASN2008), at the IEEE Int. Conference on Distributed Computing Systems (ICDCS 2007), Beijing, China, June 20, 2008 www.cs.umanitoba.ca/~softart/WWASN2008.html .

Workshops Chair, ACM Mobihoc, Hong Kong, China, May 26-30, 2008. www.sigmobile.org/mobihoc/2008 .

Publicity co-chair, 22nd IEEE International Parallel & Distributed Processing Symposium IPDPS, Miami - April 14-18, 2008, www.ipdps.org .

Workshop general co-chair of LOCAN: The Third International Workshop on Localized Communication and Topology Protocols for Ad hoc Networks, http://ants.dif.um.es/locan2007 at the 4th IEEE International Conference on Mobile Ad-Hoc and Sensor Systems, MASS 2007, (http://cnd.iit.cnr.it/mass2007 /), Pisa, October 12, 2007.

General Chair, The First International Workshop on Localized Algorithms and Protocols for Wireless Sensor Networks LOCALGOS 2007, In conjunction with the IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS 2007), Santa Fe, NM, USA, June 18-20, 2007 http://libra.dif.um.es/localgos07 www.dcoss.org/dcoss07 .

Steering Committee member of the First IFIP Wireless Sensor and Actor Networks (WSAN 2007) September 24-26 2007, Albacete, Spain www.i3a.uclm.es/wsan07 .

Advisory Committee member, International Conference on Sensor Technologies and Applications SENSORCOMM 2007 Oct. 14-20, 2007 - Valencia, Spain www.iaria.org/conferences2007/CfPSENSORCOMM07.html .

Steering Committee member of the 12th IFIP Personal Wireless Communications Conference (PWC'07), September 12-14, 2007, Prague, Czech Republic http://pwc07.cvut.cz .

Steering Committee member of the International Conference on Mobile Ad-hoc and Sensor Networks (MSN), Dec. 2007, Beijing, China.

Advisory Committee member, 4th International Conference on Ubiquitous Intelligence and Computing (UIC-07) www.uic-conference.org/2007, Hong Kong, China, July 11-13, 2007.

Workshops Co-Chair, ACM Mobicom and Mobihoc, Montreal, Sep 09-14, 2007.

General co-chair of the Fourth Workshop on Wireless Ad hoc and Sensor Networks (WWASN2007), at the IEEE International Conference on Distributed Computing Systems (ICDCS 2007), Toronto, Canada, June 25, 2007.

Program co-chair, Research Workshop on Wireless Computing and Sensor Networks, Havana, Cuba, April 23-May 4, 2007.

Advisory Committee member, Scientific workshop at RFID show, Lille, France, November 2006 www.rfid-show.com .

Workshop general co-chair for The Second International Workshop on Localized Communication and Topology Protocols for Ad hoc Networks LOCAN, at the 3nd IEEE International Conference on Mobile Ad-hoc and Sensor Systems MASS, Vancouver, Oct. 9-12, 2006 http://polaris.cse.fau.edu/mass2006 .

Best Paper Award Committee, First International Conference on Grid and Pervasive Computing GPC, May 3-5, 2006, Taichung City, Taiwan http://hpc.csie.thu.edu.tw/gpc2006.

Advisory committee member, the 3rd International Conference on Ubiquitous Intelligence and Computing (UIC-06), Wuhan and Three Gorges of China, September 3-6, 2006 http://grid.hust.edu.cn/uic06.

Local Arrangements Chair, 5th International Conference on AD-HOC Networks & Wireless, Aug. 17 - 19, 2006, Ottawa, http://kunz-pc.sce.carleton.ca/AdHocNow2006/ .

Steering Committee Member, IFIP 11th Personal Wireless Communications PWC'06, Sept. 20-22, 2006, Albacete, Spain, www.i3a.uclm.es/pwc06 .

Award Co-Chair, The 3nd IEEE International Conference on Mobile Ad-hoc and Sensor Systems MASS, Vancouver, Oct. 9-12, 2006 http://polaris.cse.fau.edu/mass2006 .

Workshop Chair, The 2nd IEEE International Conference on Mobile Ad-hoc and Sensor Systems MASS, Washington, DC, USA, November 7-10, 2005, www.mass05.wpi.edu.

Advisory Board member of Advanced Industrial Conference on Wireless Technologies AICWT'2005, Montreal, Canada, August 17-20, 2005, www.iaria.org .

Panel organizer at Wireless Industry Congress, Ottawa, 21-23 Sep. 2003 (on: Ad Hoc Networks).

Advisory committee member for IASTED International Conference on Parallel and Distributed Computing and Systems, 1999 (Boston, Nov. 3-6); Anaheim, CA, Aug. 2001; Boston, Nov. 4-6, 2002.

Advisory Committee member for the Software Technology Track of the Hawaii Int. Conference on System Sciences HICSS, Hawaii, January 1994-1998; 2001, 2002.

Steering Committee chair, IASTED International Conference on Parallel and Distributed Computing and Systems, Washington, Oct. 13-16, 1997.

Program and Organizing Committee member of Second Canadian Conference in Computational Geometry, Ottawa, Ontario, Canada, August 6-10, 1990.

- **Program Committee member of the following conferences:**

Stojmenovic served as member of 9 program committees for 2009, 9 in 2008, 27 program committees in 2007, 34 in 2006, 38 in 2005, 22 in 2004, 12 in 2003, 10 in 2002, 10 in 2001, 6 in 200, and 19 in 1990-1999, including ACM Mobihoc 2006, ACM Mobicom 2006, IEEE INFOCOM 2005, IEEE ICPCS 2004, IFIP Medhoc 2004, IEEE ICPADS 2004, IEEE IPSN 2004, IEEE ISCC 2004-6, IFIP PWC 2003, AdHocNow 2202-3; IFIP Networking 2002, 2004; IEEE ICPDS 2001; IEEE ICCCN 2000-3.

External examiner for Ph.D. theses (since 2000):

Patrick Morin (Carleton University), 2000.

Dana Cristofor (Univ. Mass., Boston), 2002.

Laurentiu Cristofor (Univ. Mass., Boston), 2002.

Stefan Bruda (Queen's Univ.), 2002.

Jason Morrison (Carleton University), 2002.

Lan Wang (Old Dominion University, Norfolk), December 2004.

Xiaojing Tao (Carleton University), August 2005.

Jie Lian (University of Waterloo), November 2005.

Fabrice Theoleyre (INSA, Lyon, France), September 2006.

Catherine THOMAS DECAYEUX, Amiens, France, September 2006.

Javid Taheri, The University of Sydney, Australia, Nov. 2006.

Colin Lemmon, James Cook University, Cairns, Australia, May 2007.

Internal examiner for Ph.D. theses, at the University of Ottawa (since 2000):

Natalija Vlajic (supervisors: D. Makrakis, C. Charalambous) , 2003.

Di Tian (supervisor: N. Georganas), March 2005.

Song Guo (supervisor: Oliver Young), November 2005.

Grant Evaluations:

Canada, USA, Hong Kong, Switzerland, UK, Kuwait, Israel, Australia, European union.

- Other:

Panel member, NSF (USA), for NEDG panel at NeTS (Network Systems), June 2008.
Panel member, NSF (USA), for Computing and Communications Foundation, June 2008.
Panel member, ACM Mobihoc, ('New architectures and disruptive technologies for the future wireless networks'), Hong Kong, May 29, 2008.
2008 IEEE Computer Society Fellows Committee Evaluator.
Evaluator, European Commission, Embedded Systems and Control, Brussels, Belgium, November 12-16, 2007.
Chair, Reappointment Committee, IEEE Transactions on Parallel and Distributed Systems, 2007.
Vice Chair for Publications, IEEE Technical Committee of Multiple-valued Logic (2004-07) http://cs3.el.gunma-u.ac.jp/MVL/TC06.html .
Panel member, National Science Foundations (USA), for Wireless Networks, March 2007.
Panel member, National Science Foundations (USA), for NeTS Networks Broadly Defined, May 2006.
Panelist, Mobility Provisioning and Management in Sensor Networks (chaired by Jie Wu), at RPMSN Workshop at IEEE MASS, Washington, DC, USA, November 7, 2005.
Participant of the COST-TIST Strategic Workshop on Algorithmic Challenges in Software Intensive Systems, Brussels, Belgium, Aug. 30-31, 2005.
Member of the Advisory Board and Scientific Committee of the AIKS - International Artificial Intelligence Knowledge Society www.knowledgesocieties.org since 2005.
Guest associate editor, special issue Parallel/Distributed Computing and Networking, in the IEICE Transactions on Information and Systems, Japan, Feb. 2006, to appear.
Review Committee, Special Issue on Mobile and Wireless Ad Hoc Networking, Journal of Pervasive Computing and Communications (JPCC), expected publication March 2005.
Advisory board, Graphics filter development, Fortress 22, Ottawa, 2004.
Vice Chair for Publications, IEEE Technical Committee of Multiple-valued Logic (from 2004).
Panel member, Communications and Information Technology Ontario (CITO), September 2003.
External Collaborator, RD2P Research Group, POPS (System and Networking for Portable Objects Proved to be Safe) INRIA project, INRIA Futurs research unit, Lille, France, since 2003.
Panel member, NSF (USA), for Theoretical Computer Science, February 2001.
Member of the Management Committee of the HPCnet, a Canadian Network for High Performance Computing (1996-2000)
Referee for a number of journals and conferences.

