

ULUÇ SARANLI

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RESEARCH INTERESTS

Formal methods for robot programming, analysis and control of legged locomotion, dynamically dexterous robot behaviors, applications of formal logic and type theory to robot motion planning, physically realistic simulation.

EDUCATION

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| Ph.D. in Computer Science: Intelligent Systems
University of Michigan, Ann Arbor, MI, USA | 09/2002 |
| M.Sc. in Computer Science
University of Michigan, Ann Arbor, MI, USA | 05/1998 |
| B.Sc. in Electrical and Electronics Engineering
Middle East Technical University, Ankara, Turkey. GPA: 3.72/4.00 | 05/1996 |

ACADEMIC AND INDUSTRIAL EXPERIENCE

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|---|-------------------|
| Assistant Professor
Dept. of Computer Engineering, Bilkent University, Ankara, Turkey | 09/2005 - Present |
| Postdoctoral Fellow
The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, USA | 09/2002 - 06/2005 |
| Research Assistant
Dept. of Computer Science, The University of Michigan, Ann Arbor, MI, USA | 09/1998 - 08/2002 |
| Graduate Student Instructor
Dept. of Computer Science, The University of Michigan, Ann Arbor, MI, USA | 01/1997 - 08/1998 |
| Project Manager
The Scientific and Technical Research Council of Turkey, Ankara, Turkey | 09/1994 - 01/1996 |
| Computer Consultant
The Middle East Technical University Computer Center, Ankara, Turkey | 09/1992 - 05/1994 |

ACTIVE RESEARCH PROJECTS

1. Programming Autonomous Dynamic Robot Behaviors Through Reasoning Within Constrained Intuitionistic Linear Logic. Funded by The Scientific and Technological Council of Turkey (TÜBİTAK - 109E032), 09/2009 - 09/2012, 369,802.00TL. Principal Investigator

COMPLETED RESEARCH PROJECTS

1. Behavioral Planning for Dynamically Dexterous Robots Using Constrained Intuitionistic Linear Logic. Funded by the European Commission, Marie-Curie International Reintegration Program (MIRG-CT-2006-044964), 09/2007 - 09/2009, €80,000.00. Principal Investigator.
2. State estimation and dynamic feedback behaviors for a legged robot for outdoor applications. Funded by The Scientific and Technological Council of Turkey (TÜBİTAK - 106E089), 01/2007 - 1/2010, 298,741.00TL. Co-PI.

TEACHING EXPERIENCE

Assistant Professor, Bilkent University

- CS 223: Digital Design (Fall 2006)
- CS 315: Programming Languages (Fall 2005, Fall 2006, Fall 2007, Fall 2008, Fall 2009, Fall 2010).
- CS 482: Logic for Computer Science (Fall 2008, Fall 2010).
- CS 431: Embedded Systems (Spr 2006, Spr 2007, Spr 2008, Spr 2009, Spr 2010).
- CS 548: Robot Motion Planning and Control (Spr 2007, Spr 2008, Spr 2009, Spr 2009, Spr 2010).

Graduate Student Instructor, The University of Michigan

- EECS 467: Introduction to Robotics (Winter 1998).
- EECS 303: Discrete Mathematics (Fall 1997).
- EECS 481: Software Engineering (Winter 1997).

GRADUATE STUDENT SUPERVISION

- Tuğba Yıldız (M.Sc.), graduated August 2010, Bilkent University
- M. Mert Ankaralı (M.Sc.), graduated January 2010, Middle East Technical University
- Cihan Öztürk (M.Sc.), graduated August 2009, Bilkent University
- Ömür Arslan (M.Sc.), graduated July 2009, Bilkent University
- Akın Avcı, graduated December 2008, Bilkent University
- Mert Duatepe, graduated September 2008, Bilkent University
- İskender Yakın (M.Sc.), graduated July 2008, Bilkent University

