NIKOLA MILOSAVLJEVIĆ

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Research Interests

Wireless ad-hoc and sensor networks; algorithm design, analysis and engineering; computational geometry and topology; convex and combinatorial optimization.

Education

09/2003–present	Ph.D. program in Computer Science, Stanford University, Stanford, CA. Expected graduation: 03/2009.
10/2002–07/2003	Pre-doctoral school in Computer Science and Telecommunications, Swiss Federal Institute of Technology, Lausanne, Switzerland.
07/1997–05/2002	B.Sc. in Electrical Engineering, University of Belgrade, Serbia. 5 year program, GPA 10/10. Diploma thesis title: Adaptive Space-time Block Codes. Mentor: Prof. Dušan Drajić.

Dissertation

Title: Robust Algorithms for Infrastructure Establishment in Sensor Networks
Advisor: Prof. Leonidas Guibas
Reading committee: Prof. Ashish Goel, Prof. Leonidas Guibas, Prof. Serge Plotkin

Abstract:
We propose several algorithms for wireless sensor networks whose common feature is that they do not perform any sensing or information processing *per se*, but rather *establish the network infrastructure* – build up the computational environment required for execution of such application-level algorithms. Our contributions cover three types of infrastructure: (i) topology control and channel assignment, (ii) inferring geometric and topological features from network connectivity, and (iii) discovering relevant data sources in a set that evolves over time. In the spirit of sensor network algorithms, our main design objectives are *communication efficiency* and *robustness* to network volatility. We achieve the latter by making our algorithms local, simple and stateless. We demonstrate, by a mix of theoretical and experimental results, that our methods to improve solution quality and/or energy efficiency of existing approaches, while retaining simplicity and practical relevance.

Publications

1. J. Gao, L. Guibas, N. Milosavljević, D. Zhou. Distributed Resource Management and Matching in Sensor Networks. Accepted to 8th International Conference on Information Processing in Sensor Networks (IPSN), 2009.

2. B. Kusy, HJ. Lee, M. Wicke, N. Milosavljević, L. Guibas. Predictive QoS Routing to Mobile Sinks in Wireless Sensor Networks. Accepted to 8th International Conference on Information Processing in Sensor Networks (IPSN), 2009.

3. D. Dumitriu, S. Funke, M. Kutz, N. Milosavljević. On the Locality of Extracting a 2-Manifold in $\mathbb{R}^3$. Proceedings of the 11th Scandinavian Workshop on Algorithm Theory (SWAT) 2008, preliminary version at the 24th European Workshop on Computational Geometry (EWCG) 2008.

4. A. Ene, W. Horne, N. Milosavljević, P. Rao, R. Schreiber, R. E. Tarjan. Fast Exact and Heuristic Methods for Role Minimization Problems. Proceedings of the 13th ACM Symposium on Access Control Models and Technologies (SACMAT), 2008.

5. H. Lin, M. Lu, N. Milosavljević, J. Gao, L. J. Guibas. Composable Information Gradients in Wireless Sensor Networks. Proceedings of the 7th International Conference on Information Processing in Sensor Networks (IPSN), 2008.

6. D. Dumitriu, S. Funke, M. Kutz, N. Milosavljević. How Much Geometry It Takes to Reconstruct a 2-Manifold in $\mathbb{R}^3$. Accepted to ACM Journal of Experimental Algorithmics, preliminary version at the 9th Workshop on Algorithm Engineering and Experiments (ALENEX), 2008.

7. J. Gao, L. Guibas, J. Hershberger, N. Milosavljević. Sparse Data Aggregation in Sensor Networks. Proceedings of the 6th International Conference on Information Processing in Sensor Networks (IPSN), 2007.

8. A. Nguyen, N. Milosavljević, Q. Fang, J. Gao, L. J. Guibas. Landmark Selection and Greedy Landmark-Descent Routing for Sensor Networks. Proceedings of IEEE INFOCOM 2007.

9. S. Funke, N. Milosavljević. Guaranteed-delivery Geographic Routing Under Uncertain Node Locations. Proceedings of IEEE INFOCOM 2007.

10. S. Funke, N. Milosavljević. Network Sketching or: "How Much Geometry Hides in Connectivity? – Part II". Proceedings of the 18th ACM-SIAM Symposium on Discrete Algorithms (SODA) 2007.

11. S. Funke, N. Milosavljević. Infrastructure-Establishment from Scratch in Wireless Ad-Hoc Networks. Proceedings of the 1st IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS), 2005.

Awards and Honors

08/2008	Siebel Fellowship
03/2003	Best student in 2002, University of Belgrade
12/2002	Award for exceptional undergraduate accomplishment, SoEE alumni association
12/2002	Best student in the Division of Electronics, Telecommunications and Automatics, SoEE
02/2002	Scholarship, Karađorđević Family Foundation
01/2002	Award for excellent academic performance, Serbian Ministry of Education
09/2000	Award for excellent academic performance, Embassy of Norway in Belgrade
1998–2002	Scholarship, Serbian Ministry of Education, Foundation for Young Artists and Scientists

Research

01/2004–present	Research assistant, Geometric Computing Lab, Stanford University Advisor: Prof. Leonidas Guibas.
07/2007–09/2007	Summer internship, Hewlett-Packard Labs, Palo Alto, CA. Mentor: Robert Schreiber. Worked on algorithms for the biclique cover problem for clustering and compressing bipartite graphs, applied to access database management and role discovery.
11/2005, 09/2006	Research visits to the Max-Planck Institut für Informatik, Saarbrücken, Germany. Mentor: Stefan Funke. Worked on algorithms for topology discovery in location-unaware wireless networks.
01/2003–06/2003	Semester project, Algorithmics Lab, Swiss Federal Institute of Technology Lausanne. Mentor: Amin Shokrollahi. Studied and implemented algorithms for factoring polynomials over finite fields, and list-decoding algorithms for Reed-Solomon codes.
09/2002–12/2002	Visiting research assistant, Division of Engineering and Applied Sciences, Harvard University, Cambridge, MA. Mentor: Aleksandar Kavčić. Worked on iterative decoding schemes for LDPC codes.
09/2001–05/2002	Course projects, School of Electrical Engineering, University of Belgrade. LCD technology survey, neural network-based handwritten digit recognition system, fuzzy logic-based image enhancement algorithm.

Teaching

04/2007–06/2007	Teaching assistant, CS154 Introduction to Automata and Complexity Theory, CS Department, Stanford University.
04/2006–07/2006	Teaching assistant, CS368 Geometric Algorithms, CS Department, Stanford University.
01/2005–04/2005	Teaching assistant, CS348A Geometric Modelling, CS Department, Stanford University.
09/2000–06/2002	Lab assistant, Electronics Lab, School of Electrical Engineering, University of Belgrade.

Professional Activities

Reviewer for networking conferences/journals: IPSN, Globecom, ACM Transactions on Sensor Networks, ICCCN, Wireless Networks.
Reviewer for algorithms conferences/workshops: ALENEX, SoCG, STOC.

Patent

A. Ene, N. Milosavljević, R. Schreiber, R. Tarjan and M. Shah. Method for Exact Biclique Cover of a Bipartite Graph. U.S. patent pending.

Other Employment

09/2001–12/2001	Intern, Computer Center, Universidad Pontificia Comillas, Madrid, Spain. Worked on network administration, computer support and maintenance.

Language Proficiency
Serbian native, English fluent.

Programming
C++, Java, Matlab, LaTeX, HTML.