Administrative duties at the Univ. of Ottawa:

OCICS (Ottawa-Carleton Institute of Computer Science) Director and Graduate Studies Coordinator (2002-2004).

Committees: Library, System Science graduate program, Graduate admission, Curriculum, Space, Scholarship, Graduate students seminar, Research profile.

Tutorials

Presented tutorials on ad hoc and sensor networks at the Summer School on Wireless Sensor Networks SenZations, Ljubljana, Slovenia, Sept. 5, 2008, ACM MobiHoc, Hong Kong, May 27, 2008, ProSense, Dublin, March 11, 2008, SENSORCOMM 2007, Valencia, Spain, October 15, 2007, Advanced Study Institute, City University of Hong Kong, Dec. 7, 2006; IEEE 64th Vehicular Technology Conference VTC2006-Fall, Montreal, Sept. 25, 2006; Summer School in Wireless Sensor Networks, Ottawa, August 15, 2006; Summer School on Applications of Wireless Sensor Networks, Novi Sad, Serbia, July 31, 2006; 9éme Ecole d'eté Internet Nouvelle Generation ING 2005, Montreuil, 2005; IEEE Int. Conf. on Mobile Ad-hoc and Sensor Systems MASS, 2004; Int. Conf. on AD-HOC Networks & Wireless, 2003 and 2004; The Third Annual Mediterranean Ad Hoc Networking Workshop, Bodrum, Turkey, June 28, 2004; IEEE COMSOC-OWRA Seminar, Ottawa, November 26, 2003; and IEEE Symposium on Computers & Communications ISCC, 2002.

Keynotes at conferences:

(invited talks at universities are not listed)

International Conference on Intelligent Computation Technology and Automation ICICTA 2008) 20. October, 2008, Changsha, China, *Keynote*: Contribution of applied algorithms to applied computing. http://www.icicta.org/Show.asp?id=36 (250 attended).

PhDNow 2008, at AdHocNow Conference, Sophia Antipolis, France, Sept. 13, 2008: 'How to present research articles'.

IEEE 11th Int. Conf. on Computational Science and Engineering CSE, Sao Paulo, SP, Brazil, July 17, 2008, *Keynote*: Contribution of applied algorithms to applied computing. http://www.icmc.usp.br/~cse08/keynote.html .

First ACM Workshop on Sensor Actor Networks SANET 2007, at **ACM MobiCom'07,** Montreal, Canada, Sept. 10, 2007, 1-2, Keynote talk: Simulations in ad hoc and sensor networks.

IEEE ICCCN, Hawaii, August 13, 2007:
Position talk: Sensor-actuator networks: Merging sensor and ad hoc networks

The 1st International Workshop on Wireless Mesh Networks and Applications (WiMa 2006), at IEEE MASS, October 9, 2006: 'Routing in ad hoc networks'.

ACM DIALM-POMC Workshop, Philadelphia, October 1, 2004:
'State of the art in ad hoc and sensor networks research'.

Algorithms for Wireless and mobile networks (A_SWAN) workshop, Boston, 26 August 2004:
'State of the art in ad hoc and sensor networks research'.

Mathematical activities for high school students

Stojmenovic I., **Collected problems with solutions for mathematics competitions of secondary schools** (Serbian), DMFA, Novi Sad, Serbia, 1977 (second edition 1981), pp. 100. Written while Stojmenovic was freshmen at the university.

Editorial board member of the journal ***Tangenta*** (mathematics and computer science for high school students in Serbia) 1995-2003, http://www.matf.bg.ac.yu/dms/ .
Member of mathematical competition jury for high schools in Yugoslavia 1977-1982.
Competition director for the province of Voivodina (Serbia) 1977-1982.

Research:

Author or co-author of over 250 different research papers. There are over 2700 citations to these articles (listed at www.site.uottawa.ca/~ivan). Research is generally on the design and analysis of algorithms, with scientific, engineering and practical applications. Current main research areas are ad hoc, sensor and cellular wireless networks and mobile computing. Research interest includes interconnection networks, parallel algorithms, computational geometry, combinatorial algorithms, combinatorics, multiple-valued logic, neural networks, genetic algorithms, data structures, graph theory, computational chemistry, and computer science education.

Contribution to the presentation of research results:

Ivan Stojmenovic, How to write research articles in computer science and related engineering disciplines, **Adjunct Workshop Proceedings, Prosense Special Session, at IEEE DCOSS**, Santorini, June 14, 2008, VI-1—VI-11, www.site.uottawa.ca/~ivan .

Summary of publications (October 2006)

Books: **3** written, **3** edited *Book chapters:* **32**

Refereed *journals:* (=F+L+J): **143**

Refereed *conferences* (papers published later in a journal are not counted): (=C+N): **53**

Duplications (mainly conference papers later published in a journal =D): **76**

Distinct *refereed articles* (=BC+F+L+C+J+N): ***228***

Citations summary

Recognitions:

Fast Breaking Paper, October 2003 (the only one in October for the entire computer science, and one out of four papers awarded to computer science field for the whole year 2003; awarded bimonthly to 12-15 highly cited papers from 22 broad fields of science), for article [SSZ],
Thomson ISI Essential Science Indicators *http://esi-topics.com/fbp/fbp-october2003.html* .

Citeseer August 2006: **I. Stojmenovic in the top 0.56% most cited authors in Computer Science**
http://citeseer.ist.psu.edu/allcited.html .

Top cited articles per year http://citeseer.ist.psu.edu/articles.html
1999:

50. Doc Context *124* [BMSU] P. Bose, P. Morin, I. Stojmenovic and J. Urrutia, *Routing with guaranteed delivery in ad hoc wireless networks*, 3 rd int. Workshop on Discrete Algorithms and methods for mobile computing and communications, Seattle, August 20, 1999, to appear.
2000:
6. Doc Context *216* [12] Brad Karp and H. T. Kung. *GPSR: Greedy perimeter stateless routing for wireless networks*. In Proc. ACM/IEEE MobiCom, August 2000.
(note: this article is a duplication of our article [BMSU])

Donald E. Knuth included our integer partition generator in his historical The Art of Computer Programming, Volume 4, Fascicle 3, Errata Oct. 25, 2005.

Statistics April 2008 :
Citations collected and listed by I. Stojmenovic
Self-references (citations made in articles by Stojmenovic) are not included.
Lists of all citations are available.

Lifetime (1985-2007)
Total citations count: **3968**
Total number of distinct cited articles: **174**
Average number of citations per article: **22.8**

Wireless networks (from 1999)
Total citations count: **2911**
Total number of distinct cited articles: **69**
Average number of citations per article: **42.2**

Other areas (since 1985)
Total citations count: **1057**
Total number of distinct cited articles: **105**
Average number of citations per article: **10.1**

