

Hamidreza Chitsaz

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Department of Computer Science
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Research Interests

- **Genomics:** single cell and multicell de novo assembly and variation detection of genome and transcriptome
- **Structural Molecular Biology:** RNA-RNA interaction, RNA secondary and tertiary structure prediction and kinetics, RNA drug design
- **Robotics:** optimal control and geodesics for mobile robots, motion planning for nonholonomic systems

Education

Doctor of Philosophy	Computer Science University of Illinois at Urbana-Champaign August 2001 - January 2008
Master of Science	Mathematics University of Illinois at Urbana-Champaign December 2006
Bachelor of Science	Computer Engineering - Software and Pure Mathematics (dual major) Sharif University of Technology September 1996 - June 2001

Employment

2011-	Assistant Professor	Dept of Computer Science	Wayne State University
2010-2011	Postdoctoral Scholar	Bioinformatics	University of California, San Diego
2008-2009	Postdoctoral Fellow	Computational Biology	Simon Fraser University
2002-2008	Research Assistant	Computer Science	University of Illinois at Urbana-Champaign
1997-2001	Undergrad RA	RoboCup Lab	Sharif University of Technology

Publications

Book

1. **Hamidreza Chitsaz.** Geodesics for Mobile Robots: A geometric optimal control approach. ISBN: 978-3639126785, Saarbrücken, Germany: VDM, 2009

Journal Publications

2. **Hamidreza Chitsaz**, Joyclyn L. Yee-Greenbaum, Glenn Tesler, Mary-Jane Lombardo, Christopher L. Dupont, Jonathan H. Badger, Mark Novotny, Douglas B. Rusch, Louise J. Fraser, Niall A. Gormley, Ole Schulz-Trieglaff, Geoffrey P. Smith, Dirk J. Evers, Pavel A. Pevzner, Roger S. Lasken. Efficient De Novo Assembly of Single-Cell Bacterial Genomes from Short-Read Data Sets
Nature Biotechnology, Vol. 29, No. 10, pp 915 - 921, October 2011 (doi:10.1038/nbt.1966)
3. **Hamidreza Chitsaz**, Raheleh Salari, S. Cenk Sahinalp, Rolf Backofen. A Partition Function Algorithm for Interacting Nucleic Acid Strands
Bioinformatics 25(12): i365-i373; doi:10.1093/bioinformatics/btp212
4. **Hamidreza Chitsaz**, Steven M. LaValle, Devin J. Balkcom, Matthew T. Mason. Minimum Wheel-Rotation Paths for Differential-Drive Mobile Robots
International Journal of Robotics Research (IJRR), 28: 66-80, 2009
5. Manuela M. Veloso, Tucker R. Balch, Peter Stone, Hiroaki Kitano, Fuminori Yamasaki, Ken Endo, Minoru Asada, Mansour Jamzad, B. S. Sadjad, V. S. Mirrokni, Moslem Kazemi, **Hamidreza Chitsaz**, A. Heydarnoori, MohammadTaghi Hajiaghayi, Ehsan Chiniforooshan. RoboCup-2001: The Fifth Robotic Soccer World Championships
AI Magazine, Vol. 23(1): 55-68, American Association for Artificial Intelligence, 2002
6. M. Jamzad, A. Foroughnassiraei, E. Chiniforooshan, R. Ghorbani, M. Kazemi, **H. Chitsaz**, F. Mobasser, and S.B. Sadjad. ARVAND: A Soccer Player Robot
AI Magazine, Vol. 21(3): 47-51, American Association for Artificial Intelligence, 2000

Refereed Conference Publications

7. **Hamidreza Chitsaz**, Rolf Backofen, S. Cenk Sahinalp. biRNA: Fast RNA-RNA Binding Sites Prediction
The 9th Workshop on Algorithms in Bioinformatics (WABI), Philadelphia, PA
Lecture Notes in Bioinformatics Vol. 5724, pp. 25-36, Springer, 2009
8. **Hamidreza Chitsaz**, Raheleh Salari, S. Cenk Sahinalp, Rolf Backofen. A Partition Function Algorithm for Interacting Nucleic Acid Strands
Proceedings of the 17th Annual International Conference on Intelligent Systems for Molecular Biology (ISMB/ECCB), Stockholm, Sweden, 2009
9. **Hamidreza Chitsaz**, Steven M. LaValle, Jason O’Kane. Exact Pareto-optimal Coordination of Two Translating Polygonal Robots on a Cyclic Roadmap
Proceedings of the 20th Canadian Conference on Computational Geometry (CCCG), 2008
10. Andrei Furtuna, Devin J. Balkcom, **Hamidreza Chitsaz**, Paritosh Kavathekar. Generalizing the Dubins and Reeds-Shepp cars: fastest paths for bounded-velocity mobile robots
Proceedings of IEEE Conference on Robotics and Automation (ICRA), 2008
11. **Hamidreza Chitsaz** and Steven M. LaValle. Time-optimal Paths for a Dubins Airplane
Proceedings of the 46th IEEE Conference on Decision and Control (CDC), 2007
12. **Hamidreza Chitsaz** and Steven M. LaValle. Minimum Wheel-Rotation Paths for Differential-Drive Mobile Robots Among Piecewise Smooth Obstacles
Proceedings of IEEE Conference on Robotics and Automation (ICRA), 2007

