

Zsolt Kira

CONTACT INFORMATION	85 Fifth St. NW, Room S27 Mobile Robot Laboratory Georgia Institute of Technology Atlanta, GA 30328 USA	<i>Office Phone:</i> (404) 894-9311 <i>Mobile Phone:</i> (678) 758-1010 <i>E-mail:</i> zkira@gatech.edu <i>WWW:</i> http://www.cc.gatech.edu/~zkira
RESEARCH INTERESTS	Multi-Robot Systems, Machine Learning, Robot Perception, Cognitive Vision, Communication & Coordination, Grounded Concept Learning	
EDUCATION	Georgia Institute of Technology , Atlanta, Georgia USA <i>College of Computing</i> Ph.D., Computer Science, May 2010 (expected) Advisor: Ronald C. Arkin Specialization: Intelligent Systems / Robotics Thesis Title: <i>Communication and Alignment of Grounded Symbolic Knowledge Among Heterogeneous Robots</i> M.S., Computer Science, August 2008 Specialization: Intelligent Systems / Robotics University of Miami , Coral Gables, Florida USA <i>Department of Electrical and Computer Engineering</i> B.S., Computer Engineering and Computer Science (Dual), July, 2002 GPA: 3.92	
HONORS AND AWARDS	FLAIRS 2009 Best Student Paper Award Awarded 2007 Google Summer of Code grant (8 proposals accepted out of 69 for the project) Outstanding SAIC Scholar Research Award (1st place), April 2007. 2004 National Defense Science and Engineering Graduate Fellowship, Honorable Mention Eliahu I. and Joyce Jury Award for undergraduate scholarship Tzay Y. Young Award for Outstanding Senior Design Project Vice President of U.M. Chapter of ACM (Association for Computing Machinery) Member of the Eta Kappa Nu engineering honors society	
PUBLICATIONS IN SUBMISSION	[S.2] Kira, Z. , Arkin, R.C., Collins, T., “A Design Process for Robot Capabilities and Missions Applied to Microautonomous Platforms”, submitted to the SPIE Conference on Unmanned Systems Technology XII. [S.1] Ulam, P., Kira, Z. , Collins, T., Arkin, R.C., “Mission Specification and Control for Unmanned Aerial and Ground Vehicles for Indoor Target Discovery and Tracking”, submitted to the SPIE Conference on Ground/Air Multi-Sensor Interoperability, Integration, and Networking for Persistent ISR.	
PEER-REVIEWED CONFERENCE PUBLICATIONS	[C.7] Kira, Z. , Transferring Embodied Concepts between Perceptually Heterogeneous Robots , In <i>Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)</i> , pp. 4650–4656, 2009. [C.6] Kira, Z. , Mapping Grounded Object Properties across Perceptually Heterogeneous Embodiments , in <i>Proceedings of the 22nd International FLAIRS Conference</i> , pp. 57-62, 2009. Won Best Student Paper Award.	

- [C.5] **Kira, Z.** and Potter, M.A., **Exerting Human Control Over Decentralized Robot Swarms**, *4th International Conference on Autonomous Robots and Agents*, 2009.
- [C.4] **Kira, Z.** and Long, K., **Modeling Robot Differences by Leveraging a Physically Shared Context**, in *Proceedings of the Seventh International Conference on Epigenetic Robotics*, pp. 53-59, 2007.
- [C.3] **Kira, Z.**, **Modeling Cross-Sensory and Sensorimotor Correlations to Detect and Localize Faults in Mobile Robots**, in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 1520-1526, 2007. San Diego, CA.
- [C.2] **Kira, Z.** and Schultz, A.C., **Continuous and Embedded Learning for Multi-Agent Systems**, in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp.3184-3190, 2006.
- [C.1] **Kira, Z.** and Arkin, R.C., **Forgetting Bad Behavior: Memory Management for Case-Based Navigation**, *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 3145-3152, 2004.

NON-REFEREED

- [U.1] Likhachev, M., Kaess, M., **Kira, Z.**, and R.C. Arkin, **Spatio-Temporal Case Based Reasoning for Efficient Reactive Robot Navigation**, 2005.

RESEARCH
EXPERIENCE

Mobile Robot Lab, Georgia Institute of Technology, Atlanta, Georgia, USA
Graduate Research Assistant **August, 2002 - Present**

- Research and development on numerous DARPA and privately funded projects, culminating in realized systems, several publications, and both indoor and outdoor real robot demonstrations. Some of the projects include:
 - **ARL Micro Autonomous Systems and Technology** (August, 2008 - Present)
 - Architectural design for complex, multi-task, multi-robot micro-vehicle missions.
 - Integration of robotic simulators and implementation of 3D robot navigation behaviors.
 - Implementation of behaviors for cooperative surveillance of an indoor environment by a team of ground and aerial autonomous vehicles [S.1].
 - **Fault Detection and Localization (funded by SAIC)** (May, 2006 - December, 2006)
 - Wrote a concept paper detailing novel methods for integrating cross-sensory and sensorimotor data on a mobile robot, leading to funding by Science Applications International Corporation.
 - Independently designed and implemented a framework for detecting and identifying faults occurring on a robot during performance of a task (resulted in publication [C.3]).
 - **Visual SLAM (funded by SAIC)** (August 2004 - December 2005)
 - Conducted evaluation of vision-based Simultaneous Localization and Mapping (SLAM) in outdoor urban environments.
 - Designed and implemented (co-work with Alan Wagner) an exploration algorithm designed to minimize uncertainty while using Visual SLAM.
 - **DARPA Mobile Autonomous Robot Software** (January, 2003 - June, 2004)
 - Developed and evaluated forgetting mechanisms in a learning system.
 - Assisted with over one hundred outdoor robot trials evaluating the original case-based learning system.
 - Assisted with human usability study of robot mission specification software.
 - Resulted in a publication [C.1].