Google Scholar November 6, 2008: *4890 citations*

Publications in journals with measured impact factor by ISI

Ivan Stojmenovic journal	# published articles	2003 ISI impact factor	IF 2004	IF 2005	IF 2006	IF 2007
J. Chemical Information & Computer Science (renamed: Journal of Chemical Information and Modeling)	1	3.078	2.81	2.923	3.423	2.986
IEEE Network	1		2.667	2.792	2.211	1.609
IEEE Journal on Selected Areas in Communications	1	1.967	2.64	2.698	1.816	1.799
IEEE Communications Magazine	2	2.406	2.359	1.946	1.678	1.704
IEEE Wireless Communications	1	1.583	2.189	2.638	2.577	2
IEEE Trans. Neural Networks	2	1.666	2.178	2.205	2.62	2.769
Journal of Mathematical Imaging and Vision	1	0.617	0.887	2.197	1.767	1.22
ACM Wireless Networks	1	1.17	1.35	1.018	0.812	0.741
Journal of Molecular Structure ~~THEOCHEM~~	1	1.027	1.2	1.44	1.016	1.486
IEEE Trans. Parallel & Distributed Systems	10	1.183	1.19	1.462	1.246	1.146
IEEE Sensors Journal	1			1.1	1.117	1.34
Pattern Recognition Letters	2	0.809	0.576	1.138	0.952	0.853
Graphical Models and Image Processing (renamed: Graphical Models)	1			1.024	0.702	0.982
ACM Mobile Networks and Applications	1	0.844	0.931	0.923	0.659	0.586
Parallel Computing	3	0.908	0.915	0.855	0.685	0.825
Journal of Parallel and Distributed Computing	7	0.604	0.729	0.9	0.43	0.574
Wireless Communications and Mobile Computing	3		0.669	0.543	0.511	1.225
IEEE Transactions on Vehicular Technology	1		0.611	0.86	1.071	1.191
Neural Processing Letters	1	0.631	0.605	0.701	0.753	0.58
Int. J. Pattern Recognition and Artificial Intelligence	1	0.551	0.588	0.638	0.508	0.374
Computer Communications	1	0.508	0.574	0.556	0.444	0.391
Networks	1	0.649	0.571	0.742	0.485	0.609
The Computer Journal	2	0.681	0.557	0.691	0.593	0.88
Discrete Applied Mathematics	3	0.503	0.557	0.585	0.577	0.625
Information Sciences	1	0.447	0.54	0.723	1.003	2.147
IEEE Transactions on Education	1		0.526	0.644	0.362	0.815
Lecture Notes in Computer Science (# until 2006)	12		0.513	0.402	n/a	
Journal of Supercomputing	2	0.404	0.474	0.482	0.398	0.246
Int. J. Computational Geometry and Applications	3	0.5	0.463	0.435	0.449	0.298
Computing and Informatics	1		0.456	0.091	0.136	0.349
Information Processing Letters	7	0.473	0.453	0.557	0.532	0.66
Computers & Mathematics with Applications	2	0.498	0.431	0.43	0.611	0.72
IEEE/KICS Journal of Communication Networks	1		0.403	0.457	0.233	0.223
International Journal of Parallel Programming	3	0.515	0.371	0.432	0.289	0.255
Telecommunication Systems	1	0.413	0.346	0.409	0.33	0.423
International Journal of Computer Mathematics	2	0.226	0.216	0.254	0.428	0.423

Utilitas Mathematica	1	0.099	0.169	0.158	0.268	0.262
Fibonacci Quarterly	1	0.18	0.134	0.14	0.096	0.108
MVLSC	4				0.2	0.407
International Journal of Distributed Sensor Networks	1				0.333	0.289
IEEE Transactions on Computers	1					1.68
IEEE Transactions on Mobile Computing	1					1.716
Cluster Computing	1					0.424
Integrated Computer-Aided Engineering	1					0.113
total number of article in rated journals	96					

Ivan Stojmenovic

Most significant contributions 2001-2007

[BMSU] Prosenjit Bose, *Pat Morin,* Ivan Stojmenovic and Jorge Urrutia, Routing with guaranteed delivery in ad hoc wireless networks, Proc. of 3rd ACM Int. Workshop on Discrete Algorithms and Methods for Mobile Computing and Communications DIAL M99, Seattle, August 20, 1999, 48-55; ACM/Kluwer Wireless Networks, 7, 6, November 2001, 609-616.

Stojmenovic introduced the problem to co-authors who are experts in computational geometry but never worked in wireless networks. The goal was to design practical routing algorithms that have guaranteed delivery of packets in ad hoc and sensor networks where each node/sensor has the same transmission radius and has only local knowledge (geographic position information of itself, its immediate neighbors), and accurate position of destination, assuming also no memorization at nodes and ideal MAC layer. Co-authors proved that previously known face routing, proposed for geometric graphs, is applicable to wireless networks model. Stojmenovic then contributed practical version, GFG (Greedy-Face-Greedy) of the protocol. Packet advances in Greedy mode, and is sent to neighbor that is closest to the destination. When a packet reaches a node *A* where greedy forwarding is impossible, the algorithm recovers by Face routing. A planar connected subgraph (e.g. Gabriel graph) can be constructed without any communication overhead. Face routing then follows faces of this planar graph which intersect imaginary line from *A* to destination, until a node closer to destination than *A* is reached. Greedy forwarding then continues. GFG protocol is scalable and has performance very close to the optimal shortest path algorithm, which assumes that each node is aware on the complete network topology. Our algorithm is widely recognized as a *breakthrough result* in the area, and was subsequently enhanced in a number of articles and applied in many tasks. The article has *over 700 citations* (self-citations are not counted here and in the other papers below) and was been widely implemented and added to most existing simulation tools. For example, a research group at Harvard described the implementation and experimental results of our protocol, renamed as GPSR and added it to ns-2, in an article at ACM MOBICOM 2000 that was additionally cited over 500 times. GFG remains the only know framework for guaranteed delivery of localized memoryless path-based routing and is one of very few most fundamental protocols in the entire ad hoc and sensor network research domain.

[SSZ] Ivan Stojmenovic, *Mahtab Seddigh* and Jovisa Zunic, Dominating sets and neighbor elimination based broadcasting algorithms in wireless networks, IEEE Transactions on Parallel and Distributed Systems, Vol. 13, No. 1, January 2002, 14-25.

This article was selected in October 2003 issue of Thompson ISI http://esi-topics.com/fbp/fbp-october2003.html as one of *Fast Breaking Papers*. It was the only one in October 2003 for the entire computer science, and one out of four papers awarded to computer science field for the whole year 2003. Fast breaking papers are awarded bimonthly to 12-15 highly cited papers from 22 broad fields of science. In a broadcasting task, a source node sends the same message to all the nodes in a network. In this paper, we propose a fundamental framework for broadcasting in ad hoc networks, which significantly reduces or eliminates the communication overhead. The framework is based on localized connected dominating sets and neighbor elimination. The construction and maintenance of localized dominating sets does not require any communication overhead in addition to maintaining positions of neighboring nodes, or two-hop topological information. Retransmissions by only internal nodes in a dominating set is sufficient for reliable broadcasting. We also propose to eliminate neighbors that already received the message, and re-broadcast only if the list of neighbors that might need the message is nonempty. A retransmission after

negative acknowledgements scheme is also described. The important features of proposed algorithms are their reliability (reaching all nodes in the absence of message collisions), significant rebroadcast savings, and their localized and parameterless behavior. This article introduced the reliability as the goal, and subsequently has generated a growing interest in broadcasting problem. It was *cited over 300 times.*

[SL2] Ivan Stojmenovic and *Xu Lin*, Power-aware localized routing in wireless networks, IEEE Trans. on Parallel and Distr. Systems, Vol. 12, No. 11, Nov. 2001, 1122-1133.

We discussed routing algorithms for wireless networks with the goal of increasing the network and node life. Cost metric is based on the remaining node energy. We propose power, cost, and power-cost position based localized routing algorithms, where nodes make routing decisions solely on the basis of location of their neighbors and destination. Power aware localized routing algorithm attempts to minimize the total power needed to route a message between a source and a destination. Cost-aware localized algorithm is aimed at extending network's lifetime. The combined power-cost localized routing algorithm attempts to minimize the total power needed and to avoid nodes with short battery's remaining lifetime. This paper provides basis for developing power efficient localized routing algorithms with guaranteed delivery [SD], QoS, or other properties. We have recently published some improved schemes [KNS3], and these schemes are still the only known approaches for power efficient localized routing. The paper already has *over 210 citations*.

[SL1] I. Stojmenovic and *Xu Lin,* Loop-free hybrid single-path/flooding routing algorithms with guaranteed delivery for wireless networks, IEEE Transactions on Parallel and Distributed Systems, Vol. 12, No. 10, October 2001, 1023-1032.

This was the first article of Ivan Stojmenovic in the new research area of wireless networks and mobile computing. It established basis for subsequent very successful articles by introducing proper metrics for routing in ad hoc networks. It was proven that directional based routing (published in two MOBICOM articles) is not loop-free. A thorough literature review discovered several existing routing protocols proposed in 1974-6, which are proven in this article to be loop-free, and which are modified for better performance. A loop-free hybrid routing algorithm with guaranteed delivery is described. It was argued that the independent variable should be density (average number of neighbors) and not transmission radius as in all existing articles on the problem. It was also argued to measure the performance of routing protocols in comparison with the best existing, and ideal shortest path algorithm rather than the worst existing, blind flooding protocol as it was done in existing literature. Instead of flooding based approaches exclusively discussed in literature in 1980s at the beginning of ad hoc networks 'research euphoria', this article was the first one to point to path based approach to the community, including existing 'forgotten' solutions. This article already collected *over 170 citations* (again, not counting self-citations).