PROFESIONAL ACTIVITIES

- EURON (European Robotics Network) member
- CLAWAR (Climbing and Walking Robots Association) member
- IEEE and IEEE Robotics and Automation Society member
- Organizing Committee Memberships
 - RSS 2011 - Area chair for the 2011 Robotics: Science and Systems Conference
 - Robocup 2011 - Local organizing chair for the 2011 Robocup Symposium
 - UYMS 2007 - Organizing committee member and editorial board co-chair for the 2007 Turkish National Symposium on Software Engineering
 - ICRA 2006 - Associate editor for the 2006 International Conference on Robotics and Automation
- Program Committee Memberships
 - RSS 2010 - Robotics: Science and Systems Conference
 - ICRA 2010 - International Conf. on Robotics and Automation
 - IROS 2010 - International Conf. on Intelligent Robots and Systems
 - CLAWAR 2009 - International Conf. on Climbing and Walking Machines
 - ICRA 2009 - International Conf. on Robotics and Automation
 - IROS 2009 - International Conf. on Intelligent Robots and Systems
 - ICRA 2008 - International Conf. on Robotics and Automation
 - IROS 2008 - International Conf. on Intelligent Robots and Systems
 - UYMS 2007 - Turkish National Symposium on Software Engineering
 - RTAS 2004 - IEEE Real-Time and Embedded Technology and Applications Symposium
- Refereeing for Scholarly and Professional Journals
 - IEEE Transactions on Robotics and Automation
 - International Journal on Robotics Research
 - Autonomous Robots
 - Robotics and Autonomous Systems
 - Advanced Robotics
 - IEEE/ASME Transactions on Mechatronics
 - ASME Journal of Dynamic Systems, Measurement, and Control
 - IEEE Journal on Systems, Man and Cybernetics
 - IEEE Transactions on Instrumentation and Measurement
 - Nonlinear Dynamics

- IEEE Transactions on Parallel and Distributed Systems

PATENTS

M. Buehler, U. Saranlı, D. E. Koditschek, "Single Actuator per leg Robotic Hexapod", U.S. Patent no. 6,481,513, November 2002

HONORS AND AWARDS

- The Scientific and Technical Research Council of Turkey Graduate Fellowship, 1996–1997
- Middle East Technical University: graduated with High Honors in Engineering, 1996

PUBLICATIONS

Journal Papers

1. M. M. Ankaralı, and U. Saranlı, "Control of Underactuated Planar Pronking Through an Embedded Spring-Mass Hopper Template". *Autonomous Robots*. to appear, 2010.
2. M. M. Ankaralı and U. Saranlı, "Stride-to-stride energy regulation for robust self-stability of a torque-actuated dissipative spring-mass hopper", *Chaos*, 20, 033121, September 2010.
DOI: 10.1063/1.3486803.
3. U. Saranlı, A. Avcı, M. C. Öztürk, "A Modular, Real-Time Fieldbus Architecture for Mobile Robotic Platforms". *IEEE Transactions on Instrumentation and Measurement.*, 2010.
DOI: 10.1109/TIM.2010.2078351
4. U. Saranlı, Ö. Arslan, M. M. Ankaralı and Ö. Morgül, "Approximate Analytic Solutions to Non-symmetric Stance Trajectories of the Passive Spring-Loaded Inverted Pendulum with Damping", *Nonlinear Dynamics*, 62(4):729-742, December 2010.
DOI: 10.1007/s11071-010-9757-8.
5. A. Greenfield, U. Saranlı, and A. A. Rizzi, "Solving Models of Controlled Dynamic Planar Rigid-Body Systems with Frictional Contact", *International Journal of Robotics Research*, 24(11):911-931, November 2005.
DOI: 10.1177/0278364905059056.
6. U. Saranlı, A. A. Rizzi, D. E. Koditschek, "Model-Based Dynamic Self-Righting Maneuvers for a Hexapedal Robot", *International Journal of Robotics Research*, 23(9):903-917, September 2004.
DOI: 10.1177/0278364904045594.
7. U. Saranlı, M. Buehler, D. E. Koditschek, "RHex: A Simple and Highly Mobile Hexapod Robot", *International Journal of Robotics Research*, 20(7):616–631, July 2001.
DOI:10.1177/02783640122067570.
8. R. Altendorfer, N. Moore, H. Komsuoglu, M. Buehler, H.B. Brown Jr., D. McMordie, U. Saranlı, R.J. Full, D. E. Koditschek. "RHex: A Biologically Inspired Hexapod Runner", *Autonomous Robots* 11 : 207–213, 2001.
DOI: 10.1023/A:1012426720699.

