

Curriculum Vitae

Maxim A. Batalin

<http://cens.ucla.edu/~maxim> cell: +1 858 405 8319 email: maxim.batalin@gmail.com

Education

2002-2005 **PhD in Computer Science**, Specialty: Robotics, Sensor Networks, Intelligent Systems
2001-2002 **Master of Science in Computer Science**

University of Southern California, Los Angeles, CA, USA

Thesis: "Symbiosis: Collaborative Algorithms for Mobile Robots and a Sensor Network" – the first formal work on collaborative usage of mobile robots and sensor networks for a variety of tasks. Today a separate field of Actuated Sensing studies such problems.

Thesis Advisor: Prof. Gaurav S. Sukhatme (USC)

1997-2002 **Master of Science in Management (With Distinction)**, Specialty: General Management
Tavriya National University, Simferopol, Crimea, Ukraine

Thesis: "Restructuring of the Marketing Strategy." Case study was based on the JSC "Zavod Phiolent"

Thesis Advisor: Prof. Gennady N. Rotanov

2002 **Certified in United States as M.S. in Managerial Economics**

1998-2001 **Bachelor of Science in Computer Science**
Bachelor of Science in Mathematics
University of Oregon, Eugene, OR, USA

Completed two research projects:

1. CurveBuilder – developed the first software application to recreate in 3D a computer model of the spatial curve with dynamically defined curvature and torsion parameters. Supervisor on the project: Prof. Richard Hoch (Harvard).
2. DinoMorph – was a key developer of the project that allows reconstruction of the skeleton structures of any kind and Dinosaurs in particular. The results of our system were used in a variety of media, such as the BBC series "Walking with Dinosaurs", etc. Supervisor on the project: Prof. Kent Stevens (MIT).

Undergraduate Advisors: Prof. Eugene M. Luks (MIT), Prof. Richard Hoch (Harvard)

Professional Experience

2005 – **Development Engineer (Postdoctoral Fellow, Lead Researcher, Program Manager)**
present **University of California, Los Angeles (UCLA)**

At UCLA my work is mostly involved with ASCENT laboratory and affiliated with the Center for Embedded Networked Sensing and Wireless Health Institute, where I am supervising and leading teams of graduate and undergraduate students (approx. 10-20 students) in a variety of projects. Developing the scientific vision for the lab's future projects; producing grant and

reporting documentation to Government Agencies; presenting research work and results at key conferences, sponsor meetings, government boards, etc.; assist in transition of the developed technology towards commercialization.

Types of the completed projects:

- Cabled-robotics
 - Aquatic Networked InfoMechanical System (NIMS-AQ) – cabled robot for aquatic applications
 - NIMS 3D – a cabled robot capable of delivering payloads in 3D.
 - Systems for cabled robots - calibration, navigation, path planning, trajectory tracking, etc.
- Multitier multiscale sampling algorithms for spatiotemporal phenomena monitoring
- Robot path optimization for efficient environmental sampling
- Spatial and semantic mapping with a miniature underwater sonar
- IDEA: Autonomous Iterative experiment Design for Environmental Applications
- Design of an energy aware platform for biomedical and environmental applications - MicroLEAP
- Wireless Telehealth System and Architecture for Biomedical Applications
- IDM: Incremental Diagnosis Method for an efficient diagnosis of the patient condition with minimum sensor set
- SmartCane system for intelligent assistance and training in geriatrics and rehabilitative care

2006 present - **Technology and Strategic Consultant to the Chairman of the Board, JSC 'Zavod Phiolent', Simferopol, Ukraine (leading developer and manufacturer of the autonomous control systems, power tools and micro machines)**

Advisory services to the Board of Directors in new technology development and strategic reorganization. Some of the recent developments include: home and building automation (new business area for the company), two prospective projects with the construction companies are currently underway; market analysis and product development in the field of autonomous robotic appliances (possible expansion of the product line for the future); analysis of novel technologies in the autonomous control systems.

2001- 2005 **Research Assistant, Robotic Embedded Systems Laboratory
University of Southern California, Los Angeles**

Research and development of algorithms and systems that use mobile robots and sensor networks together to solve problems of coverage and exploration, mobile robot navigation, task allocation, sensor network maintenance, deployment and repair. We have also applied our methodologies to a sensor-actuator system (NIMS) for efficient spatiotemporal monitoring.