[CSS] *J. Cartigny,* D. Simplot, I. Stojmenovic, Localized minimum-energy broadcasting in ad hoc networks, Proc. IEEE INFOCOM, San Francisco, CA, USA, April 1-3, 2003.

In the minimum energy broadcasting problem, nodes can adjust transmission power. The problem is to send a message from a source node to all the other nodes in the network by minimal total sum of transmission powers used by each node. There were over twenty solutions for this problem in ad hoc networks, all applying globalized solutions, where each node needs global network knowledge. However, when nodes are mobile or change between active and passive status, the communication overhead needed for maintenance of the global knowledge erases all the benefits from minimizing total power. We

proposed a localized algorithm based on RNG (relative neighborhood graph), subsequently improved by us in journal version by applying local minimal spanning tree, for the problem. Our next publications then improved the performance for dense networks, and overall we have achieved, in addition to energy savings coming from localized behavior, also very competitive performance (not exceeding twice the minimum energy) of best globalized algorithm. This article is *cited over 100 times*.

Ivan Stojmenović: List of selected publications

Co-authors which were graduate students (at the time of writing article) are indicated in *italics*
General area: *Applied algorithms: Solving scientific, engineering and practical problems*

Network layer in ad hoc and sensor wireless networks

We have made several fundamental discoveries in this area. Our routing with guaranteed delivery protocol [BMSU] from 1999 has been cited over 440 times (while the duplication of the work published a year later in a highly visible conference collected substantially more citations; details about this duplication can be seen at the applicant's web site), and is basically the only known such protocol (all subsequent ones are extensions of this one). Our article with fundamental broadcasting protocols [SSZ, S-ssz] has over 250 citations and is declared as the *Fast Breaking Paper in Computer Science* for October 2003. Our power aware localized routing protocols [SL2] also has over 210 citations and remain unique such localized solutions, until follow up protocols this year also by us [KNS3]. There are over 2400 citations to less than 50 my articles in the area, all published since 1999! Five major contributions [BMSU, SSZ, SL2, SL1, CSS] are described above. Additional contributions are described next.

The *greedy/flooding* method from [SL1] was subsequently improved [LLS] so that only one neighbor in each connected component of the neighborhood subgraph further forwards a forwarding message from the concave node. The routing with guaranteed delivery protocol [BMSU] was made more efficient in [DSW] by adding two-hop information. Localized power and cost aware protocols from [SL2] are improved in [SD] to guarantee delivery and in [KNS3] so that greedy decisions are made without the knowledge of ideal routing behavior. We made some contributions to the location update problem for efficient routing in mobile ad hoc networks, summarized in the survey [S-loc]. We described a broadcasting protocol for one-to-one wireless networks [SSS], which includes Bluetooth based ad hoc networks, that drastically reduce the overhead (going from twice lower for sparse to twenty times lower for dense networks), as compared to the state of the art article by the MIT group at MOBICOM 1999. Energy efficient metrics, depending on the node's remaining energy and local density, were introduced in [WWS, WDGS, SSSW] for defining dominating sets, allowing the nodes to rotate in the set and extend network life. We also investigated energy efficient broadcasting where nodes may adjust their transmission radii. Our original contribution [CSS] was subsequently improved by us in [ISS1, ISS2] by adding a target radius and dominating sets to be competitive with globalized approaches for all densities, and to allow some nodes to sleep. We also studied the scatternet formation problem for Bluetooth technology [LSW, WSL, SZ]. Geocasting and routing was studied in [SRL], improving upon the state of the art in directional based approaches. Geocasting protocols with guaranteed delivery are described in [S-g]. Generalized k-hop clustering definitions and protocols were proposed in [GSS]. Localized algorithms for detection of critical links for connectivity in ad hoc networks are described in [JHSS]. Finding minimum transmission radii and constructing minimal spanning trees was studied in [OSGG]. Physical layer impact on routing and broadcasting and relevant protocols are proposed in [KNS1, KNS2] which is pioneering work in the field, with expected significant impact. References not listed here can be 'decoded' at www.site.uottawa.ca/~ivan .

Routing, geocasting, multicasting and location service in ad hoc and sensor networks

[SRLS] *Juan Sanchez,* Pedro Ruiz, *Xuehong Liu,* Ivan Stojmenovic, Bandwidth-Efficient Geographic Multicast Routing Protocol for Wireless Sensor Networks, **IEEE Sensors,** Volume 7, Issue 5, May 2007, 627 – 636.

Hannes Frey, Ivan Stojmenovic, On Delivery Guarantees of Face and Combined Greedy-Face Routing Algorithms in Ad Hoc and Sensor Networks, The Twelfth **ACM Annual International Conference on Mobile Computing and Networking MOBICOM**, Los Angeles, Sept. 23-29, 2006, 390-401 (acceptance rate <12%).

[KNS1] *Johnson Kuruvila,* Amiya Nayak, and Ivan Stojmenovic, Hop count optimal position based packet routing algorithms for ad hoc wireless networks with a realistic physical layer, **IEEE Journal of Selected Areas in Communications**, Vol. 23, No. 6, June 2005, 1267-1275.

[SNK] Ivan Stojmenovic, Amiya Nayak and *Johnson Kuruvila,* Design guidelines for routing protocols in ad hoc and sensor networks with a realistic physical layer, **IEEE Communications Magazine**, 43, 3, March 2005, 101-106.

[S-geo] Stojmenovic I., Geocasting with guaranteed delivery in sensor networks, **IEEE Wireless Communications Magazine**, Vol. 11, No.6, December 2004, 29-37.

[S-cm] I. Stojmenovic, Position based routing in ad hoc networks, **IEEE Commmunications Magazine**, Vol. 40, No. 7, July 2002, 128-134.

[GS1] S. Giordano, I. Stojmenovic, Position based routing algorithms for ad hoc networks: A taxonomy, in: '**Ad Hoc Wireless Networking**', X. Cheng, X. Huang and D.Z. Du (eds.), Kluwer, 2004, 103-136.

[S-lu] I. Stojmenovic, Location updates for efficient routing in ad hoc wireless networks, in: **Handbook of Wireless Networks and Mobile Computing**, Wiley, 2002, 451-471.

[SL1] I. Stojmenovic and *X. Lin,* Loop-free hybrid single-path/flooding routing algorithms with guaranteed delivery for wireless networks, **IEEE Transactions on Parallel and Distributed Systems**, Vol. 12, No. 10, October 2001, 1023-1032.

[BMSU] Prosenjit Bose, *Pat Morin,* Ivan Stojmenovic and Jorge Urrutia, Routing with guaranteed delivery in ad hoc wireless networks, **ACM Wireless Networks**, 7, 6, November 2001, 609-616; Proc. of 3rd **ACM Int. Workshop on Discrete Algorithms and Methods for Mobile Computing and Communications DIAL M99**, Seattle, August 20, 1999, 48-55.

[SL2] Ivan Stojmenovic and *Xu Lin,* Power aware localized routing in wireless networks, **IEEE Transactions on Parallel and Distributed Systems,** Vol. 12, No. 11, November 2001, 1122-1133.

[KNS3] *Johnson Kuruvila,* Amiya Nayak, and Ivan Stojmenovic, Progress based localized power and cost aware routing algorithms for ad hoc and sensor wireless networks, **International Journal of Distributed Sensor Networks**, Vol. 2, No. 2, April-June 2006, 147-159, 2006.

[LLS] *X. Lin, M. Lakshdisi,* and I. Stojmenovic, Location based localized alternate, disjoint, multi-path and component routing algorithms for wireless networks, **ACM Symposium on Mobile Ad Hoc Networking & Computing MobiHoc**, Long Beach, California, USA, October 4-5, 2001, 287-290.

[S-vd] Ivan Stojmenovic, *Anand P. Ruhil,* D. K. Lobiyal, Voronoi diagram and convex hull based geocasting and routing in wireless networks, **Wireless Communications and Mobile Computing** (Wiley), 6, 2, February 2006, 247-258.

[SD] Ivan Stojmenovic and *Susanta Datta,* Power and cost aware localized routing with guaranteed delivery in wireless networks, **Wireless Communications and Mobile Computing**, 4, 2, 2004, 175-188.

