Robin L. H. Deits

CONTACT INFORMATION
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EDUCATION

Massachusetts Institute of Technology: Ph.D. Candidate — **Sept. 2012 to Present**

Department of Computer Science, Robot Locomotion Group.

MIT: S.B. Physics — **June, 2011: GPA: 4.9/5.0**

Concentrated in Robotics. Relevant coursework included:

- **CS:** AI, Computation Structures, EECS I & II, Robotics: Science & Systems
- **EE:** Power Electronics Laboratory, Microcomputer Project Laboratory
- **MechEng:** Mechanical Engineering Tools, Dynamics & Controls I

HONORS

Hertz Foundation Graduate Fellowship	**2011**
MIT-Schlumberger Energy Initiative Fellowship	**2012**
MIT Prince Edward Fellowship	**2012**
Phi Beta Kappa Honors Society, Xi Chapter	**2011**
Sigma Pi Sigma Physics Honors Society	**2011**

EXPERIENCE

Robot Locomotion Group

Ph.D. Candidate Researcher — **September 2012 to Present**

Researching motion planning for walking robots:

- Developed the footstep planning software used by Team MIT in the DARPA Robotics Challenge Virtual Robotics Challenge 2013 and Robotics Challenge Trials 2014
- Currently exploring optimal footstep planning around obstacles, to enable robots to walk over rough terrain

Engineering Consulting

Subcontracted by Battelle Memorial Institute — **September 2011 to August 2012**

Consulted on a variety of interdisciplinary projects:

- Developed a software system for tracking the digging movements of a live razor clam for the MIT RoboClam project
- Produced a software package for gait control for a novel walking robot
- Conducted experiments and analyzed data to develop a natural language system for human-robot interaction

MIT, Department of EECS, Lab For Electromagnetic and Electronic Systems

Power Electronics and Microcomputer Lab Assistant — **September 2010 to May 2011**

Assisted in teaching the laboratory component of 6.115: Microcomputer Project Lab and 6.131: Power Electronics Lab. Gained expertise designing and debugging systems ranging from power electronics to C and assembly code.

Undergraduate Researcher — **November 2010 to February 2011**

Developed an HTML and JavaScript interface for interacting with data from the NILM power consumption management system.

MIT, Department of Mechanical Engineering, Hatsopolous Microfluids Lab

Undergraduate Researcher — **January 2009 to December 2010**

Worked on the MIT RoboClam project sponsored by Bluefin Robotics and Battelle to design an efficient, biologically inspired burrowing mechanism

- Designed and wrote a genetic algorithm to optimize the robot's control parameters
- Wrote control and data acquisition software for the robot
- Performed analysis of the efficiency and energy consumption of the system
- Ran tests of the robot in the lab and in the field

Siemens Dynamowerk, Berlin, Germany

Intern **June to August 2010**

Implemented an optimization system in MATLAB and achieved significant improvements in expected efficiency of magnetic bearing systems. Work resulted in a patent, granted in June 2012.

Mazemakers, Wellesley, MA

Senior Counselor **June to August 2008 & 2009**

Designed and taught lessons on a variety of subjects, including Robotics, Video Game Design, and Science.

- Introduced children as young as 8 to basic concepts of programming and engineering
- Developed course plans, activities, and demonstrations for science, photography, game design, art, and robotics classes.

SKILLS

Computer Science:

- Controls, data analysis, and optimization in MATLAB, Python, and LABVIEW
- Additional programming experience in C, C++, Intel 8051 assembly, Java, HTML, CSS, JavaScript, Julia, and Go
- Hardware and FPGA design with BlueSpec
- Data acquisition using National Instruments DAQ hardware and software
- Design and implementation of genetic algorithms and neural networks
- Software including Windows/MacOS/Linux, MS Office, LaTeX, Eclipse, Vim

Electrical Engineering:

- Power electronics circuits, including buck/boost converters, transformers, and rectifiers.
- Analog and digital electronic systems, including Intel, Pic, and Atmel microcontrollers

Mechanical Engineering:

- Mechanical design using Solidworks CAD sofware
- Machine tools including the lathe, milling machine, and CNC mill

PROJECTS

Adaptive Particle Image Velocimetry

- Implemented a recent approach to fluid flow tracking on an FPGA: `http://csg.csail.mit.edu/6.375/6_375_2013_www/handouts/finals/group2_report.pdf`

Cryptic Crossword Solver

- Applied techniques from linguistics and natural language processing to solving cryptic crossword clues: `http://blog.robindeits.com/2013/02/11/a-cryptic-crossword-clue-solver/`

PUBLICATIONS

[1] R. L. H. Deits and R. Tedrake, "Computing large convex regions of obstacle-free space through semidefinite programming," in *Submitted to: Workshop on the Algorithmic Fundamentals of Robotics*, Aug. 2014. [Online]. Available: http://groups.csail.mit.edu/robotics-center/public_papers/Deits14.pdf

[2] M. Fallon, S. Kuindersma, S. Karumanchi, M. Antone, T. Schneider, H. Dai, C. Perez D'Arpino, R. Deits, M. DiCicco, D. Fourie, T. Koolen, P. Marion, M. Posa, A. Valenzuela, K.-T. Yu, J. Shah, K. Iagnemma, R. Tedrake, and S. Teller, "An architecture for online affordance-based perception and whole-body planning," *Submitted to: Journal of Field Robotics*, Mar. 2014. [Online]. Available: http://dspace.mit.edu/handle/1721.1/85690

[3] R. L. H. Deits and M. Lang, "Radial magnetic bearing for magnetic support of a rotor," Patent Application US 2013/0 293 051 A1, 2014. [Online]. Available: http://www.freepatentsonline.com/20130293051.pdf

[4] R. L. H. Deits, S. Tellex, P. Thaker, D. Simeonov, T. Kollar, and N. Roy, "Clarifying commands with information-theoretic human-robot dialog," *Journal of Human-Robot Interaction*, vol. 2, no. 2, pp. 58–79, 2013. [Online]. Available: http://humanrobotinteraction.org/journal/index.php/HRI/article/view/112

[5] A. G. Winter, R. L. H. Deits, and D. S. Dorsch, "Critical timescales for burrowing in undersea substrates via localized fluidization, demonstrated by RoboClam: a robot inspired by atlantic razor clams," 2013. [Online]. Available: http://gear.mit.edu/Publications/RoboClam/2013_RoboClam_ASME_IDETC_Final.pdf

[6] A. G. Winter, R. L. H. Deits, and A. E. Hosoi, "Localized fluidization burrowing mechanics of ensis directus," *Journal of Experimental Biology*, vol. 215, no. 12, pp. 2072–2080, 2012. [Online]. Available: http://jeb.biologists.org/cgi/doi/10.1242/jeb.058172

[7] M. Lang and R. L. H. Deits, "Radial magnetic bearing for the magnetic bearing of a rotor," Patent, 2012. [Online]. Available: http://patentscope.wipo.int/search/en/WO2012084590

[8] A. G. Winter, R. L. H. Deits, D. S. Dorsch, and A. E. Hosoi, "Multi-substrate burrowing performance and constitutive modeling of RoboClam: a biomimetic robot based on razor clams," 2010. [Online]. Available: http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=5654364

[9] A. G. Winter, R. L. H. Deits, D. S. Dorsch, A. E. Hosoi, and A. H. Slocum, "Teaching RoboClam to dig: The design, testing, and genetic algorithm optimization of a biomimetic robot." IEEE, 2010, pp. 4231–4235. [Online]. Available: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=5654364

[10] A. G. Winter, A. E. Hosoi, A. H. Slocum, and R. L. H. Deits, "The design and testing of RoboClam: a machine used to investigate and optimize razor clam-inspired burrowing mechanisms for engineering applications," 2009, pp. 1–6.

[11] S. Tellex, P. Thaker, R. L. H. Deits, D. Simeonov, T. Kollar, and N. Roy, "Toward information theoretic human-robot dialog," 2012. [Online]. Available: http://www.roboticsproceedings.org/rss08/p52.pdf