

# Wesley H. Huang

## Assistant Professor of Computer Science

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## Education

Carnegie Mellon University: Ph.D. in Robotics (School of Computer Science), August 1997

Massachusetts Institute of Technology: S.B. in Electrical Engineering, June 1991

## Professional experience

- 1999 – present            Assistant Professor, Department of Computer Science  
                                 Joint appointment in Electrical, Computer, and Systems Engineering (ECSE)  
                                 Rensselaer Polytechnic Institute
- 1997 – 1998              Postdoctoral Fellow, Institute for Complex Engineered Systems  
                                 Carnegie Mellon University
- Fall 1996                 Intern  
                                 Interval Research Corporation, Palo Alto, CA
- 1991 – 1997              Graduate Research Assistant, Robotics Institute  
                                 Carnegie Mellon University

## Teaching experience

- 1999 - present            Assistant Professor, Rensselaer Polytechnic Institute
- CSCI-4150 Introduction to Artificial Intelligence: Fall 1999–2005
  - CSCI-4190 Introduction to Robotic Algorithms: Spring 2002–2004, 2006
  - CSCI-6280 Mobile Robotics: Spring 2001, Spring 2005
  - CSCI-697X Mathematics for Mobile Robotics: Spring 2006
  - CSCI-496X/696X Advanced Robotics: Spring 1999–2000
  - CSCI-496X Computer Ethics: Spring 2000
- Web sites for all these courses are available from my home page.
- Summer 2001 & 2002    Instructor for Fundamentals of Computer Science course  
                                 CTY program, Johns Hopkins University
- The CTY program is an intensive summer academic program for talented 12–16 year olds held at various sites around the country. In a three week session, students take one course which meets for 5 hours per day. My course covered computer science basics, programming in Scheme, and computer hardware — from transistors to microcontrollers.
- Summer 1995 & 1996    Computer Science Instructor  
                                 Pennsylvania Governor’s School for the Sciences
- The Pennsylvania Governor’s School for the Sciences is a five week program for 90 talented high school juniors selected from across the state. Students take a set of core science courses and also engage in a research project. The CS core course covered data structures, algorithm design and analysis, and programming in C.

Summer 1994	Robotics coinstructor Andrew's Leap program, Carnegie Mellon University  Andrew's Leap is a six week summer enrichment program for local (Pittsburgh) high school students to introduce them to computer science and robotics. Students attend lectures on theoretical computer science in the mornings and work on specialized research projects (e.g., in robotics) in the afternoons.
Fall 1993	Teaching assistant for MATH-131 Analysis I Carnegie Mellon University
Summer 1992	Instructor for Data Structures and Algorithms course and Digital Logic course CTY program, Johns Hopkins University
Summer 1991	Teaching assistant for Computer Science I and Digital Logic courses CTY program, Johns Hopkins University

### Teaching-related activities

Organized a "Teaching Strategies Workshop" for the Computer Science department in August 2002.  
 Attended several of Rensselaer's annual Colloquium on Teaching and Learning.  
 Completed the "Documentation of Teaching Development" program offered by Carnegie Mellon's Eberly Center for Teaching Excellence. (Involved taking six teaching seminars, classroom observation and feedback, and preparation of a syllabus.)

### Honors and awards

National Science Foundation CAREER Award (2000)  
 NASA Graduate Student Research Program Fellow (1993-1996)

### Research grants

H. Stephanou, D. Popa, Y. Bellouard, W. H. Lee, W. Huang, J. Wen, A. Sanderson, "Remote Health Monitoring: Biophotonic Sensing of Harmful Pathogens and Biowarfare Agents," Infotonics Center of Excellence, \$385,000, March 1, 2003 - August 31, 2004.  
 W. Huang, "CAREER: Nonprehensile Mobile Manipulation," National Science Foundation, \$280,941, June 1, 2000 - May 31, 2005.  
 W. Huang, "Motion Planning and Control for Tapping," National Science Foundation, \$215,167, September 1, 1999 - August 31, 2004.

### Publications

#### Journal articles

A. Gupta and W. Huang, "Centralized and Distributed Algorithms for a Cooperative Carrying task," being revised for resubmission to the *IEEE Transactions on Robotics*.  
 W. Huang, B. Fajen, J. Fink, and W. Warren, "Visual Navigation and Obstacle Avoidance Using a Steering Potential Function," to appear in *Robotics and Autonomous Systems*.  
 W. Huang and K. Beevers, "Topological Map Merging," *International Journal of Robotics Research*, August 2005, pp. 601-613.

W. Huang, "Mechanics, Planning, and Control for Tapping," *International Journal of Robotics Research*, October 2000, pp. 883–94.

S. Akella, W. Huang, K. Lynch, and M. Mason, "Parts Feeding on a Conveyor with a One Joint Robot," *Algorithmica*, March-April 2000, pp. 313–44.

#### **Papers in edited collections (peer reviewed)**

W. Huang and K. Beevers, "Topological Mapping with Sensing-Limited Robots," in *Algorithmic Foundations of Robotics VI*, M. Erdmann et al., Eds., Springer, 2005, pp. 235–250.