Summer 2003 **Research Scientist
Intel Research, Hillsboro, OR**

Research and development of a novel sensor network mediated mobile robot navigation. The developed system allowed mobile robot to navigate in an unknown environment without any a priori known information about the environment and without constructing any representation of the environment. As part of the system a sensor network of 9 sensor nodes was embedded into the environment and used in navigation.

Honors and Awards

Sigma Xi Scientific Research Society: <http://www.sigmaxi.org>

Phi Beta Kappa (ΦBK) Honorary Society: <http://www.pbk.org>

Golden Key Honor Society: <http://www.goldenkey.org>

Skills

Languages: English (fluent), Russian (native), Ukrainian (fluent)

Operating Systems/Environments: Linux/Unix, Windows, Matlab, TinyOS, Android

Tool Development: Robotics Environment: Player/Stage/Gazebo engine, developed and maintaining a Java Client for the engine

Analytical: Working knowledge of applied mathematics, physics, algorithm design and analysis, problem solving techniques, modeling

Project Leadership/Student Mentorship: Have experience with successfully completing projects that required management of several team members and complex project requirements

Other: Can work equally well as part of a team or alone; My research and development background enables me to learn new areas fast

Selected Publications and Presentations

Journal Articles

1. Per Henrik Borgstrom, Brett Jordan, Bengt Jonas Borgstrom, Michael J. Stealey, Gaurav S. Sukhatme, Maxim A. Batalin, and William J. Kaiser, (2008-submitted), "NIMS-PL: A Novel Redundant Cabled Robot with Self-Calibration Capabilities", *IEEE Transactions on Robotics*.
2. Per Henrik Borgstrom, Nils Peter Borgstrom, Michael J. Stealey, Brett Jordan, Gaurav S. Sukhatme, Maxim A. Batalin, and William J. Kaiser, (2008), " Design and Implementation of NIMS3D, a Three-Dimensional Cabled Robot for Actuated Sensing Applications ", To Appear in *IEEE Transactions on Robotics*, 2008
3. David A. Caron, Beth Stauffer, Stefanie Moorthi, Amarjeet Singh, Maxim A. Batalin, Eric Graham, Mark Hansen, William J. Kaiser, Jnaneshwar Das, Arvind Pereira, Amit Dhariwal, Bin Zhang, Carl Oberg and Gaurav S. Sukhatme, (2008), "Macro- to fine-scale spatial and temporal distributions and dynamics of phytoplankton and their environmental driving forces in a small subalpine lake in southern California, USA", *Journal of Limnology and Oceanography*, vol. 53, pp. 2333-2349
4. Winston Wu, Alex Bui, Maxim A. Batalin, L.A. Au, J.D. Binney and W.J. Kaiser, (2008), "MEDIC: Medical Embedded Device for Individualized Care", *Artificial Intelligence in Medicine*, Volume 42, Issue 2, Pages 137 – 152, Feb 2008
5. Amarjeet Singh, Maxim A. Batalin, Stealey, M., Zhang, B., Dhariwal, A., Stauffer, B., Moorthi, S., Oberg, C., Pereira, A., Chen, W., Lam, Y., Caron, D., Hansen, M., Kaiser, W. and Sukhatme, G., (2007), Human

- assisted robotic team campaigns for aquatic monitoring", *Journal of Field Robotics*, vol. 24, pp. 969-989, 2007
6. Maxim Batalin and Gaurav S. Sukhatme, (2007), "The Design and Analysis of an Efficient Local Algorithm for Coverage and Exploration Based on Sensor Network Deployment", *In IEEE Transactions on Robotics*, 23(4):661-675, Aug 2007
 7. Winston Wu, Alex Bui, Maxim A. Batalin, Duo Liu and William J. Kaiser, (2007), "Incremental Diagnosis Method for Intelligent Wearable Sensor Systems," *IEEE Transactions on Information Technology in Biomedicine*, vol. 11, pp. 553-562, Sep 2007
 8. Maxim Batalin and Gaurav S. Sukhatme, (2004), "Coverage, Exploration and Deployment by a Mobile Robot and Communication Network," *In Telecommunication Systems Journal, Special Issue on Wireless Sensor Networks*, Vol. 26, No. 2, pp. 181-196, 2004.

