# ANDREW SPIELBERG

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**Academic Interests:** Robotics, Graphics and Fabrication, Machine Learning, Information Retrieval, Digital Games

## EDUCATION

**Massachusetts Institute of Technology** *09/2014 - Present*
Ph.D., Computer Science
Overall GPA: 5.00 (out of 5.00 scale)
Group: Distributed Robotics Laboratory
Project: *3-D Printable Programmable Robots*
PIs: Daniela Rus and Wojciech Matusik

**Cornell University** *08/2010-05/2011*
M. Eng., Computer Science
Overall GPA: 3.82
Project: *Inexpensive Structured Light Projection 3D Scanner Tool For 3D Printers*
Group: Creative Machines Lab
PI: Hod Lipson
Part of the Fab@Home Project

**Cornell University** *08/2006-05/2010*
B. S., Engineering Physics and Computer Science (Double Major)
Double Minor: Applied Mathematics and Game Design
Overall GPA: 3.41

**Johns Hopkins University** *08/2011-12/2012*
M.S. Program in Applied and Computational Mathematics (uncompleted)
Note: Left program before completion to accept job at Massachusetts Institute of Technology
Overall GPA: 3.80

## ACADEMIC PUBLICATIONS AND PATENTS

### Papers Accepted for Publication

. Dogar, M.*; Knepper, R.*; Spielberg, A.*; Choi, C.; Christensen, H.; Rus, D., "Multi-Scale Assembly With Robot Teams," The International Journal of Robotics Research - ISER 2014 Special Issue. (* denotes co-first authorship)

. Dogar, M.; Spielberg, A.; Baker, S.; Rus, D., "Multi-Robot Grasp Planning for Sequential Assembly Operations," *Robotics and Automation (ICRA), 2015 IEEE International Conference on.* **Nominated for best paper in manipulation and best overall paper award.**

. Knepper, R.; Dogar, M.; Spielberg, A.; Choi, C.; Christensen, H.; Rus, D., "Towards Coordinated Precision Assembly with Robot Teams," *2014 International Symposium on Experimental Robotics (ISER 2014).*

. Ayanian, N.; Spielberg, A.; Arbesfeld, M.; Strauss, J.; Rus, D., "Controlling a Team of Robots With a Single Input," *Robotics and Automation (ICRA), 2014 IEEE International Conference on.*

### Provisional Patents

. Provisional Patent, "Crowdsourcing Solutions to NP-Complete Problems Through Online Distributed Video Games."
. Provisional Patent, "Method And System For Organizing And Facilitating Collaboration On Open Source Development Projects."

## HONORS/AWARDS

. 2nd Place in CSAIL Amazing Research Highlight Competition, a competition aimed at promoting exciting research projects at CSAIL. The award was won for our Interactive Robogami project.

. Finalist in 2014 Kuka Innovation Award (Withdrew from finals due to conference travel conflicts).

. Three-time finalist in JHU/APL Ignition Grants Challenge, a challenge in which employees submit small-scale grant proposals and the proposals are voted on by the employee-base of the lab. My projects were in developing a 3D scanner, an educational game for teaching algorithmic thinking to high schoolers, and a kit for rapidly prototyping robots.

. Honorable mention in JHU/APL Innovation Challenge.

. 2nd place in Cornell Mathematical Contest in Modeling, Honorable Mention at national level.

. Deans List (Cornell University undergraduate).

## WORK/ RESEARCH EXPERIENCE

**Disney Research - Pittsburgh** June 2015 - September 2015
*Intern* *Pittsburgh, PA*

***Fabrication Group***

· Designed framework for rapid prototyping of devices with low-latency, wirelessly powered interaction.
· Research paper submitted to SIGCHI.

**Massachusetts Institute of Technology** June 2013 - Present
*Computer Science and Artificial Intelligence Laboratory - Distributed Robotics Lab* *Cambridge, MA*

**Current Projects:**
***Printable Programmable Robots Project***Developed algorithms and environment for data-design of parameterized, functional 3-D printable, foldable walking robots with provably stable gaits. (Currently being prepared for *Science* submission within the next month. Developing optimization based-approach for co-design of robot control and parametric robot structure from functional specification, with an emphasis on contact-based robot gait (targetting RSS 2016 submission).
***IkeaBot Project*** Developing advanced decentralized planning and manipulation algorithms for IkeaBot, a project aimed at coordinated assembly of furniture for applications in manufacturing robotics.
***Image Compression For Big Image Databases*** Developing system for compression of very large image collections with fast storage and retrieval (targetting CVPR 2016 submission).
**Older Projects:**
***Gesture-Based Swarm Robot Control*** iPad-based gestural control of swarms which affords high-level control over an arbitrary number of robots, and provides guarantees of motion that is collision-free and will reach its goal.

**Johns Hopkins University Applied Physics Laboratory (JHU/APL)** July 2011 - June 2013
*Asymmetric Operations Department* *Laurel, MD*

· ***Cloud Computing API Development For Big Data Analytics***
· Integrated various face recognition algorithms with Accumulo for benchmarking in cloud environment.

- Performed extensive literature search on current state-of-the-art cloud architectures for face and image recognition and contributed findings to government training course on cloud computing.

