

# PATRICK BEESON

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## RESEARCH INTERESTS

**AI Robotics:** focusing on the knowledge representations, algorithms, and interfaces needed to create intelligent mobile agents, including indoor robots, smart wheelchairs, and robotic cars

**Cognitive science:** specifically research on human/animal navigation and learning

**Sensor fusion**

## EDUCATIONAL EXPERIENCE

### **The University of Texas at Austin**

Ph.D. in Computer Sciences, August 2008

Thesis title: Creating and Utilizing Symbolic Representations of Spatial Knowledge using Mobile Robots

Committee: Benjamin Kuipers (advisor), Dana Ballard, Gregory Dudek, Raymond Mooney,

Brian Stankiewicz, Peter Stone

### **Tulane University**

B.S. in Computer Science, May 1999

*summa cum laude*; minor in Mathematics and Philosophy

## WORK EXPERIENCE

<b>Senior Scientist</b> TRAC Labs Inc., Houston, TX	7/09 – present
<b>Research Educator</b> (non-tenure faculty) The University of Texas at Austin, College of Natural Sciences, Freshman Research Initiative	9/08 – 6/09
<b>Assistant Instructor</b> The University of Texas at Austin, Department of Computer Sciences	1/08 – 8/08
<b>Graduate Research Assistant</b> The University of Texas at Austin, Department of Computer Sciences	9/00 – 12/07
<b>Lead Software Engineer / Lead Programmer</b> Austin Robot Technology, DARPA Urban Challenge Supervised <i>undergraduate</i> programmers for an autonomous car project, which placed among the top 21 vehicles at the 2007 DARPA Urban Challenge.	4/07 – 11/07
<b>Graduate Research Assistant</b> The University of Texas at Austin, Department of Psychology	1/06 – 5/06
<b>Teaching Assistant</b> The University of Texas at Austin, Department of Computer Sciences	9/05 – 12/05
<b>Undergraduate Research Assistant</b> Tulane University, Department of Electrical Engineering and Computer Science	6/98 – 5/99

## TEACHING EXPERIENCE

<b>Research Educator</b>	9/08 – 6/09
The University of Texas at Austin, College of Natural Sciences	
CS 370: Undergraduate Reading and Research, Fall 2008	
CS 378: Autonomous Vehicles in Traffic, Spring 2009	Instructor Rating: 4.2/5
CS 370: Undergraduate Conference Course, Spring 2009	
<b>Assistant Instructor</b>	1/08 – 8/08
The University of Texas at Austin, Department of Computer Sciences	
CS 378: Autonomous Vehicles in Traffic, Spring 2008	Instructor Rating: 3.9/5
Supervised paid undergraduate research, Summer 2008	
<b>Teaching Assistant</b>	1/05 – 5/05
The University of Texas at Austin, Department of Computer Sciences	
CS 344R: Robotics	

## AWARDS

- Research Internship**, The University of Texas at Austin, Department of Computer Sciences, 2000–2001
- Dean's Honor Scholar**, Tulane University, 1995–1999

## PROFESSIONAL ACTIVITIES

### Associate Editor

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2011

### Program Committee

Robotics: Science and Systems Conference (RSS), 2007

AAAI Workshop on Lifelong Learning from Sensorimotor Experience, 2011

### Journal Reviewer

Autonomous Robotics

Cognitive Systems Research

IEEE Transactions on Robotics (T-RO)

IEEE Transactions on Systems, Man, and Cybernetics, Part A: Systems and Humans (SMCA)

IEEE Transactions on Systems, Man, and Cybernetics, Part C: Applications and Reviews (SMCC)

Intelligent Service Robotics (ISR)

International Journal of Robotics Research (IJRR)

Journal of Field Robotics (JFR)

Journal of Intelligent and Robotic Systems (JIRS)

### Conference Reviewer

AAAI Conference on Artificial Intelligence

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

IEEE International Conference on Robotics and Automation (ICRA)

International Conference on Machine Learning (ICML)

### Co-organizer

UT-Austin Forum for Artificial Intelligence, 2002–2003

## INVITED TALKS

<b>Soar Technology, Inc.</b>	4/09
<b>Southwest Research Institute</b> , Intelligent Transportation Systems Department	4/09
<b>Willow Garage, Inc.</b>	4/09
<b>University of Colorado at Boulder</b> Computer Science Colloquium	3/09
<b>Texas A&amp;M University</b> Computer Science and Engineering Colloquium	1/09
<b>Neural Information Processing Systems (NIPS) Workshop</b> The Urban Challenge – Perspectives of Autonomous Driving	12/08
<b>AAAI Spring Symposium Series</b> Special session of the Developmental Robotics Symposium	5/05
<b>International Spatial Cognition Summer Institute</b> Young Scientist Forum on Categorization in Spatial Cognition	8/03

## PUBLICATIONS

### Journal

Patrick Beeson, Joseph Modayil, Benjamin Kuipers. Factoring the mapping problem: Mobile robot map-building in the Hybrid Spatial Semantic Hierarchy. *International Journal of Robotics Research (IJRR)*, 29(4), April 2010

Patrick Beeson, Jack O’Quin, Bartley Gillan, Tarun Nimmagadda, Mickey Ristroph, David Li, and Peter Stone. Multiagent Interactions in Urban Driving. *Journal of Physical Agents*, Special Issue on Multi-Robot Systems, 2(1), March 2008