Refereed Book Chapters

Batalin, M and Sukhatme, G.S. (2005): "Sensor Network-Mediated Multi-Robot Task Allocation", *In Multi-Robot Systems. From Swarms to Intelligent Automata Volume III*, Proceedings from the Third International Naval Research Laboratory Multi-Robot Systems Workshop, edited by Lynne E. Parker, Frank E. Schneider and Alan C. Schultz, Springer, pp. 27-38, Mar 2005.

Refereed Conference and Workshop Papers

1. Per Henrik Borgstrom, Amarjeet Singh, Gaurav Sukhatme, Maxim Batalin, and William Kaiser, (2008), "Energy Based Path Planning for a Novel Cabled Robotic System", *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 1745-1751, 22-26 Sept. 2008
2. W.H. Wu, L.K. Au, B. Jordan, T. Stathopoulos, M.A. Batalin, W.J. Kaiser, A. Vahdatpour, M. Sarrafzadeh, M. Fang and J. Chodosh, (2008), "Smart Cane System: An Assistive Device for Geriatrics", *Third International Conference on Body Area Networks (BodyNets 2008)*, March 13-17, 2008.
3. L.K. Au, W.H. Wu, M.A. Batalin, and W.J. Kaiser, (2008), "Active Guidance Towards Proper Cane Usage", *5th International Workshop on Wearable and Implantable Body Sensor Networks*, June 1-3, 2008.
4. Per Henrik Borgstrom, Peter Nils Borgstrom, Michael Stealey, Brett Jordan, Gaurav Sukhatme, Maxim A. Batalin, William Kaiser, (2008), "Generation of Energy Efficient Trajectories for NIMS3D, a Three-Dimensional Cabled Robot", *ICRA*, 19-23 May 2008, pp. 2222 - 2227
5. Michael J. Stealey, Amarjeet Singh, Maxim A. Batalin, Brett Jordan, William J. Kaiser, (2008), "NIMS-AQ: A novel system for autonomous sensing of aquatic environments", *ICRA*, 19-23 May 2008, pp. 621 - 628
6. Victor Chen, Maxim A. Batalin, William Kaiser, Gaurav Sukhatme, (2008), "Towards Spatial and Semantic Mapping in Aquatic Environments", *ICRA*, 19-23 May 2008, pp. 629 - 636
7. Lawrence K. Au, Winston H. Wu, Maxim A. Batalin, Dustin H. McIntire and William J. Kaiser, (2007), "MicroLEAP: Energy-aware Wireless Sensor Platform for Biomedical Sensing Applications", *IEEE BIOCAS2007*, 27-30 Nov. 2007, pp. 158 - 162
8. Per Henrik Borgstrom, Peter Nils Borgstrom, Michael Stealey, Brett Jordan, Gaurav Sukhatme, Maxim A. Batalin, William Kaiser, (2007), "Discrete Trajectory Control Algorithms for NIMS3D, an Autonomous Underconstrained Three-Dimensional Cabled Robot", *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Oct 29 - Nov 2, 2007, Sheraton Hotel, San Diego, CA, pp. 253 - 260
9. Winston Wu, Maxim A. Batalin, L.K. Au, A.A.T Bui, W.J. Kaiser, "Context-aware Sensing of Physiological Signals," *29th Conference of IEEE Engineering in Medicine and Biology Society (EMBC 2007)*, 22-26 Aug. 2007, pp. 5271 - 5275, Lyon, France.

