

Permanent Address:
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71 Fulkerson St Apt 104
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Alexander C. Shkolnik

SUMMARY

- Detail oriented **PhD candidate at MIT**, with a broad range of experience in industry, academia and start-ups, who prefers to tackle the most challenging problems, and finds innovative outside-the-box solutions.
- **High Dimensional Motion Planning / Control** applied to quadruped robot bounding on rough terrain
- Experience modeling complex dynamic systems, ranging from living **neuronal networks**, to **robots to combustion engines**, with 11 peer-reviewed publications and **3 patents** pending across these fields
- Cofounded a combustion engine company, managed a team that wrote an award winning business plan, wrote a winning Army SBIR proposal, helped secure venture financing – *without a prototype*

WORK EXPERIENCE (NON-ACADEMIC)

LiquidPiston, Inc. West Hartford, CT
Director, Cofounder 2003 - Present

- Assisting with development of a novel internal combustion engine, including engineering and modeling
- Helped write award winning business plan, with top-4 finishes in MIT \$50k Competition (2004); MIT Enterprise Forum Clean Energy Competition (2005); GE/Dow Clean Energy Competition (2006)
- Wrote winning Army SBIR Phase I proposal
- Helped secure \$2.25M of VC financing

Emory University Atlanta, GA
Computer Lab Coordinator, Graduate School of Psychology Part time 15 hrs/wk, 1999 - 2003

Agency Management Services (AMS) Windsor, CT
ASP Programmer and Systems Engineer Summers, 1999 – 2001

Quest Systems, Inc. West Hartford, CT
General Manager, Computer Consultant 1993-2000

Invention Machine Corporation Boston, MA
Engineering Intern Summer 1998

- Received training in TRIZ: Theory of Inventive Problem Solving
- Designed a micro-valve for use in refrigerators made by a company in Germany

RESEARCH & TEACHING

National Inst. of Advanced Industrial Science and Technology (AIST) Tsukuba, Japan
NSF / JSPS EAPSI Research Fellow Summer 2007

- Studied foot-roll and toe-off in humanoid robot walking, advised by Shuuji Kajita

Massachusetts Institute of Technology Cambridge, MA
Teaching Assistant, Course 6.881: Underactuated Robotics Spring 2007

- TA'd the first offering of this course, and assisted in course development.

Research Assistant, Robot Locomotion Group 2005 – present

- Developing control algorithms for the DARPA “Learning Locomotion” project using the LittleDog quadruped robot developed by Boston Dynamics, Inc.;
- Primary contributions are in the area of fast motion planning by integrating ideas from task space control, and intelligent sampling methods for randomized planning algorithms
- Studying biologically inspired mechanisms and control algorithms, and Reinforcement Learning

Research Assistant (and NSF Graduate Research Fellow), CBCL 2003 – 2005

- Decoding visual stimuli from electrical recordings in IT cortex in macaque monkeys

Georgia Institute of Technology, Neuroengineering Lab Atlanta, GA
Research Fellow (SURE, Center For Behavioral Neuroscience) 2002 - 2003

- Studied plasticity in cultured neural networks of dissociated cortical rat brain tissue. For masters thesis researched, developed a neurally controlled robot that follows a reference object (or another robot) and maintains a given distance (similar to a car on autopilot).
- Worked with the University of Western Australia to develop MultiElectrode array ART (MEART). Data from a cultured neural network was processed in real-time and was used to control a robotic drawing arm.

Emory University Atlanta, GA
Research Fellow (SURE) 2001 – 2002

- Studied the role of the medial nucleus of the amygdala in social memory in mice; research included electrolytic and excitotoxin brain lesioning, behavioral testing, histology, etc.

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EDUCATION

Massachusetts Institute of Technology (MIT)

PhD in Artificial Intelligence, focus on control for walking robots
Advisor: Russ Tedrake, Robot Locomotion Group

Cambridge, MA
expected summer 2009

Emory University, 4.0 / 4.0 GPA in CS / Math major, 3.8 overall

M.S. in Computer Science/Mathematics (thesis research done at GA Tech)
B.S. in Computer Science/Mathematics, Summa Cum Laude
2nd major in Neuroscience and Behavioral Biology