[KNS4] *J. Kuruvila,* A. Nayak, I. Stojmenovic, Greedy localized routing for maximizing probability of delivery in wireless ad hoc networks with a realistic physical layer, **Journal of Parallel and Distributed Computing**, Vol. 66, No. 4, April 2006, 499-506.

[SNKOV] Stojmenovic I., A. Nayak, *J. Kuruvila, F. Ovalle-Martinez, E. Villanueva-Pena,* Physical layer impact on the design and performance of routing and broadcasting protocols in ad hoc and sensor networks, **Computer Communications**, Vol. 28, Issue 10, June 2005, 1138-1151.

[RS] Pedro M. Ruiz, I. Stojmenovic, Cost-efficient multicast routing in ad hoc and sensor networks, in: **Handbook on Approximation Algorithms and Metaheuristics,** Chapman & Hall/CRC (Teofilo Gonzalez, ed.), to appear.

[SRLS] Juan Sanchez, Pedro Ruiz, Xuehong Liu, Ivan Stojmenovic GMR: Geographic Multicast Routing for Wireless Sensor Networks, special issue in **IEEE Sensors,** on Intelligent sensors, to appear.

Dandan Liu , Ivan Stojmenović and Xiaohua Jia, A scalable quorum based location service in ad hoc and sensor networks, **IEEE International Conference on Mobile Ad-hoc and Sensor Systems MASS**, Vancouver, Oct. 9-12, 2006, 489-492.

Broadcasting, clustering, activity scheduling and dominating sets in ad hoc networks

[IRSSY] Julien Iguchi-Cartigny, Pedro M. Ruiz, David Simplot-Ryl, Ivan Stojmenovic*, Carmen M. Yago,* Localized minimum-energy broadcasting for wireless multihop networks with directional antennas, **IEEE Transactions on Computers**, to appear.

*[*GCSS]. *Antoine Gallais,* Jean Carle, David Simplot-Ryl, Ivan Stojmenovic, Localized sensor area coverage with low communication overhead, **IEEE Transactions on Mobile Computing,** Volume 7, Issue 5, 2008, 661-672.

[SW] Stojmenovic I. and J. Wu, Broadcasting and activity scheduling in ad hoc networks, in: **Mobile Ad Hoc Networking** (S. Basagni, M. Conti, S. Giordano and I. Stojmenovic, eds.), IEEE/Wiley, 2004, 205-229.

[SSS] *M. Seddigh,* J. Solano and I. Stojmenovic, RNG and internal node based broadcasting in one-to-one wireless networks, **ACM Mobile Computing and Communications Review**, Vol. 5, No. 2, April 2001, 37-44.

[SSZ] I. Stojmenovic, *M. Seddigh,* J. Zunic, Dominating sets and neighbor elimination based broadcasting algorithms in wireless networks, **IEEE Transactions on Parallel and Distributed Systems** , Vol. 13, No. 1, January 2002, 14-25. ***Fast Breaking Paper* in Computer Science for October 2003!**

[WWS] J. Wu, *B. Wu* and I. Stojmenovic, Power-aware broadcasting and activity scheduling in ad hoc wireless networks using connected dominating sets, **Wireless Communications and Mobile Computing**, Vol. 4, No. 1, June 2003, 425-438.

[CISS] *J. Cartigny, F. Ingelrest,* D. Simplot-Ryl, I. Stojmenovic, Localized LMST and RNG based minimum energy broadcast protocols in ad hoc networks; Proc. **IEEE INFOCOM**, San Francisco, CA, USA, April 1-3, 2003.

[ISS1] *F. Ingelrest,* D. Simplot-Ryl, I. Stojmenovic, Optimal transmission radius for energy efficient broadcasting protocol in ad hoc and sensor networks, **IEEE Transactions on Parallel and Distributed Systems**, Volume 17, Issue 6, June 2006, 536 – 547.

[CSS] *J. Cartigny,* D. Simplot-Ryl, I. Stojmenovic, An adaptive localized scheme for energy-efficient broadcasting in ad hoc networks with directional antennas, 9th IFIP Int. Conf. on **Personal Wireless Communications PWC**, September 21-23, 2004, Delft - The Netherlands; Lecture Notes in Computer Science, Vol. 3260, pp. 399–413, 2004. ***This article received the Best Paper Award at PWC.***

Bluetooth scatternet formation in wireless ad hoc networks

[ZDS]. Nejib Zaguia, *Yassine Daadaa*, Ivan Stojmenovic, Simplified bluetooth scatternet formation using maximal independent sets, **Integrated Computer-Aided Engineering** 15, 3 (2008) 229-239.

[SZ] I. Stojmenovic, N. Zaguia, Bluetooth scatternet formation in ad hoc wireless networks, Chapter 9 in: **Performance Modeling and Analysis of Bluetooth Networks: Network Formation, Polling, Scheduling, and Traffic Control** (J. Misic and V. Misic), Auerbach Publications (Taylor & Francis Group), 2006, 147-171.

[LSW] X. Li, I. Stojmenovic, *Y. Wang,* Partial Delaunay triangulation and degree limited localized Bluetooth scatternet formation, **IEEE Transactions on Parallel and Distributed Systems,** 15, 4, April 2004, 350-361.

Topology construction and maintenance in ad hoc and sensor networks

[OSGS] *F.J. Ovalle-Martinez,* I. Stojmenovic, F. Garcia-Nocetti, J. Solano-Gonzalez, Finding minimum transmission radii and constructing minimal spanning trees in ad hoc and sensor networks, **Journal of Parallel and Distributed Computing,** Vol. 65, No. 2, February 2005, 132-141.

Sensor networks

Sensor networks have specific challenges which differ them from wireless ad hoc networks. In [OS-inf], we consider uniformly distributed sensors, where all sensors send the same number of reports toward the closest sink. We investigated theoretical aspects of the uneven energy depletion phenomenon recently noticed in sink-based wireless sensor networks. We describe an iterative process for determining the sizes of coronas and corresponding transmission radii. In [CGSS], we propose several localized sensor area coverage protocols, for arbitrary ratio of sensing and transmission radii. The approach has a very small communication overhead since prior knowledge about neighbor existence is not required.

We present [S-n] a simple framework for designing network layer protocols for sensor networks including localized routing, broadcasting, area coverage and so on. The framework is general enough and is applicable to variety of problems, network assumptions, and optimality criteria. Our simple framework is based on optimizing the ratio of the cost of making certain decisions, e.g., selecting forwarding neighbor for routing, and the progress made in doing so, e.g., reduction in distance to destination. We show how to apply this general guideline for the design of hop count, power aware, maximal lifetime, beaconless and physical layer based routing, minimal energy broadcasting, sensor area coverage, and multicasting protocols. Moreover, we show that, in case of routing, the best known strictly localized position based techniques are, in almost all cases, special cases of the described general cost to progress ratio paradigm.

[OS-inf] Stephan Olariu, Ivan Stojmenovic, Design guidelines for maximizing lifetime and avoiding energy holes in sensor networks with uniform distribution and uniform reporting, **IEEE INFOCOM**, Barcelona, Spain, April 24-25, 2006. (18% acceptance ratio)

[GCSS] Antoine Gallais, Jean Carle, David Simplot-Ryl, Ivan Stojmenovic, Localized sensor area coverage with low communication overhead, Fourth Annual **IEEE International Conference on Pervasive Computer and Communications PerCom**, Pisa, Italy, March 13-17, 2006. (8% acceptance ratio for full papers).

[S-n] I. Stojmenovic, Localized network layer protocols in sensor networks based on optimizing cost over progress ratio, **IEEE Network**, Vol. 20, No. 1, January/February 2006, 21-27.

Antoine Gallais, Jean Carle and David Simplot-Ryl Ivan Stojmenovic, Ensuring k-Coverage in Wireless Sensor Networks under Realistic Physical Layer assumptions**, 5th IEEE International Conference on Sensors**, Daegu, Korea, Oct 22 -25, 2006.

Pervasive Computing

[ASY]. *Furuzan Atay Onat,* Ivan Stojmenovic and Halim Yanikomeroglu, Generating Random Graphs for the Simulation of Wireless Ad Hoc, Actuator, Sensor, and Internet Networks, **Pervasive and Mobile Computing** (Elsevier), Volume 4, Issue 5, October 2008, Pages 597-615.