10. Winston Wu, Maxim A. Batalin, A.A.T. Bui, M. Sarrafzadeh and W.J. Kaiser, "A novel method and testbed for sensor management and patient diagnosis," *Joint Workshop On High Confidence Medical Devices, Software, and Systems (HCMDSS) and Medical Device Plug-and-Play (MD PnP) Interoperability (HCMDSS/MD PnP'07)*, pp. 76-87, Boston, MA, June 2007
11. Amarjeet Singh, Maxim A. Batalin, M., Stealey, M., Chen, W., Lam, Y., Hansen, M., Harmon, T., Sukhatme, G., Kaiser, W., (2007), "Mobile robot sensing for environmental applications", *6th International Conference on Field and Service Robotics*, Volume 42/2008, pp. 125-135, June 9-12, 2007, Chamonix France
12. Amarjeet Singh, Maxim A. Batalin, Chen, W., Stealey, M., Jordan, B., Fisher, J., Harmon, T., Hansen, M. and Kaiser, W., (2007), "Autonomous robotic sensing experiments at San Joaquin river", *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 4987-4993, April 10-14, 2007, Rome, Italy
13. Brett L. Jordan, Maxim A. Batalin, William J. Kaiser, "NIMS RD: A Rapidly Deployable Cable Based Robot", *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 144-150, April 10-14, 2007, Rome, Italy
14. Amarjeet Singh, Krause, A., Guestrin, C., Kaiser, W., Maxim A. Batalin, (2007), "Efficient planning of informative paths for multiple robots", *International Joint Conference on Artificial Intelligence(IJCAI)*, January 6-12, 2007, Hyderabad, India
15. Amarjeet Singh, Diane Budzik, Willie Chen, Maxim A. Batalin and William J. Kaiser, (2006), "Multiscale Sensing: A new paradigm for actuated sensing of high frequency dynamic phenomena," *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Beijing, China, pp. 328 – 335, October 2006.
16. Per Henrik Borgstrom, Michael Stealey, Maxim A. Batalin and William J. Kaiser, (2006), "NIMS RD-3D: A Novel Rapidly Deployable Robot for 3-Dimensional Applications," *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Beijing, China, Page(s):3628 - 3635, October 2006.
17. Maxim A. Batalin and Gaurav S. Sukhatme, "The Analysis of an Efficient Algorithm for Robot Coverage and Exploration based on Sensor Network Deployment," In *IEEE International Conference on Robotics and Automation*, pp. 3478 - 3485, Barcelona, Spain, Apr 2005.
18. Maxim A. Batalin, William Kaiser, Richard Pon, Gaurav S. Sukhatme, Gregory Pottie, Yan Yu, Jason Gordon, Mohammad H. Rahimi, and Deborah Estrin, "Task Allocation for Event-Aware Spatiotemporal Sampling of Environmental Variables," In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 721 – 728, Edmonton, Canada, Aug 2005.
19. Richard Pon, Maxim A. Batalin, Jason Gordon, Mohammad H. Rahimi, William Kaiser, Gaurav S. Sukhatme, Mani Srivastava, and Deborah Estrin, "Networked Infomechanical Systems: A Mobile Wireless Sensor Network Platform," In *IEEE/ACM Fourth International Conference on Information Processing in Sensor Networks (IPSN-SPOTS)*, pp. 376-381, Apr 2005.
20. Maxim A. Batalin and Gaurav S. Sukhatme, "Using a Sensor Network for Distributed Multi-Robot Task Allocation," In *IEEE International Conference on Robotics and Automation*, pp. 158-164, New Orleans, Louisiana, Apr 2004.
21. Maxim A. Batalin, Gaurav S. Sukhatme, and Myron Hattig, "Mobile Robot Navigation using a Sensor Network," In *IEEE International Conference on Robotics and Automation*, pp. 636-642, New Orleans, Louisiana, Apr 2004.
22. Maxim A. Batalin, Gaurav S. Sukhatme, Yan Yu, Mohammad H. Rahimi, Gregory Pottie, William Kaiser, and Deborah Estrin, "Call and Response: Experiments in Sampling the Environment," In *ACM SenSys*, pp. 25-38, Baltimore, Maryland, Nov 2004.
23. Richard Pon, Maxim A. Batalin, Yan Yu, Deborah Estrin, Gregory Pottie, Mani Srivastava, Gaurav S. Sukhatme, and William Kaiser, "Self-Aware Distributed Embedded Systems," In *10th IEEE International Workshop on Future Trends of Distributed Computing Systems*, pp. 102-107, May 2004.
24. Maxim A. Batalin, Gaurav S. Sukhatme, Yan Yu, Mohammad H. Rahimi, Gregory Pottie, William Kaiser, and Deborah Estrin, "Sensor Network as a Distributed Manager for Multi-Robot Task Allocation," In *ACM SenSys*, pp. 320-321, November 2003, Los Angeles, CA