Atlanta, GA
August 2003
May 2003

ACADEMIC HONORS

NSF / JSPS EAPSI Fellowship, summer 2007
National Science Foundation Graduate Research Fellowship, 2003-2006
Graduated with Highest Honors (Summa Cum Laude) in CS / Math, Emory, 2003
Accelerated 4 yr B.S. / M.S. program in Computer Science / Mathematics, Emory
Summer Undergraduate Research at Emory (SURE) Fellowship, 2001 and 2002
Barry M. Goldwater Scholarship for Excellence in Science - honorable mention, 2002

Honor Societies: *Golden Key* (top 15% of class, academic), *Phi Beta Kappa* (academic), *Omicron Delta Kappa* (Economics), *Nu Rho Psi*, (Neuroscience)

SELECTED PEER REVIEWED PUBLICATIONS IN ROBOTICS

Shkolnik, A., and Tedrake, R., "Path Planning in 1000+ Dimensions Using a Task-Space Voronoi Bias." Submitted to IEEE International Conference on Robotics and Automation (ICRA), 2009.

Shkolnik, A., Walter, M., Tedrake, R., "Reachability-Guided Sampling For Planning Under Differential Constraints." Submitted to IEEE International Conference on Robotics and Automation (ICRA), 2009.

Shkolnik, A., and Tedrake, R. "High-dimensional underactuated motion planning via task space control." IEEE/ Intl. Conf. on Intelligent Robots and Systems (IROS). September 22-28, 2008, Nice, France.

Byl, K., Shkolnik, A., Prentice, S., Roy, N., and Tedrake, R. "Reliable dynamic motions for a stiff quadruped." 11th International Symposium on Experimental Robotics (ISER), July 14-17, 2008, Athens, Greece.
Winner, IFRR Student Fellowship Award (Best Paper / Presentation by Katie Byl)

Doshi, F., et al. "A Supervised Learning Approach for Collision Detection in Legged Locomotion." Submitted to 2007 IEEE International Conference on Intelligent Robots and Systems (IROS).

Shkolnik A., Tedrake, R. "Inverse Kinematics for a Point-Foot Quadruped Robot with Dynamic Redundancy Resolution." 2007 IEEE International Conference on Robotics and Automation (ICRA).

SELECTED PEER REVIEWED PUBLICATIONS IN NEUROSCIENCE AND NEURAL ROBOTICS

Kreiman G., Chou, H., Shkolnik, A., Poggio, T., and DiCarlo, J. (2004). "Object recognition by selective spike and LFP data in inferior temporal cortex." (San Diego: Society for Neuroscience)

Potter, S., et al. (2004). "Hybros: Hybrids of living neurons and robots for studying neural computation," in Proc. Brain Inspired Cognitive Systems BICS2004, Scotland, UK.

Bakkum, D. J., Shkolnik, A. C., Ben-Ary, G., Gamblen, P., DeMarse T. D., and Potter, S. M. (2004) "Removing the 'A' from AI: Embodied Cultured Networks" in Embodied Artificial Intelligence, Luc Steels and Rolf Pfeiffer, editors, Springer.

Shkolnik A., (2003). "Neurally controlled simulated robot: applying cultured neurons to handle an approach / avoidance task in real time, and a framework for studying learning in vitro." Masters Thesis, Department of Computer Science, Emory University. Advisor Steve Potter, GA Tech.

PUBLICATIONS IN COMBUSTION ENGINES

Shkolnik N., Shkolnik A. Rotary High Efficiency Hybrid Cycle Engine. SAE Paper 2008-01-2448. Proceedings of the SAE Powertrains, Fuels, and Lubricants Meeting, October 2008, Chicago, IL.

Shkolnik N., Shkolnik A. "High Efficiency Hybrid Cycle Engine." Proc. ASME Internal Combustion Engine Conference, ASME paper ICEF2005-1221, 2005

PATENTS

Shkolnik, N., Shkolnik, A. (2007). "Hybrid Cycle Combustion Engine" (Pending)
Shkolnik, N., Shkolnik, A. (2006). "Hybrid Cycle Rotary Combustion Engine and Methods." (Pending)
Shkolnik, N., Shkolnik, A. (2004). "Hybrid Cycle Combustion Engine." (Pending)

MISC.

Programming experience in Java, C/C++, ASP, HTML, JavaScript, Matlab, Pascal, Eosys
A+ certified computer technician (Comptia) – 100% customer satisfaction rating
Fluent in Russian