13. **Hamidreza Chitsaz**, Steven M. LaValle, Devin J. Balkcom, Matthew T. Mason. An Explicit Characterization of Minimum Wheel-Rotation Paths for Differential-Drives
Proceedings of the 12th IEEE International Conference on Methods and Models in Automation and Robotics (MMAR), 2006
14. **Hamidreza Chitsaz**, Steven M. LaValle, Devin J. Balkcom, Matthew T. Mason. Minimum Wheel-Rotation Paths for Differential-Drive Mobile Robots
Proceedings of IEEE Conference on Robotics and Automation (ICRA), 2006
15. **Hamidreza Chitsaz**, Jason M. O’Kane, Steven M. LaValle. Exact Pareto-Optimal Coordination of Two Translating Polygonal Robots on an Acyclic Roadmap
Proceedings of IEEE Conference on Robotics and Automation (ICRA), 2004
16. M. Jamzad, B. S. Sadjad, V. S. Mirrokni, M. Kazemi, **H. Chitsaz**, A. Heydarnoori, M. T. Hajiaghahi, E. Chiniforooshan. A Fast Vision System for Middle Size Robots in RoboCup
Lecture Notes in Computer Science Vol. 2377, pp. 71-80, 2002
This paper is awarded the **Best Engineering Challenge Award** in RoboCup 2001.
17. M. Jamzad, A. Foroughnassiraei, E. Chiniforooshan, R. Ghorbani, M. Kazemi, **H. Chitsaz**, F. Mobasser, and S.B. Sadjad. Middle Sized Soccer Robots: ARVAND
RoboCup-99: Robot Soccer World Cup III, Lecture notes in Artificial Intelligence, Vol. 1856, pp. 61-73, Springer-Verlag, Berlin, 2000

Abstracts and Non-refereed Publications

18. **H. Chitsaz**. De Novo Assembly of Bacterial Genomes from Single Cells
Genome Informatics-Cold Spring Harbor Lab, 2011
19. R. Backofen, **H. Chitsaz**, I. Hofacker, S. C. Sahinalp, and P. F. Stadler. Computational Studies of Non-Coding RNAs - Session Introduction
Pacific Symposium on Biocomputing (PSB), 2010
20. Mansour Jamzad, **Hamidreza Chitsaz**, Amirali Foroughnassirai, Reza Ghorbani, Moslem Kazemi, V. S. Mirrokni, B. S. Sadjad. Basic Requirements for a Teamwork in Middle Size RoboCup
RoboCup 2001: Lecture Notes in Computer Science Vol. 2377, pp. 621-626, 2002
21. Mohammad Taghi Manzuri, **Hamidreza Chitsaz**, Reza Ghorbani, Pooya Karimian, Alireza Mirazi, Mehran Motamed, Roozbeh Mottaghi, Payam Sabzmeydani. Sharif CESR Small Size Robocup Team
RoboCup 2001: Lecture Notes in Computer Science Vol. 2377, pp. 595-598, 2002
22. M. Jamzad, A. Foroughnassiraei, M.T. Hadjiaghahi, V.S.Mirrokni, R. Ghorbani, A. Heydarnoori, M. Kazemi, **H. Chitsaz**, F. Mobasser, M. Ebraahimi Moghaddam, M. Gudarzi, N. Ghaffarzadegan. A Goalkeeper for Middle Size RoboCup
RoboCup-2000: Robot Soccer World Cup IV, Lecture notes in Artificial Intelligence, Vol. 2019, pp. 583-586, Springer-Verlag, Berlin, 2001
23. M. Jamzad, A. Foroughnassiraei, E. Chiniforooshan, R. Ghorbani, M. Kazemi, **H. Chitsaz**, F. Mobasser, and S.B. Sadjad. Design and Construction of a Soccer Player Robot ARVAND
RoboCup-99: Robot Soccer World Cup III, Lecture notes in Artificial Intelligence, Vol. 1856, pp. 745-749, Springer-Verlag, Berlin, 2000

Preprints

24. **Hamidreza Chitsaz**. Prediction of RNA-RNA interaction structure by centroids in the Boltzmann ensemble
arXiv:1002.1736v1, <http://arxiv.org/abs/1002.1736v1>, Feb 2010

