

Joydeep Biswas

CURRENT APPOINTMENT

Assistant Professor

College of Information and Computer Sciences
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EDUCATION

Carnegie Mellon University, Pittsburgh, USA

Ph.D., Robotics, 2014. Advisor: Professor Manuela Veloso.

Thesis title: “Vector Map-Based, Non-Markov Localization for Long-Term Deployment of Autonomous Mobile Robots”

M.S., Robotics, 2010. Advisor: Professor Manuela Veloso.

Indian Institute of Technology Bombay, Mumbai, India

B.Tech., Engineering Physics, 2008.

B.Tech. Project: “Design And Control of an Enclosed One Wheel Robot”

FELLOWSHIPS

Siebel Scholar, Class of 2015 - awarded annually for academic excellence and demonstrated leadership to 85 top students from the world’s leading graduate schools.

RESEARCH EXPERIENCE

Video demonstrations are available at <http://www.joydeepb.com/research.html>

CoBot Robots : Indoor Service Mobile Robots

2008 - 2015

Advised by Prof. Manuela Veloso (Computer Science Department, CMU), developed long-term localization, mapping and navigation algorithms using WiFi, Laser rangefinder and depth camera sensors. Deployed autonomous CoBots continuously, traversing more than 150Km to date.

CMDragons : RoboCup Small Size League

2009 - 2015

Developed a novel “Coerce And Attack” planner to coerce opponents into leaving strategic openings and exploiting them to score. Also designed motion controllers for dynamic interception of moving balls. Won RoboCup 2015, and second in 2010, 2013, and 2014.

Reactobot : Design And Control of an Enclosed One Wheel Robot

July 2007 - August 2008

Advised by Prof. Bharatendu Seth (Department of Mechanical Engineering, IIT Bombay), designed and constructed a reaction-wheel stabilized enclosed single wheel robot. Research focused on autonomous estimation of balancing equilibrium point and robust control.

Nimblina : A Two Wheel Balancing Robot

March - April 2007

Independent research, advised by Prof. Chitta Amarnath (Department of Mechanical Engineering, IIT Bombay). Designed and constructed a two wheel inverted pendulum robot. Developed a self-tuning mechanism, enabling dynamic corrections without a set point, and making it insensitive to change in centre of mass.

TEACHING EXPERIENCE

Teaching Assistant : Introduction to Feedback Control Systems

Spring 2010

Created new lab modules using National Instruments hardware to provide hands-on experience to students, and accompanying theory assignments to analyse and simulate the same hardware. In addition, taught classes, held review sessions, and graded assignments and exams.

EMPLOYMENT
HISTORY

Computer Science Department, Carnegie Mellon University, Pittsburgh, USA

Post-Doctoral Fellow

January - August 2015

Researched long-term localization and mapping for autonomous service mobile robots. Jointly led the CMU RoboCup team, CMDragons to win the RoboCup 2015 competition.

Google Research, Mountain View, USA

Summer Intern

June - September 2012

Developed algorithms for building 3D models of objects using low-cost depth cameras. Demonstrated high speed capture of depth and color imagery for 3D model construction and texturing.

Intel Research Pittsburgh, USA

Summer Intern

July - September 2010

Ported autonomous localization and navigation algorithms for CoBot-2 to Robot Operating System (ROS). Demonstrated continuous, robust and safe autonomous motion during Intel Research Pittsburgh open house, 2010.

ideaForge Technology, Mumbai, India

Summer Intern

May - July 2007

Developed a low cost tool chain for ARM7 development for robots with wireless in-system programming. Successfully demonstrated on a four wheel omni-directional robot and a quadrotor.

SELECT
PUBLICATIONS

All publications are available at <http://www.joydeepb.com/publications.php>

Google Scholar profile: <https://scholar.google.com/citations?user=f28F1YUAAAAJ>

Joydeep Biswas and Manuela Veloso. *Localization and Navigation of the CoBots Over Long-term Deployments*. In IJRR, The International Journal of Robotics Research, December 2013 vol. 32 no. 14 pp. 1679-1694.

Joydeep Biswas and Manuela Veloso. *Episodic Non-Markov Localization: Reasoning About Short-Term and Long-Term Features*. In Proceedings of ICRA'14, IEEE International Conference on Robotics and Automation, Hong Kong, May 2014.

Joydeep Biswas and Manuela Veloso. *Multi-Sensor Mobile Robot Localization For Diverse Environments*. In Proceedings of the RoboCup Symposium, Eindhoven, Netherlands, July 2013.

Benjamin Choi, Cetin Mericli, Joydeep Biswas and Manuela Veloso. *Fast Human Detection for Indoor Mobile Robots Using Depth Images*. In Proceedings of ICRA 2013, IEEE International Conference on Robotics and Automation, Karlsruhe, Germany, 2013.

Joydeep Biswas, Manuela Veloso. *Planar Polygon Extraction and Merging from Depth Images*. In Proceedings of IROS'12, the IEEE/RSJ International Conference on Intelligent Robots and Systems, Algarve, Portugal, October 2012.

Joydeep Biswas and Manuela Veloso. *Depth Camera Based Indoor Mobile Robot Localization and Navigation*. In Proceedings of ICRA'12, the IEEE International Conference on Robotics and Automation, St. Paul, MN, May 2012.

Joydeep Biswas, Brian Coltin, and Manuela Veloso. *Corrective Gradient Refinement for Mobile Robot Localization*. In Proceedings of IROS'11, the IEEE/RSJ International Conference on Intelligent Robots and Systems, San Francisco, CA, September 2011.

Joydeep Biswas and Manuela Veloso. *WiFi Localization and Navigation for Autonomous Indoor Mobile Robots*. In Proceedings of 2010 IEEE International Conference on Robotics and Automation, Anchorage, AK, May 2010.