RFID tag identification

The wireless connectivity, essential for pervasive computing, has ephemeral character and can be used for connection with RFID tags. The seamless support for the interaction patterns in the pervasive computing poses myriad of challenges, many of which are related to multiple access problems over a shared channel. We have investigated [MNSS] RFID tag identification problem, where reader sends signals over common channel and tags compete for responses. The task is to read all tags. We have designed a hybrid scheme then applies n-ary partition protocol on the whole set, followed by binary partition on the stations that caused collision. We proved analytically that the expected number of time slots in the hybrid algorithm with known number of users is $<2.20 \cdot n$. Performance of these algorithms was also evaluated experimentally by comparing it with existing algorithms, and an improvement from $e \cdot n$ to approximately $2.15 \cdot n$ was obtained.

[MNSS] *Aleksandar Micic,* Amiya Nayak, David Simplot-Ryl, and Ivan Stojmenovic, A hybrid randomized protocol for RFID tag identification, **Sensor Review**, 26(2), 2006, 147-154.

Localization with lightweight equipment

One of currently very hot problems is to identify technology that can provide required level of precision. One application is to provide position information with few meters of accuracy in a complex of buildings (e.g. a factory), tracking workers with very light equipment, such as sensors embedded into name tags, with small readers placed on walls or floors. Another application is in monitoring movements of body parts in patients on rehabilitations, where position of markers is required to be within centimetres. The later research was initiated recently with a small internal grant, in cooperation with an engineer and a medical researcher ('3D human motion analysis').

Peer-to-Peer systems

[EPSS] *O. Escalante-Mendieta, T. Pérez,* J. Solano, I. Stojmenovic, RNG-based searching and broadcasting over Internet graphs and peer-to-peer computing systems, **3rd ACS/IEEE Int. Conf. on Computer Systems and Applications**, Cairo, Egypt, Jan. 3-6, 2005.

Cellular Networks

In addition to a tutorial book chapter on cellular networks [ZS], we considered hybrid channel assignment problem for cellular networks [VNS1] and location management and connection rerouting problems [FSZ, GSZ].

[VNS1] *Geetali Vidyarthi,* Alioune Ngom, Ivan Stojmenovic, An hybrid channel assignment approach using an efficient evolutionary strategy in wireless mobile networks, **IEEE Transactions on Vehicular Technology**, Vol. 54, No. 5, September 2005, 1887-1895.

[ZS] J. Zhang, I. Stojmenovic, Cellular networks, chapter 45 in: **Handbook on Security** (H. Bidgoli, ed.), Wiley, Dec. 2005.

[FSZ] *Guangbin Fan,* Ivan Stojmenovic, and Jingyuan Zhang, Elimination of Generalized Ping-Pong Effects Using Triple-Layers of Location Areas in Cellular Networks, **IEEE Int. Conf. on Computer Communications and Networks IC3N'02**, Miami, Florida, USA, Oct. 2002, 489-492.

[GSZ] F. Garcia, I. Stojmenovic and J. Zhang, Addressing and routing in hexagonal networks with applications in location update and connection rerouting in mobile phone networks, **IEEE Transactions on Parallel and Distributed Systems**, Vol. 13, No. 9, Sept. 2002, 963-971.

Data broadcast in wireless networks

[OSS] *F. J. Ovalle Martínez,* J. Solano Gonzalez, and I. Stojmenovic, A parallel hill climbing algorithm for pushing dependent data in clients-providers-servers systems, **ACM Mobile Networks and Applications MONET**, 9, 4, 257-264, Aug. 2004.

Bioinspired Algorithms and Applications

(intensive 1996-1998, sporadic 1998-present): www.site.uottawa.ca/~ivan/evolution.html .

I started research in this area in order to supervise Dr. Alioune Ngom, currently at the University of Windsor (Canada). We designed perceptrons for neural networks and studied algebraic foundations of biomolecular (carrier) computing. We applied neural networks, genetic algorithms, tabu search and other evolutionary computing methods to the synthesis of multiple-valued functions and circuits, channel assignment in wireless cellular networks, data broadcasting etc. Genetic algorithms are applied to solve the pagenumber problem in interconnection networks. A parallel hill climbing algorithm for pushing dependent data in clients-providers-servers systems is proposed.

[NSZ1] A. Ngom, I. Stojmenovic, J. Zunic, On the Computing Capacity of Multiple-Valued Multiple-Threshold Perceptrons, Chapter 25 in: **Handbook of Bioinspired Algorithms and Applications**, S. Olariu and A. Zomaya (eds.), 425-450, CRC Press, 2006, 425-450.

[VNS2] *Geetali Vidyarthi,* Alioune Ngom, Ivan Stojmenovic, Combinatorial Evolutionary Methods in Wireless Mobile Computing, in: "**Combinatorial Optimization in Communication Networks**" (edited by Ding-Zhu Du, Maggie Cheng and Yingshu Li), Kluwer, 2006, 39-85.

[NSZ] *Ngom A.,* Stojmenovic I., Zunic J., On the number of multilinear partitions and the computing capacity of multiple-valued multiple-threshold perceptrons, **IEEE Transactions on Neural Networks**, 14, 3, May 2003, 469-477.

[OSS] *F. Ovalle,* J. Solano and I. Stojmenovic, A parallel hill climbing algorithm for pushing dependent data in clients-providers-servers systems, **ACM Mobile Networks and Applications MONET**, 9, 4, August 2004, 257-264.

[KRSZ] *N. Kapoor, M. Russell,* I. Stojmenovic, and A. Zomaya, A genetic algorithm for finding the pagenumber of interconnection networks, **Journal of Parallel and Distributed Computing**, 62, 2, Feb. 2002, 267-283.

[NSM] *Ngom A.,* Stojmenovic I., Milutinovic V., STRIP - A strip-based neural-network growth algorithm for learning multiple-valued functions, **IEEE Transactions on Neural Networks**, 12, 2, March 2001, 212-227.

[NRSS-cc] Ngom A., Reischer C., Simovici D.A., and Stojmenovic I., Set-valued logic algebra: A carrier computing foundation, **Multiple-Valued Logic, an International Journal,** Vol. 2, No. 3, 1997, 183-216.

Interconnection networks and parallel algorithms

(intensive 1988-1996, sporadic afterwards): www.site.uottawa.ca/~ivan/parallel.html .

I proposed several new interconnection networks: honeycomb networks, multiplicative circulant networks, Gray Code incomplete hypercubes, higher dimensional honeycomb and hexagonal networks. Lower bound and graph theoretical properties of new architectures are studied. Dynamic initialization of parallel computers is introduced and investigated. Parallel algorithms are developed in computational geometry, image processing, graph theory and combinatorics, using various architectures or models of parallel computation (PRAM, mesh connected computers, hypercubes, incomplete hypercubes, star, linear array of processors, BSR: broadcasting with selective reduction). My article on fundamental algorithms for star network was cited in over 50 papers, and showed that star graph has elegant communication protocols and better topological properties than hypercube network.

I. Stojmenovic, Topological properties of interconnection networks, in: **Combinatorial Optimization in Communication Networks** (edited by Ding-Zhu Du, Maggie Cheng and Yingshu Li), Kluwer, 2006, 427-465.

Stojmenovic I., Direct interconnection networks, in: **Parallel and Distributed Computing Handbook** (A.Y. Zomaya, ed.), McGraw-Hill, Inc., 1996, 537-567.

Akl S.G., and Stojmenovic I., Broadcasting with selective reduction: A powerful model of parallel computation, in: **Parallel and Distributed Computing Handbook** (A.Y. Zomaya, ed.), McGraw-Hill, Inc., 1996, 192-222.

F. Garcia, J. Solano, I. Stojmenovic and *M. Stojmenovic,* Higher-dimensional hexagonal networks, **Journal of Parallel and Distributed Computing**, Vol. 63, Issue 11, November 2003, 1164-1172.

J. Carle, J.F. Myoupo and Ivan Stojmenovic, Higher dimensional honeycomb networks, **Journal of Interconnection Networks**, 2, 4, December 2001, 391-420.

[S-honey] Stojmenović I., Honeycomb networks: Topological properties and communication algorithms, **IEEE Transactions on Parallel and Distributed Systems,** Vol. 8, No. 10, October 1997, 1036-1042.