Naval Research Laboratory, Washington D.C. USA **June - August, 2004-2005, 2007-2009**
Contractor, Supervisors: Alan C. Schultz, Mitchell A. Potter

- Investigated the use of Anytime Learning in a multi-agent resource protection domain, in which a simulator is used for online learning in an agent (using Genetic Algorithms).
- Developed algorithms to facilitate human control of a robotic swarm in a physicomimetic system.
- Resulted in publications [C.2] [C.5].

INVITED TALKS

- **Invited Speaker at the Information Fusion and Cognitive Robotics session**, at the SPIE Defense and Security Symposium: Multisource, Multisensor Fusion Conference, Orlando, Florida, April, 2010.
- **Invited Speaker at the Fifth International Cognitive Vision Workshop (ICVW09)**, at IROS 2009, St. Louis, Missouri, October, 2009. *Overcoming heterogeneity when transferring concepts between robots with different embodiments.*
- **Design Intelligence Laboratory**, Georgia Tech, Atlanta, GA, February, 2009. *Communication and Alignment of Grounded Symbolic Knowledge Among Heterogeneous Robots.*
- **Socially Intelligent Machine Lab**, Georgia Tech., Atlanta, GA. September, 2008. *Communication and Alignment of Grounded Symbolic Knowledge Among Heterogeneous Robots.*
- **Naval Research Laboratory**, Washington D.C. May, 2007. *Finding Common Ground: Knowledge Exchange among Heterogeneous Robots.*

TEACHING AND SUPERVISORY EXPERIENCE

Georgia Institute of Technology, Atlanta, Georgia USA

Students Supervised

October, 2006 - Present

- Mentored underrepresented and minority undergraduate students as part of the SAIC scholar program.
- Mentored student's research received first place **Outstanding SAIC Scholar Research Award**, third place 2008 UROC Research Symposium Judges' Award (presented by Kathryn Long), and results stemming from this research were published [C.4].
- Supervised graduate student (Sung Hyun Park) as part of the MAST project.

Graduate Teaching Assistant

August, 2007 - December, 2007

- Courses:
 - "Robots and Society" (Spring, 2008). Instructor: Dr. Ronald C. Arkin
 - "Autonomous Robotics" (Spring, 2007). Instructor: Dr. Ronald C. Arkin
 - "Computing, Society, and Professionalism" (Fall, 2007). Instructor: Dr. Amy Bruckman
 - "Computing, Society, and Professionalism" (Spring, 2006). Instructor: Dr. Ashok Goel
- As teaching assistant, duties included giving lectures, creating assignments and exams, assisting with course materials, grading, and providing student assistance.

University of Miami, Coral Gables, Florida USA

Teaching Assistant

September, 2000 - August, 2001

Supervisor: Dr. Stephen Murrell

- Creation & grading of homeworks and tests for several courses including Introduction to Programming and Intermediate Programming.
- Duties also include system administration of a Unix system used by students and assisting students when they require help.

INVITED LECTURES

- **CS 7630 Autonomous Robotics**, Georgia Tech., Atlanta, GA. October, 2008. *Sharing of Grounded Symbolic Knowledge Among Heterogeneous Robots.*
- **CS 7630 Autonomous Robotics**, Georgia Tech., Atlanta, GA. March, 2008. *Heterogeneous Perception and Knowledge Sharing.*
- **CS 7630 Autonomous Robotics**, Georgia Tech., Atlanta, GA. February, 2007. *Heterogeneous Perception and Knowledge Sharing.*

SERVICE ACTIVITIES

- Co-chair: "Learning Systems" session, IROS 2009.
- Academic Reviewer:
 - IEEE International Conference on Robotics and Automation (ICRA), 2009.
 - The Tower (Undergraduate Research Journal of Georgia Institute of Technology, 2007-2009).
- Participated in Mentoring Undergraduate Researchers workshop (January 2007), Motivating Undergraduates in Research workshop (October 2008).

- Robotics demonstration for students at Dodgen Middle School, Cobb county, GA (Dec. 2006).
- FIRST Lego League (FLL) robotics competition, technical judge (January 2007,2009).
- Lab manager, Mobile Robot Laboratory (2008-Present).

SOFTWARE

MissionLab - Contributed to this robotics simulator and mission configuration system implementing the AuRA behavior-based architecture. Several of my contributions, including a teleoperation interface GUI and several robot behaviors, have been included in the main release. It is available at <http://www.cc.gatech.edu/ai/robot-lab/research/MissionLab/>

Fast Artificial Neural Network (FANN) library - I implemented the Self-organizing Maps and Growing Neural Gas algorithms to this open-source library as part of Google Summer of Code, 2007. It is available at <http://www.sourceforge.net/fann>.

SKILLS

Robotics: Extensive experience with Player/Stage, USARSim, and MissionLab robotic simulation environments. Some experience with Microsoft Robotics Studio, Gazebo, and ROS (Willow Garage)
Operating Systems: Windows XP/2k/Vista, Unix, Linux (Redhat, Fedora, Ubuntu)
Languages: Proficient in C, C++, Java, Matlab
Libraries: OpenCV, Weka, QT, wxWidgets, OpenGL, GLUT
Tools and Utilities: Microsoft Access & Visual Studio, Eclipse, Netbeans, LaTeX

MEMBERSHIPS

- Association for Computing Machinery (ACM)
- Institute of Electrical and Electronics Engineers (IEEE)
- IEEE Robotics and Automation Society

PERSONAL

- Citizenship: United States
- Fluent in spoken Hungarian