

Hamidreza Chitsaz

School of Computing Science

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Research Interests

- RNA secondary and tertiary structure prediction
- RNA-RNA and RNA-Protein interaction prediction
- RNA folding and RNA-RNA interaction kinetics
- Dynamical metabolic modeling and control
- Optimal Control and Geodesics for Mobile Robots
- Motion Planning for Nonholonomic Robots

Education

Doctor of Philosophy in Computer Science
University of Illinois at Urbana-Champaign
August 2001 - January 2008

Master of Science in Mathematics
University of Illinois at Urbana-Champaign
December 2006

Bachelor of Science in Computer Engineering - Software
and Pure Mathematics (dual major)
Sharif University of Technology
September 1996 - June 2001

Research Experience

- **SFU Computational Biology Lab:** Postdoctoral Fellow, School of Computing Science, Simon Fraser University working on RNA folding and RNA-RNA interaction prediction algorithms with Cenk Sahinalp since Feb 2008.
- **UIUC Motion Strategy Lab:** On shortest and optimal trajectories for mobile robots working with Steven M. LaValle, Jan 2002 - Jan 2008.
- **UIUC Bioinformatics Lab:** On algorithms for detection of cis-regulatory modules, Department of Computer Science working with Saurabh Sinha, Fall 2005.
- **Sharif CE Middle Size RoboCup team:** On control and motion planning algorithms and software for mobile robots, Department of Computer Engineering, Sharif University of Technology working with Mansour Jamzad, Oct 1997 - Aug 2001.
- **Sharif CESR Small Size RoboCup team:** On control and motion planning algorithms and software for mobile robots, Department of Computer Engineering, Sharif University of Technology working with Mohammad Taghi Manzuri, Mar 2000 - Aug 2001.

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**, 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
3. **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
4. 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, Mohammad-Taghi Hajiaghayi, Ehsan Chiniforooshan. RoboCup-2001: The Fifth Robotic Soccer World Championships
AI Magazine, Vol. 23(1): 55-68, American Association for Artificial Intelligence, 2002

5. 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

6. **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
7. **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
8. **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
9. 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
10. **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
11. **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
12. **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
13. **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
14. **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

15. M. Jamzad, B. S. Sadjad, V. S. Mirrokni, M. Kazemi, **H. Chitsaz**, A. Heydarnoori, M. T. Hajiaghai, 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.
16. 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

Non-Refereed Conference Publications

17. 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
18. Mohammad Taghi Manzuri, **Hamidreza Chitsaz**, Reza Ghorbani, Pooya Karimian, Alireza Mirazi, Mehran Motamed, Roozbeh Mottaghi, Payam Sabzmezdani. Sharif CESR Small Size Robocup Team
RoboCup 2001: Lecture Notes in Computer Science Vol. 2377, pp. 595-598, 2002
19. M. Jamzad, A. Foroughnassiraei, M.T. Hadjiaghayi, V.S.Mirrokni, R. Ghorbani, A. Heydarnoori, M. Kazemi, **H. Chitsaz**, F. Mobasser, M. Ebraahimi Moghadam, M. Gudarzi, N. Ghaffarzagdegan. 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
20. 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

Theses

21. **Hamidreza Chitsaz**. Geodesic Problems for Mobile Robots
PhD Dissertation, University of Illinois at Urbana-Champaign, 2008
22. **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 Experience

- *CS173 Discrete Mathematical Structures*, University of Illinois at Urbana-Champaign, Department of Computer Science, Fall 2005
- *Foundations of Computer Science I* at 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**¹ 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
- **First Place** in Computer Science and **Fourth Place** in Computer Engineering Higher Education (MSc) National Universities Entrance Examination, Iran, 2001
Remark: About 20,000 students participated in Computer Engineering and Science Higher Education (MSc) National Universities Entrance Examination in 2001.
- The 31st place in Iran National Universities Entrance Examination, 1996
Remark: About 300,000 students participated in Iran National Universities Entrance Examination in Mathematics, Physics, and Engineering fields. I took the 31st rank in this exam in 1996.
- **Bronze Medal** in Iran 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 Developing Exceptional Talents*, 1996

Served as Program Chair and Referee

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

¹<http://www.robocup.org/games/01Seattle/3151.html>

Journals: International Journal of Robotics Research (IJRR), IEEE Transactions on Robotics (ITRO), IEEE Transactions on Automatic Control (ITAC), IEEE Transactions on Robotics and Automation (ITRA), SIAM Journal on Control and Optimization (SICON), IEEE Transactions on Systems, Man, and Cybernetics (ITSMC), Journal of guidance, control, and dynamics (AIAA JGCD)

Conferences: 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) (Program Chair), Southern Symposium on System Theory (SSST)

Invited Talks

- *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
- *Shortest Paths for a Differential Drive Vehicle*, CS Theory Seminar, Department of Computer Science, University of Waterloo, April 2006

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, PC x86 Assembly, Cobol, Matlab, HTML, PHP, SQL, L^AT_EX, **OS:** Linux, Unix, Vax/Vms, and Windows, **Hardware design:** Micro-controllers, TI DSPs, and FPGA

Current References

<p><i>S. Cenk Sahinalp, Professor</i> School of Computing Science Simon Fraser University 8888 University Dr, Burnaby, BC Canada Tel: (778) 782-7040 Email: cenk@cs.sfu.ca</p>	<p><i>Steven M. LaValle, Professor</i> Department of Computer Science University of Illinois at Urbana- Champaign 201 N. Goodwin Ave, Urbana, IL 61801 Tel: (217) 265-6313 Email: lavalle@uiuc.edu</p>
<p><i>Jeff Erickson, Associate Professor</i> Department of Computer Science University of Illinois at Urbana- Champaign 201 N. Goodwin Ave, Urbana, IL 61801 Tel: (217) 333-6769 Email: jeffe@cs.uiuc.edu</p>	<p><i>Anil N. Hirani, Assistant Professor</i> Department of Computer Science University of Illinois at Urbana- Champaign 201 N. Goodwin Ave, Urbana, IL 61801 Tel: (217) 333-2727 Email: hirani@cs.uiuc.edu</p>
<p><i>Devin J. Balkcom, Assistant Professor</i> Dartmouth Computer Science Department 6211 Sudikoff, Hanover, NH 03755 Tel: (603) 646-1691 Email: devin.balkcom@dartmouth.edu</p>	