25. Maxim A. Batalin and Gaurav S. Sukhatme, "Efficient Exploration Without Localization," In *IEEE International Conference on Robotics and Automation*, pp. 2714-2719, Taipei, Taiwan, Sep 2003.
26. Maxim A. Batalin and Gaurav S. Sukhatme, "Dynamic Coverage via Multi-Robot Cooperation," In *Proceedings from the International Workshop on Multi-Robot Systems*, pp. 295-296, Washington DC, Mar 2003.
27. Maxim A. Batalin and Gaurav S. Sukhatme, "Sensor Network-based Multi-Robot Task Allocation," In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 1939-1944, Las Vegas, Nevada, Oct 2003.
28. Maxim A. Batalin and Gaurav S. Sukhatme, "Coverage, Exploration and Deployment by a Mobile Robot and Communication Network," In *Proceedings of the International Workshop on Information Processing in Sensor Networks*, pp. 376-391, Palo Alto Research Center (PARC), Palo Alto, Apr 2003.
29. Maxim A. Batalin and Gaurav S. Sukhatme, "Spreading Out: A Local Approach to Multi-robot Coverage," In *Proceedings of the International Symposium on Distributed Autonomous Robotic Systems*, pp. 373-382, Fukuoka, Japan, Jun 2002.
30. Maxim A. Batalin and Gaurav S. Sukhatme, "Sensor Coverage using Mobile Robots and Stationary Nodes," In *SPIE Conference on Scalability and Traffic Control in IP Networks II (Disaster Recovery Networks)*, pp. 269-276, Aug 2002.

Unrefereed Publications

1. Batalin, M.A., Rahimi M. H., Yu Y., Liu D., Kansal A., Sukhatme G. S., Kaiser, W., Hansen M., Pottie G., Srivastava M., and Estrin D. (2004): "Towards Event-Aware Adaptive Sampling Using Static and Mobile Nodes", Center for the Embedded Network Sensing (CENS) Technical Report #38, 2004.
2. Batalin, M.A. and Sukhatme, G.S. (2002): "Multi-robot Dynamic Coverage of a Planar Bounded Environment", Technical Report, Center for Robotics and Embedded Systems, School of Engineering (CRES), CRES-02-011

Presentations (not including conference presentations)

1. "Cooperative Algorithms for Mobile Robots and a Sensor Network," lecture of CS 213 course at UCLA, Los Angeles, CA, February 24, 2004.
2. "Symbiosis: Cooperative Algorithms for a Mobile Robot and a Sensor Network," CENS Technical Seminar Series, Boelter Hall, UCLA, Los Angeles, CA, February 13, 2004
3. "Mobile Robots And Sensor Network: Working Together," presentation at CENS First Annual Research Review, CENS, Los Angeles, CA, October 10, 2003.
4. "Robots and Sensor Network: Exploration, Deployment, Navigation and Beyond," presentation at CENS First Annual Research Review, CENS, Los Angeles, CA, October 10, 2003.
5. "Collaboration between Mobile Robots and Sensor Networks," Intel Research Seminar Series, Portland, OR, August 4, 2003.

Memberships

IEEE: <http://www.ieee.org>

Center for Robotic and Embedded Systems (CRES): <http://www-robotics.usc.edu/~cres>

NSF Center for the Embedded Networked Sensing (CENS): <http://www.cens.ucla.edu>

New York Academy of Sciences: <http://www.nyas.org>

Reviewing

Journals: IEEE Transactions on Robotics and Automation, IEEE Computer Journal, IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, Autonomous Robots, IEEE Pervasive Computing magazine, IEEE Transactions on Systems, Man and Cybernetics

Conferences: IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference of Robots and Systems (IROS), International Symposium on Distributed Autonomous Robotic Systems, IEEE Wireless Communications and Networking Conference, International Conference on Body Area Networks