The honeycomb mesh, based on hexagonal plane tessellation, is considered as a multiprocessor interconnection network. A honeycomb mesh network has 25% smaller degree and 18.5% percent smaller diameter than the mesh-connected computer with approximately the same number of nodes. Vertex and edge symmetric honeycomb torus network is obtained by adding wraparound edges to the honeycomb mesh. The network cost, defined as the product of degree and diameter, is better for honeycomb networks than for the two other families based on square (mesh-connected computers and tori) and triangular (hexagonal meshes and tori) tessellations. A convenient addressing scheme for nodes is introduced which provides simple computation of shortest paths and the diameter. Simple and optimal (in the number of required communication steps) routing, broadcasting, and semigroup computation algorithms are developed. In addition to honeycomb meshes bounded by a regular hexagon, we consider also honeycomb networks with rhombus and rectangle as the bounding polygons. This article is cited *over 50 times.*

N. Kapoor, M. Russell, I. Stojmenovic, and A. Zomaya, A genetic algorithm for finding the pagenumber of interconnection networks, **Journal of Parallel and Distributed Computing,** 62, 2, Feb. 2002, 267-283.

Xiang L., Ushijima K., Akl S.G. and Stojmenovic I., An efficient implementation for the BROADCAST instruction of BSR+, **IEEE Transactions on Parallel and Distributed Systems,** 10, 8, August 1999, 852-863.

Olariu S., Stojmenovic I. and Zomaya A., On the dynamic initialization of parallel computers, **Journal of Supercomputing,** 15, 5-24, 2000; also in: **IEEE International Parallel Processing Symposium**, Geneva, Switzerland, April 1997, 679-683.

Stojmenovic I., Multiplicative circulant networks: Topological properties and communication algorithms, **Discrete Applied Mathematics,** 77, 1997, 281-305.

[S-bsr] Stojmenovic I., Constant time BSR solutions to parenthesis matching, tree decoding and tree reconstruction from its traversals, **IEEE Transactions on Parallel and Distributed Systems**, Vol. 7, No. 2, Feb. 1996, 218-224. {30 citations}

BSR (broadcasting with selective reduction) is more powerful than any CRCW PRAM and yet requires no more resources for implementation than even EREW PRAM. The model allows constant time solutions to sorting, parallel prefix and other problems. In this paper, constant time simple solutions to problems listed in the paper title were presented. These were the first constant time solutions to these problems on any model of computation. The number of processors used is equal to the input size, for each problem. A new algorithm for sorting integers is also presented. This paper was cited in over 25 papers, including L. Xiang, K. Ushijima, On time bounds, the work-time scheduling principle, and optimality for BSR, IEEE Trans. Par. Distr. Systems 12, 2001, 912-921, which contains solutions to some open problems given in my article. In addition to the group from Japan, another group from France (Ph.D. thesis by D. Seme), was particularly inspired by this paper to continue the research on BSR.

Parallel computational geometry

(intensive 1987-1995): www.site.uottawa.ca/~ivan/pcg.html .

Problems of particular interest in computational geometry are finding the convex hull, Voronoi diagrams, intersection problems, point locations, maximal elements, circle-cover, triangulation, nearest neighbors, visibility-related problems, external watchman route etc. Several models of parallel computation are used (e.g PRAM, MMB, star, mesh, hypercube) to describe parallel algorithms for solving geometric problems.

[AQS] Akl S.G., *Qiu K.,* and Stojmenovic I., Fundamental algorithms for the star and pancake interconnection networks with applications to computational geometry, **Networks**, Vol. 23, 1993, 215-225.

The star and pancake networks were proposed as attractive topology for interconnecting processors. In [AQS] we presented several data communication schemes and basic algorithms for these two networks (e.g. broadcasting, prefix sums, concentration, distribution, set difference, reversing, translation), and used them to develop parallel solutions to various geometric problems. These algorithms are fundamental to the

design of solutions to a host of other problems. The paper was part of Ph.D. thesis by K. Qiu and was *cited over 60 times*.

Olariu S., and Stojmenovic I., Time optimal nearest-neighbor computations on enhanced meshes, **Journal of Parallel and Distributed Computing**, 36, 144-155, 1996.

Bhagavathi D., Bokka V., Gurla H., Olariu S., Schwing J.L., Stojmenovic I., Zhang J., Time-optimal visibility-related algorithms on meshes with multiple broadcasting, **IEEE Transactions on Parallel and Distributed Systems,** Vol. 6, No. 7, July 1995, 687-703.

Computational geometry (theory and sequential algorithms)

(intensive 1986-1992, sporadic 1998-1999): www.site.uottawa.ca/~ivan/cg-ts.html .

Computational geometry deals with solving geometric problems by computing means. We published the first correct code for the famous Graham's convex hull algorithm. We studied the immobilization of a shape and determined the largest k-ball in d-dimensional box (this paper established my Erdes number 2!). I published in 1991 an article on bisections and ham-sandwich cuts of convex polygons and polyhedra, which is the first publication in literature that deals with subdividing geometric figures according to their *areas*. We also investigated how to compute shortest transversals of sets, with article published in ACM Computational Geometry conference.

Czyzowicz J., Stojmenovic I., Urrutia J., Immobilizing a shape, **International Journal of Computational Geometry and Applications,** 9, 2, 1999, 181-206.

H. Everett, I. Stojmenovic, P. Valtr, S. Whitesides, The largest k-ball in a d-dimensional box, **International Journal of Computational Geometry and Applications,** 11, 1998, 59-67. {this publication earned Erdes number 2 via Pavel Valtr}

Bhattacharya B.K., Czyzowicz J., *Egyed P.,* Stojmenovic I., Toussaint, G.T., and Urrutia, J., Computing shortest transversals of sets, **International Journal of Computational Geometry and Applications**, Vol. 2, No. 4, 1992, 417-435.

Stojmenovic I., Bisections and ham-sandwich cuts of convex polygons and polyhedra, **Information Processing Letters,** 38, 1 (1991) 15-21. {this is the first publication in literature that deals with subdividing geometric figures according to their areas}

Image analysis and pattern recognition

(intensive 1990-1996): www.site.uottawa.ca/~ivan/dg.html .

I started research in this area in order to supervise Dr. Jovisa Zunic, currently at Exeter University (UK). Geometric object like line or circle is represented on a raster screen as the set of pixels obtained in the digitization process. Representation of digital objects by least square fits is proposed. Geometric properties of such digital representations are studied. Other problems studied are digital convexity, recognition of objects, visibility problems, digital lines, digital planes.

Stojmenovic I., Tosic R., Digitization schemes and the recognition of digital straight lines, hyperplanes and flats in arbitrary dimensions, in: **Vision Geometry** (R. A. Melter, A. Rosenfeld, and P.

Bhattacharya, eds.), Contemporary Mathematics Series Vol. 119, American Mathematical Society, 1991, 197-212.

Bokka V., Gurla H., Olariu S., Schwing J.L., and Stojmenovic, I., Time-optimal digital geometry algorithms on meshes with multiple broadcasting, **Int. J. Pattern Recognition and Artificial Intelligence,** Vol. 9 No. 4 (1995) 601-613.

Klette R, Stojmenovic I. and Zunic J, A parametrization of digital planes by least square fits and generalizations, **CVGIP: Graphical Models and Image Processing**, Vol. 58, No. 3, May 1996, 295-300.

Melter R.A., and Stojmenovic I., Constant time BSR solutions to L1 metric and digital geometry problems, **Journal of Mathematical Imaging and Vision,** 5, 119-127, 1995.

Melter R.A., Stojmenovic I., and Zunic J., A new characterization of digital lines by least square fits, **Pattern Recognition Letters**, 14 (1993) 83-88. {11 citations}

Sarkar D., and Stojmenovic I., Parallel algorithms for minimum separation of two sets of points and recognition of digital convex polygons, **International Journal of Parallel Programming**, Vol. 21, No. 2, April 1992, 109-121.

Combinatorial algorithms (intensive 1990-1996) www.site.uottawa.ca/~ivan/comb.html are designed using sequential and parallel models of computation. We studied generating combinatorial objects such as combinations, permutations, subsets, integer partitions, set partitions, trees, B-trees, using both sequential and parallel models of computation. Combinatorial optimization problems such as knapsack, base enumeration, branch and bound problems, applications of backtracking, isomorphs-free generation etc were also investigated. My two sequential algorithms, for generating all set partitions and integer partitions, are still fastest known algorithms.

Sequential algorithms for generating all combinatorial objects:

Donald E. Knuth included our integer partition generator in his historical The Art of Computer Programming, Volume 4, Fascicle 3, Errata Oct. 25, 2005.

Zoghbi A., and Stojmenovic I., Fast algorithms for generating integer partitions, **International Journal of Computer Mathematics,** 70, 1998, 319-332. {contains the fastest known generation algorithms for integer partitions, in both representations}

Djokic B., Miyakawa M., Sekiguchi S., Semba I., Stojmenovic I., A fast iterative algorithm for generating set partitions, **The Computer Journal**, Vol. 32, No. 3, 1989, 281-282.