Benjamin Kuipers, Patrick Beeson, Joseph Modayil, and Jefferson Provost. Bootstrap learning of foundational representations. *Connection Science*, 18(2), June 2006

### Conference

Patrick Beeson, Aniket Murarka, and Benjamin Kuipers. Adapting proposal distributions for accurate, efficient mobile robot localization. *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, 2006

Patrick Beeson, Nicholas K. Jong, and Benjamin Kuipers. Towards autonomous place detection using the Extended Voronoi Graph. *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, 2005

Joseph Modayil, Patrick Beeson, and Benjamin Kuipers. Using the topological skeleton for scalable global metrical map-building. *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2004

Benjamin Kuipers, Joseph Modayil, Patrick Beeson, Matt MacMahon, and Francesco Savelli. Local metrical and global topological maps in the Hybrid Spatial Semantic Hierarchy. *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, 2004

Benjamin Kuipers and Patrick Beeson. Bootstrap learning for place recognition. *Proceedings of the AAAI Conference on Artificial Intelligence*, 2002 (one of 29 papers selected for single track presentation)

## Workshop/Symposium

David Kortenkamp, Patrick Beeson, and Nick Cassimatis. Sensor-to-symbol reasoning for embedded intelligence. In AAAI Spring Symposium Series, Embedded Reasoning: Intelligence in Embedded Systems, 2010

Aniket Murarka, Shilpa Gultai, Patrick Beeson, and Benjamin Kuipers. Towards a safe, low-cost, intelligent wheelchair. Workshop on Planning, Perception and Navigation for Intelligent Vehicles (PPNIV), 2009

Patrick Beeson, Matt MacMahon, Joseph Modayil, Aniket Murarka, Benjamin Kuipers, and Brian Stankiewicz. Integrating multiple representations of spatial knowledge for mapping, navigation, and communication. AAAI Spring Symposium Series, Interaction Challenges for Intelligent Assistants, 2007

Benjamin Kuipers, Patrick Beeson, Joseph Modayil, and Jefferson Provost. Bootstrap Learning of Foundational Representations. AAAI Spring Symposium Series, Developmental Robotics, 2005

Patrick Beeson, Matt MacMahon, Joseph Modayil, Jefferson Provost, Francesco Savelli, and Benjamin Kuipers. Exploiting local perceptual models for topological map-building. International Workshop on Reasoning with Uncertainty in Robotics (RUR), 2003

Benjamin Kuipers and Patrick Beeson. Toward bootstrap learning for place recognition. AAAI Fall Symposium Series, Anchoring Symbols to Sensory Data in Single and Multiple Robot Systems, 2001

Benjamin Kuipers, Patrick Beeson, Joseph Modayil, and Jefferson Provost. Learning from uninterpreted experience in the SSH. AAAI Spring Symposium Series, Learning Grounded Representations, 2001

Jefferson Provost, Patrick Beeson and Benjamin Kuipers. Toward learning the causal layer of the spatial semantic hierarchy using SOMs. AAAI Spring Symposium Series, Learning Grounded Representations, 2001

## Thesis

Patrick Beeson. *Creating and Utilizing Symbolic Representations of Spatial Knowledge using Mobile Robots*. PhD thesis, The University of Texas at Austin, August, 2008

## GRANTS

### Principle Investigator

Navy Phase I STTR, Topic #N11A-T020. PI: P. Beeson. "Electro-Optical and LIDAR Sensor Fusion for Self-Calibrating, Low-Cost UGV Perception", 06/27/2011–01/27/2012. Award Amount: \$79,996; Contract Number: N00014-11-M-0322.

Army Phase I SBIR, Topic #A10-175. PI: P. Beeson. "PROWL: Perception for Robotic Operation Without Light", 04/27/2011–10/27/2012. Award Amount: \$69,994; Contract Number: W56HZV-11-C-0153.

### Project Manager

Army Phase I STTR, Topic #A10A-T030. PI: E. Huber. "Leader-Following for Mobile Robots", 09/22/2010–03/22/2011. Award Amount: \$99,178; Contract Number: W56HZV-10-C-0443.

DARPA Phase II SBIR, Topic #SB072-023. PI: D. Kortenkamp. "Building a coherent world view from sensory data", 08/12/2009–08/11/2011. Award Amount: \$749,915; Contract Number: W31P4Q-09-C-0260.

### **Proposal Contributor and Key Personnel**

Army Phase II SBIR, Topic #A09-203. PI: E. Huber. “A Compact Visual-Odometry Sensor for UGVs”, Date: TBD. Award Amount: \$729,689; Contract Number: TBD.

Navy Phase I SBIR, Topic #N101-076. PI: D. Kortenkamp. “Intelligent Navigation and Temporal Reasoning Evaluation Platform”, 05/10/2010–10/10/2010. Award Amount: \$69,901; Contract Number: N00014-10-M-0148.

NSF Phase I SBIR, Award #: IIP-1014231. PI: E. Huber. “Wearable Augmented Perception for Environmental Recognition”, 07/01/2010–12/01/2010. Award Amount: \$149,939.

Army Phase I SBIR, Topic #A09-203. PI: E. Huber. “A Compact Visual-Odometry Sensor for UGVs”, 03/13/2010–09/19/2010. Award Amount: \$69,969; Contract Number: W56HZV-10-C-0218.

### **OTHER**

Citizenship: United States