W. Huang and M. Mason, "Mechanics, Planning, and Control for Tapping," in *Robotics: the Algorithmic Perspective*, P. Agarwal, L. Kavraki, and M. Mason, Eds., A K Peters, 1998, pp. 91–102.

S. Akella, W. Huang, K. Lynch, and M. Mason, "Sensorless Parts Feeding with a One Joint Robot," in *Algorithms for Robotic Motion and Manipulation*, J.-P. Laumond and M. Overmars, Eds., A K Peters, 1997, pp. 229–38.

S. Akella, W. Huang, K. Lynch, and M. Mason, "Planar Manipulation on a Conveyor with a One Joint Robot," in *Robotics Research: the Seventh International Symposium*, G. Giralt and G. Hirzinger, Eds., Springer-Verlag, 1996, pp. 265–76.

#### **Conference papers (peer reviewed)**

K. Beevers and W. Huang, "SLAM with Sparse Sensing," accepted to the 2006 IEEE International Conference on Robotics and Automation (ICRA 2006).

K. Beevers and W. Huang, "Loop Closing in Topological Maps," in the 2005 IEEE International Conference on Robotics and Automation (ICRA 2005), pp. 4378–4383.

W. Huang and K. Beevers, "Topological Map Merging," Seventh International Symposium on Distributed Autonomous Robotic Systems (DARS 2004), pp. 91–100.

A. Gupta and W. Huang, "A Carrying task for Nonprehensile Mobile Manipulators," in the 2003 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2003), pp. 2896–901.

W. Huang, K. Babu, and J. Bandlow, "Cartop Manipulation," in the 2003 IEEE International Conference on Robotics and Automation (ICRA 2003), pp. 3613–8.

W. Huang, "Control Strategies for Fine Positioning via Tapping," in the 2003 IEEE International Symposium on Assembly and Task Planning (ISATP 2003), pp. 198–203.

W. Huang and G. Holden, "Nonprehensile palmar manipulation with a mobile robot," in the 2001 IEEE/RSJ International Conference on Robots and Systems (IROS 2001), pp. 114–9.

W. Huang, "Optimal line sweep decompositions for coverage algorithms," in the 2001 IEEE International Conference on Robotics and Automation (ICRA 2001), pp. 27–32.

W. Huang, "A Tapping Micropositioning Cell," in the 2000 IEEE International Conference on Robotics and Automation (ICRA 2000), pp. 2153–8.

K. Dixon, J. Dolan, W. Huang, C. Paredis, and P. Khosla, "RAVE: A Real and Virtual Environment for Multiple Mobile Robot Systems," in the 1999 IEEE/RSJ International Conference on Robots and Systems (IROS 1999), pp. 1360–7.

W. Huang and M. Mason, "Experiments in Impulsive Manipulation," in the 1998 IEEE International Conference on Robotics and Automation (ICRA 1998), pp. 1077–82.

S. Akella, W. Huang, K. Lynch, and M. Mason, "Sensorless parts orienting with a one joint manipulator," in the 1997 IEEE International Conference on Robotics and Automation (ICRA 1997), pp. 2383–90.

W. Huang and M. Mason, "Mechanics for Vibratory Manipulation," in the 1997 IEEE International Conference on Robotics and Automation (ICRA 1997), pp. 2391–6.

W. Huang and E. Krotkov, "Optimal Stereo Mast Configuration for Mobile Robots," in the 1997 IEEE International Conference on Robotics and Automation (ICRA 1997), pp. 1946–51.

W. Huang, E. Krotkov, and M. Mason, "Impulsive Manipulation," in the 1996 IEEE Conference on Robotics and Automation (ICRA 1995), pp. 120–5.

A. Pentland, T. Darrell, M. Turk, and W. Huang, "A simple real-time range camera," in the 1989 IEEE Conference on Computer Vision and Pattern Recognition (CVPR 1989), pp. 256–61.

## **Students**

### **Current Doctoral students**

Kristopher R. Beevers, working on topological mapping; entered Ph.D. program Fall 2004.

### **Current Masters students**

Kartik Babu, working on nonprehensile mobile manipulation.

Eric M. Meisner, working on optimal navigation with local topological maps.

### **Graduated Masters students**

Xianfeng Zhao, "Implementation of Optimal Line-Sweep-based Decompositions for Coverage Algorithms," December 2000.

Greg Holden, "Nonprehensile Palmar Manipulation with a Mobile Robot," May 2001.

Wenkai Xu, "A Tapping Micropositioning Cell," December 2001.

Atin Gupta (ECSE dept.), "Cooperative Strategies for Nonprehensile Mobile Manipulation," May 2003.

Kristopher R. Beevers, "Topological Mapping and Map Merging with Sensing-Limited Robots," May 2004.

### **Undergraduate students**

The following students have done undergraduate research projects with me on various topics in robotic manipulation, mobile robotics, and robotic sensor networks.