Stojmenovic I., Miyakawa M., Applications of a subset generating algorithm to base enumeration, knapsack and minimal covering problems, **The Computer Journal,** 31, No. 1, 1988, 65-70.

Doroslovacki R., Stojmenovic I., Tosic R., Generating and counting triangular systems, **BIT** 27, 1, 1987, 18-24.

Generating combinatorial objects at random:

Stojmenovic I., On random and adaptive parallel generation of combinatorial objects, **International Journal of Computer Mathematics,** Vol. 42, 1992,125-135.

Parallel algorithms for generating all combinatorial objects:

Stojmenovic I., Listing combinatorial objects in parallel, **International Journal of Parallel, Emergent and Distributed Systems**, Vol. 21, No. 2, April 2006, 127–146.

Akl S.G., and Stojmenovic I., Generating combinatorial objects on a linear array of processors, in: **Parallel Computing: Paradigms and Applications** (A.Y. Zomaya, ed.)., International Thomson Computer Press, 1996, 639-670.

Stojmenovic I., Generating n-ary reflected Gray codes on a linear array of processors, **Parallel Processing Letters**, Vol. 6, No. 1, 1996, 27-34.

Belbaraka M., Stojmenovic I., On generating B-trees with constant average delay and in lexicographic order, **Information Processing Letters**, 49, 1, 1994, 27-32.

Akl S.G., Meijer H. and Stojmenovic I., An optimal systolic algorithm for generating permutations in lexicographic order, **Journal of Parallel and Distributed Computing,** 20, 1, 1994, 84-91.

Elhage H., and Stojmenovic I., Systolic generation of combinations from arbitrary elements, **Parallel Processing Letters,** Vol. 2, No. 2 &3 (1992) 241-248.

Stojmenovic I., A simple systolic algorithm for generating combinations in lexicographic order, **Computers & Mathematics with Applications,** Vol. 24, No. 4, pp. 61-64, 1992.

Multiple-valued logic

(intensive 1982-1990, sporadic afterwards): www.site.uottawa.ca/~ivan/muval.html .

I did my both theses in the interdisciplinary area of multiple-valued logic. Functional completeness theory studies the constructions of logical functions from a set of primitives and enumeration of bases. The problems which are investigated include classification of functions and enumeration of bases of a closed subset of the set of all k-valued logical functions and the study of particular kinds of functions (monotone, symmetric, predicate, etc.) in many-valued logics. Set-valued logic is studied because of its recent applications in the design of biomolecular, interconnection free and wave-parallel computing models. I am managing editor of a journal in the area.

Simovici D.A., Stojmenovic I., and Tosic R., Functional completeness and weak completeness in set logic, **23-th IEEE Int. Symp. Multiple-Valued Logic,** Sacramento, CA, USA, May 1993, 251-256.

Reischer C., Simovici D.A., Stojmenovic I. and Tosic R., A characterization of Boolean collections of set-valued functions, **Information Sciences**, Vol. 99, No. 3-4, July 1997, 195-204.

Ngom A., Reischer C., Simovici D.A., and Stojmenovic I., Set-valued logic algebra: A carrier computing foundation, **Multiple-Valued Logic, an International Journal,** Vol. 2, No. 3, 1997, 183-216.

Miyakawa M., Rosenberg I., Stojmenovic I., Classification of three-valued logical functions preserving 0, **Discrete Applied Mathematics,** 28 (1990) 231-249.

Miyakawa M., Stojmenovic I., Classification of Pk2, **Discrete Applied Mathematics**, 23 (1989) 179-192.

Stojmenovic I., On Sheffer symmetric functions in three-valued logic, **Discrete Applied Mathematics,** 22 (1988/89) 267-274 .

Tosic R., Stojmenovic I., and Miyakawa, M., On the maximum size of the terms in the realization of symmetric functions, **21-th IEEE Int. Symp. Multiple-Valued Logic,** Victoria, BC, Canada, May 1991, 110-117.

Stojmenovic I., *Miyakawa M.,* Tosic, R., On spectra of many-valued logic symmetric functions, **IEEE Int. Symp. Multiple-Valued Logic,** Palma de Mallorca, Spain, May 1988, 285-292.

Miyakawa M., Stojmenovic I., Lau D., Rosenberg I., Classifications and basis enumerations in many-valued logics - a survey, **17-th Int. Symp. on Multiple-Valued Logic,** Boston, May 1987, 152-160.

Stojmenovic I., **Some combinatorial and algorithmic problems in many-valued logics,** monograph, Institute of Mathematics, University of Novi Sad, 1987, pp. 150.

Computational chemistry

(sporadic 1985-1995): www.site.uottawa.ca/~ivan/chem.html .

The problems studied were graph theory applications and computer generation of benzenoid hydrocarbons, perfect matchings of square, pentagonal and hexagonal chains, and benzenoid chains with unique Clar formulas. My paper on enumerating benzenoid hydrocarbons, published in a Yugoslavian graph theory conference proceedings in 1986, has been subsequently cited about 50 times in chemical books and journals and used to derive additional chemical information.

[TMSBCC] Tosic R., *Masulovic D.,* Stojmenovic I., Brunvoll J., Cyvin B.N. and Cyvin S.J., Enumeration of Polyhex Hydrocarbons to h=17, **Journal of Chemical Information and Computer Sciences**, 35, 2, 1995, 181-187.

[STD] Stojmenovic I., Tosic R., Doroslovacki R., Generating and counting hexagonal systems, **Sixth Yugoslav Seminar on Graph Theory,** Dubrovnik, 1985, Inst. Math., Univ. Novi Sad, 1986, 189-198. *{50 citations}*

The problem of enumerating fusenes and benzenoid (or polyhex) hydrocarbons (i.e. figures composed from regular hexagons) has been studied in hundreds of papers in chemical literature. The main data are the number of polyhexes with given number *h* of hexagons and the classification according to various parameters like perimeter, symmetry etc. The tables obtained by computer means reveal important properties of these structures (e.g. stability and color excess) and are used to derive further results in chemical literature. In 1987, Stojmenovic, Tosic and Doroslovacki [STD] computed these tables for *h*=11 (141229 in total). This was done using a computer program written by Stojmenovic, and run on a fast computer in Japan, during his stay in 1985/86. This paper and its results, despite being published only in a national conference [STD], were highly cited in chemical literature. It has made significant impact in this area. For example, J.R. Dias, J. Chem.Inf.&Comp.Sci., 30, 1990, 251-156:' The recent availability of the benzenoid isomer table of Stojmenovic and co-workers has allowed us to deduce isomer numbers that were heretofore unknown'. Our tables were copied in several chemical books (e.g. I. Gutman, S.J. Cyvin, Introduction to the Theory of Benzenoid Hydrocarbons, Springer-verlag, 1989, pp. 40-43; Topics in Current Chemistry, Vol. 162, 1992, and Vol. 166, 1993). A combined effort of a team from Serbia, Canada, and Norway [TMSBCC] extended the tables to *h*=17. The topic is still active among researchers, with current (January 2004) enumeration record at *h*=27 and current count record at *h*=35.

[TS2] Tosic R., Stojmenovic I., Benzenoid chains with the unique Clar formula, **Journal of Molecular Structure THEOCHEM,** 207 (1990) 285-291.

Programming languages and computer science education

(intensive 1982-1986, sporadic 2000-2001): www.site.uottawa.ca/~ivan/lang.html .

Before my Ph.D. in 1985, I was working on functional programming languages. My LISP compiler, made in FORTRAN as part of a team of three members, was used to teach third year computer science students in Yugoslavia for two decades. I published a textbook in Yugoslavia on PASCAL programming language. I have published an article in IEEE Transactions on Education in 2000 on teaching recursion in the first year computer science program.

Ivan Stojmenovic, Recursive algorithms in computer science courses, **IEEE Transactions on Education,** Vol. 43, No. 3, August 2000, 273-276.

Stojkovic V., Tosic D., Stojmenovic I., **Programming Language PASCAL** (Serbian), Scientific Book (Naucna knjiga), Belgrade, Yugoslavia, 1984 (2nd edition 1986), pp. 259. (this textbook was used at University of Belgrade and University of Novi Sad, Serbia).

Theses

PhD. Stojmenovic I., Classification problems of maximal sets of two and three-valued logics (Serbian), **Ph. D. Thesis**, Zagreb (Yugoslavia/Croatia), 1985, pp. 171.

MSc. Stojmenovic I., Symmetric functions of two and three-valued logic (Serbian), **Master's thesis**, Novi Sad (Yugoslavia/Serbia), 1983, pp. 60.