***LIDAR Representation for Low-Bandwidth Scenarios R&D***

- Developed optimization algorithms based on current literature for fitting Non-uniform rational B-spline (NURBS) curves and surfaces to captured LIDAR data with the goal of minimizing the amount of sent data in LIDAR map transmission.
- Experimentally assessed advantages of NURBS representations over standard mesh representations.
- Identified conditions under which each representation transfers maximal information given a fixed data size and published findings as internal memo.

***Other Projects***

- IARPA "Sirius" serious games analysis and development.
- IARPA quantum computing visualization tools development.
- Glyph recognition and glasses-based display for augmented reality training games R&D.
- Innovation Challenge on remotely controlling automobiles for law enforcement applications.
- Adapted open-source Android stock MMS application for integration of covert communication protocols.
- Web ontology-based situational awareness GUI for satellite diagnostics.

**SMiLe Lab - Johns Hopkins University** March 2012 - November 2012
PI: Han Liu *Baltimore, MD*

- Implemented algorithms from academic machine learning papers on sparse grid methods, compressive sensing, social network analysis, stochastic gradient descent for big data, and sentiment analysis.

**Personal Robotics Lab - Cornell University** January 2011 - May 2011
PI: Ashutosh Saxena *Ithaca, NY*

- Applied machine learning and computer vision algorithms in segmenting rigid bodies and labeling kinematic joint types in RGB-D video, for applications in robotic perception.

**Cornell Games Project - Cornell University** January 2009 - May 2009
PIs: Walker White and Johannes Gehrke *Ithaca, NY*

- Created interactive simulations to test functionality and speed of experimental game language (SGL) for scripting concurrent agents.
- Identified need for additional data structures and faster handling of agent interaction.

**Primet Precision Materials, Inc.** August 2008 - December 2008, June 2009 - August 2009
*Research and Development Co-Op Internship* *Ithaca, NY*

- Led two independent research-based projects, involving extensive literature/patent searches and the planning and execution of near-daily experiments for inexpensive material synthesis.
- Conducted particle size and X-Ray diffraction analyses of materials.

**Cornell Ranger Project** August 2006 - December 2006
PI: Andy Ruina *Ithaca, NY*

- Analyzed motor efficiency and described actuation method for optimal energy efficiency.
- Drafted drawings and milled parts for Cornell Ranger, the world record holder for farthest walking bipedal robot (on single battery charge).

## SELECTED COURSEWORK

(Full coursework available upon request.)

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|---|---|
| ***Machine Learning*** | Advanced Machine Learning, Algorithmic Aspects of Machine Learning, Mathematical Statistics, Unconstrained Optimization, Stochastic Processes, Learning With Combinatorial Structure |
| ***Graphics*** | Computational Fabrication, Computational Motion |
| ***Robotics*** | Underactuated Robotics, Artificial Intelligence |
| ***Other*** | Algorithmic Game Theory, Database Systems How To Make (Almost) Anything |

## COMPUTER LANGUAGES/SKILLS

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|---|---|
| ***Languages*** | |
| **Fluent In:** | Java, MATLAB, Python, C, C#, SML, Verilog |
| **Familiar With:** | C++, R, Objective-C, Mathematica, HTML5, SQL, Ruby |
| ***Skills*** | |
| **Robotics and Vision:** | OpenCV, Point Cloud Library (PCL), Robot Operating System (ROS), Drake |
| **Mobile:** | iOS, Android, AndEngine |
| **Web Programming:** | Twitter API, OWL, Django |
| **Other Tools** | SVN, Git, Visual Studio, QT, Linux, LaTeX, XNA, OpenSCAD |

## TEACHING AND RELATED EXPERIENCE

**Teaching Assistant**

- Introduction to Programming - MATLAB — Fall 2010, Spring 2011
- Design and Analysis of Algorithms — Spring 2009, Spring 2010
- Discrete Structures — Fall 2009

**Academic Excellence Workshop Facilitator**

*Instructed and developed exercises for 1 credit supplemental workshop course.*

- Introduction to Programming - Java — Fall 2007, Spring 2008

## PROFESSIONAL AND INDEPENDENT PROJECTS/ACTIVITIES

**Journal of Machine Learning Research - Production Staff Member** February 2015 - Present

- Responsible for formatting, proofreading, and coordinating with authors on paper submissions.

**Open Source Web Application Project** April 2012 - Present

- Developing web application for increasing collaboration and discussion in academia.
- Previously led a team of six undergraduate students remotely at Cornell University and worked with Dan Cosley to provide academic credit to those involved.

**Robotics Working Group** November 2012 - June 2013

- Founded weekly hands-on meetings for learning about computer vision, microcontrollers, and Android at JHU/APL.

**Scion Comics** Kickstarter Launch Tentatively Scheduled For 12/2015

- Co-Author of an in-process education comic, The Scion, a project aiming to teach advanced high-school STEM education through superhero comics.

**Alpha Chi Sigma Tau Chapter Housing Corporation** December 2006 - Present

· Secretary September 2011 - September 2012

**Alpha Chi Sigma Professional Chemistry Fraternity** Fall 2006 - Spring 2011

· Master of Ceremonies Fall 2009

· Reporter Fall 2008 - Spring 2009

· Alumni Secretary Fall 2008 - Spring 2009

**Cornell University Mascots (Big Red Bears)** Fall 2006 - Spring 2008

· Treasurer Fall 2007 - Spring 2008

**Forensics Speech and Debate** Fall 2006 - Spring 2009

**Member of ACM, IEEE Computer Society, and IEEE Computational Intelligence Society.**