Spring 1999	John Clemens, Hadas Shragai
Summer 1999	Adam Poulos
Fall 1999	Chris Bechberger, Ankur Gupta, Jeremiah Harmsen, Eric Menyhart, Chris Novak, David Schroeder, David Steck, Drew Trainor
Spring 2000	Ben FrantzDale, Adam Goode, Jeremiah Harmsen, Eric Menyhart, Greg Mitchell, Chris Novak, David Schroeder, Nghia Tang
Summer 2000	Jonathan Benne, Ian Boyd
Fall 2000	Jonathan Benne, Ian Boyd, Brett Crain, Ross Fairgrieve, Adam Grimm, Rutchanee Gullayanon, Sultan Mehrabi, Usman Mian, Greg Mitchell, Wesley Tanner, Prakrankiat Youngkong
Spring 2001	Ian Boyd, Jonathan Fink, Benjamin Guthro, Jesse Hoffman, Derek Konigsberg, Greg Mitchell, Jason Tuthill
Summer 2001	Jake Gamage, Steven Hay, Matthew Leotta, Andrea Maggi

Fall 2001	Jonathan Fink, Jake Gamage, Matthew Leotta, Andrea Maggi, Todd Murphy
Spring 2002	Jonathan Fink, Jacob Gamage, Steven Hay, Matthew Leotta, Andrea Maggi
Summer 2002	Jonathan Bandlow, Kristopher Beevers, Jacob Gamage
Fall 2002	Jonathan Bandlow, Patrick Bosco, Jonathan Fink, Eric Griffith, Drew Houston, Matt Leotta, Christopher Yard
Spring 2003	Jonathan Fink, Drew Houston, Matt Leotta
Summer 2003	Chris Chiaverini, Jonathan Fink, Philip Lamoureux
Fall 2003	Jonathan Fink, Chris Chiaverini, Philip Lamoureux, Alden Roberts
Spring 2004	Jonathan Fink, Alden Roberts
Fall 2004	Steven Manning, Vinay Shah
Spring 2005	Gabriel Mulley
Fall 2005	Stanley Bak, Patrick Marion, Kamil Wasilewski
Spring 2006	Stanley Bak, Kamil Wasilewski

### University service

May 2002 - Feb. 2004	RPI Faculty Compensation Initiative advisory committee
Jul. 2000 – Dec. 2002	CS Department Chair search committee
1999 – 2000	Undergraduate curriculum committee
2000 – 2001, 2002–2003	Graduate admissions committee
2000 – 2001	CS Colloquium committee
2001 – present	Graduate curriculum committee
2003 – present	Graduate recruiting committee

### Professional activities

Co-chair for the 2006 Workshop on the Algorithmic Foundations of Robotics ([www.wafr.org](http://www.wafr.org))

Program committee member for the IEEE/RSJ International Conference on Robots and Systems (2003–2005); the IEEE International Conference on Robotics and Automation (2006); the IEEE International Symposium on Assembly and Task Planning (2003–2005); Robotics: Science and Systems conference (2005–2006); and the International Conference on Intelligent Autonomous Systems (2006).

Reviewer for the International Journal of Robotics Research, IEEE Transactions on Robotics, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Robotics and Automation, Journal of Robotics and Autonomous Systems, Algorithmica, International Journal of Computer Application in Technology, Proceedings of the IEEE, and the MIT Press.

Panelist for National Science Foundation (ITR, RCV, and RHA programs).

### Seminars and talks

“Mapping and Exploration with Sensing-Limited Robots,” McGill University, Computer Science colloquium, September 2005.

“Approaches to Cooperative Manipulation with Mobile Robots,” McGill University, Center for Intelligent Machines seminar, September 2005

“Robotic Mapping and Exploration with Sensing-Limited Robots,” Williams College, Computer Science seminar, November 2004.

"Topological Exploration and Mapping using Sensing-limited Robots," University of Colorado at Boulder, Computer Science seminar, May 2004.

"Geometric Decompositions for Optimal Coverage," The State of the Art of Mobile Robot Area Coverage workshop, IEEE International Conference on Robotics and Automation, April 2004.

"Manipulation-Based Approaches to Mobile Manipulation," Johns Hopkins University, Mechanical Engineering seminar, November 2003.

"Manipulation-Based Approaches to Mobile Manipulation," MITRE Corporation, Alexandria, VA, November 2003.

"Manipulation-Based Approaches to Mobile Manipulation," New Developments in Mobile Robot Manipulation workshop, IEEE International Conference on Robotics and Automation, September 2003.

"Vibratory Manipulation and Manipulation on Mobile Robots," University of Tokyo, Intelligent Systems Research Group seminar, September 2003.

"Nonprehensile Mobile Manipulation," ETH, Zürich, Institute of Robotics and Intelligent Systems seminar, July 2003.

"Nonprehensile mobile manipulation," University of Pennsylvania, GRASP laboratory seminar, January 2003.

"Nonprehensile mobile manipulation," Swarthmore College, Department of Engineering seminar, January 2003.

"Nonprehensile mobile manipulation," University of Massachusetts Amherst, Laboratory for Perceptual Robotics seminar, November 2002.

"How to Mow a Lawn: motion planning for coverage tasks," Union College, Electrical Engineering and Computer Science department seminar, May 2001.

"How to Mow a Lawn: motion planning for coverage tasks," Middlebury College, Mathematics and Computer Science department seminar, May 2001.