Conference Papers

1. U. Çulha and U. Saranlı, "Quadrupedal Bounding with an Actuated Spinal Joint". Submitted to the *Int. Conf. on Robotics and Automation (ICRA)*, 2011.
2. İ. Uyanık, U. Saranlı and Ö. Morgül, "Adaptive Control of a Spring-Mass Hopper". Submitted to the *Int. Conf. on Robotics and Automation (ICRA)*, 2011.
3. M. M. Ankaralı and U. Saranlı, "Analysis and Control of a Dissipative Spring-Mass Hopper with Torque Actuation". In *Proceedings of Robotics: Science and Systems*, June 2010, Zaragoza, Spain.
4. M. M. Ankaralı, U. Saranlı and A. Saranlı, "Control of Underactuated Planar Hexapedal Pronking Through a Dynamically Embedded SLIP Monopod". In *Proceedings of the IEEE Int. Conf. on Robotics and Automation*, May 2010, Anchorage, USA.
5. Ö. Arslan, U. Saranlı and Ö. Morgül, "Reactive Footstep Planning for a Planar Spring Mass

Hopper". In *Proceedings of the IEEE/RSJ Int. Conf. on Intelligent Robots and Systems*, October 2009, St. Louis, USA.

6. M. M. Ankaralı, Ö. Arslan and U. Saranlı, "An analytical solution to the stance dynamics of passive spring-loaded inverted pendulum with damping". In *Proceedings of the 12th Int. Conf. on Climbing and Walking Robots and the Support Technologies for Mobile Machines*, September 2009, İstanbul, Turkey.
7. Ö. Arslan, U. Saranlı and Ö. Morgül, "An Approximate Stance Map of The Spring Mass Hopper with Gravity Correction For Nonsymmetric Locomotions", In *Proceedings of the IEEE Int. Conf. on Robotics and Automation*, May 2009, Kobe, Japan.
8. U. Saranlı, F. Pfennig, "Using Constrained Intuitionistic Linear Logic for Hybrid Planning Problems", *Proceedings of the IEEE Int. Conf. on Robotics and Automation*, Roma, Italy, May 2007.
9. U. Saranlı, A. Rizzi, D. E. Koditschek, "Multi-Point Contact Models for Dynamic Self-Righting of a Hexapod", *Proceedings of the Sixth International Workshop on the Algorithmic Foundations of Robotics*, Utrecht/Zeist, The Netherlands; July 2004.
10. U. Saranlı, D. E. Koditschek, "Template Based Control of Hexapedal Running", *Proceedings of the IEEE Int. Conf. On Robotics and Automation*, Taipei, Taiwan; September 2003.
11. U. Saranlı, D. E. Koditschek, "Back Flips with a Hexapedal Robot", *Proceedings of the IEEE Int. Conf. On Robotics and Automation*, 3:2209–2215, Washington DC, May 2002.
12. H. Komsuoglu, D. McMordie, U. Saranlı, N. Moore, M. Buehler, D. E. Koditschek, "Proprioception Based Behavioral Advances in Hexapod Robot", *Proceedings of the IEEE Int. Conf. on Robotics and Automation*, 3650–3655, Seoul, Korea, May 2001
13. R. Altendorfer, U. Saranlı, H. Komsuoglu, D. E. Koditschek, B. Brown, M. Buehler, E. Moore, D. McMordie R.J. Full, "Evidence for Spring Loaded Inverted Pendulum Running in a Hexapod Robot", *Experimental Robotics VII*:291–302, Honolulu, HI, Dec 2000.
14. M. Buehler, U. Saranlı, D. Papadopoulos, D. E. Koditschek, "Dynamic Locomotion with four and six-legged robots", *Proceedings of Int. Symposium on Adaptive Motion of Animals and Machines*, Montreal, Canada, Aug 2000.
15. U. Saranlı, M. Buehler, D. E. Koditschek, "Design, Modeling and Preliminary Control of a Compliant Hexapod Robot", *Proceedings of the IEEE Int. Conf. on Robotics and Automation*, 3:2598-2596, San Fransisco, CA, April 2000
16. U. Saranlı, W. J. Schwind, D. E. Koditschek, "Toward the Control of a Multi-Jointed Monoped Runner", *Proceedings of the IEEE Int. Conf. on Robotics and Automation*, 2676-2682, Leuven, Belgium, May 1998

Technical Reports and Theses

1. U. Saranlı, "Dynamic Locomotion with a Hexapod Robot", Ph.D. Thesis, The University of Michigan, Ann Arbor, September 2002.
2. U. Saranlı and D. E. Koditschek, "Design and Analysis of a Flipping Controller for RHex", Technical Report CSE-TR-452-02, The University of Michigan Department of Computer Science, February 2002.
3. U. Saranlı, "SimSect Hybrid Dynamical Simulation Environment", Technical Report CSE-TR-436-00, The University of Michigan Department of Computer Science, September 2000.

Other

1. E. Klavins and U. Saranlı, "Object Oriented State Machines", *Embedded Systems Programming Magazine*, May 2002.

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