Theses

25. **Hamidreza Chitsaz**. Geodesic Problems for Mobile Robots
PhD Dissertation, University of Illinois at Urbana-Champaign, 2008
26. **Hamidreza Chitsaz**. Design and Implementation of A Controller for Small Size Soccer Player Robot
Bachelor's Thesis (in persian), Sharif University of Technology 2001

Teaching

- *CSC7991 Advanced Topics in Computer Science: Bioinformatics II*, Wayne State University, Department of Computer Science, Winter 2012
- *CSC7991 Advanced Topics in Computer Science: Bioinformatics I*, Wayne State University, Department of Computer Science, Fall 2011
- *CS173 Discrete Mathematical Structures*, University of Illinois at Urbana-Champaign, Department of Computer Science, Fall 2005
- *Foundations of Computer Science I*, Sharif University of Technology, Computer Engineering Department, Sep 1997 - Jun 1999

Awards and Honors

- Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Research and Development **Postdoctoral Fellowship**, 2009
- Winner of **Best Engineering Challenge Award** in RoboCup in Seattle, WA, 2001
- **World Champion** (first rank together with *Sharif CE* team) in RoboCup Middle Size League in Sweden, 1999
- **Europe Champion** (first rank together with *Sharif CE* team) in European RoboCup Middle Size League in the Netherlands, 2000
- **World 3rd Place** (together with *Sharif CE* team) in RoboCup Middle Size League in Australia, 2000
- **Bronze Medal** in Iranian Mathematics Olympiad, Fall 1995
- **Diploma with Honors** from *Exceptional Talents High School* (Allameh-Helli High School) specialized for gifted and talented students affiliated with *National Organization for Development of Exceptional Talents*, 1996

Served as Program Chair and Referee

Technical Program Committee Member: Research in Computational Molecular Biology - Next generation sequencing (RECOMB-seq) 2012, RoboCup IranOpen Symposium (RIOS) 2011 and 2012

Session Co-chair: Pacific Symposium on Biocomputing (PSB) 2010

Journals: Bioinformatics, Journal of Computational Biology (JCB), BMC Bioinformatics, International Journal of Robotics Research (IJRR), IEEE Transactions on Robotics (ITRO), IEEE Transactions on Automatic Control (ITAC), SIAM Journal on Control and Optimization (SICON), Autonomous Robots (AR), IEEE Transactions on Systems, Man, and Cybernetics (ITSMC), Journal of guidance, control, and dynamics (AIAA JGCD), IEEE Transactions on Robotics and Automation (ITRA), IEEE Transactions on Control Systems Technology

Conferences: Research in Computational Molecular Biology (RECOMB), IEEE Conference on Decision and Control (CDC), ACM-SIAM Conference on Discrete Algorithms (SODA), IEEE Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Robotics: Science and Systems (RSS), American Control Conference (ACC), IEEE International Conference on Bioinformatics and Biomedicine (BIBM), Asia Pacific Bioinformatics Conference (APBC), Combinatorial Pattern Matching (CPM), IEEE Multi-conference on Systems and Control (MSC), Southern Symposium on System Theory (SSST)

Invited Talks

- *De novo assembly of bacterial genomes from single cells*, Computer Science, Wayne State University, Detroit, MI, March 2011
- *Prediction of RNA-RNA interaction probability and structure*, Computer Science and Engineering Seminar, University of California, San Diego, CA, September 2009
- *Prediction of RNA-RNA interaction probability and structure*, Bioinformatics for Combating Infectious Diseases (BCID) meeting, Simon Fraser University, September 2009
- *Predicting RNA-RNA interaction probability and structure*, MathFest - Annual Meeting of the Mathematical Association of America, Portland, OR, August 2009
- *RNA Folding and RNA-RNA Interaction Prediction*, Advanced CS Seminar, School of Computing Science, Simon Fraser University, March 2009
- *Geodesics for Mobile Robots*, Robotics Seminars, Faculty of Applied Sciences, Simon Fraser University, March 2009
- *Pareto-optimal Coordination of Multiple Robots*, Computer Science Theory Seminar, School of Computing Science, Simon Fraser University, October 2008
- *Nonlinear Optimization in Robotics*, Covert Systems Biology Lab, Bio-X Center, Stanford University, July 2007

Professional Memberships

- International Society for Computational Biology (ISCB)

- Institute of Electrical and Electronics Engineers (IEEE)
- Society for Industrial and Applied Mathematics (SIAM)

Computer Skills

Programming: C, C++, Java, Assembly, Matlab, HTML, PHP, Perl, Python, SQL

OS: Linux, AIX, SunOS

Hardware design: Microcontrollers, DSP, and FPGA