



Daniel Scarafoni

AI and HCI Researcher

Education

2014–present **M.Sc. Machine Learning**, *University of Rochester*, Rochester, NY, *GPA: 3.77*.
4 + 1 masters program, expected graduation spring 2015.

2011–2014 **B.S.**, *University of Rochester*, Rochester, NY, *GPA: 3.77*.
Major: Computer Science
Cum Laude
Highest Distinction
Highest Research Honors
Dean's List all semesters

Undergraduate Thesis

title *3D Reasoning in Natural Language Processing*
supervisors Lenhart Schubert, George Ferguson, Jiebo Luo
description Commonsense reasoning is the field of artificial intelligence dedicated to simulating and replicating high level intuition in human beings. Because many higher level human reasoning processes involve knowledge (intuitive or otherwise) about three-dimensional objects, scenes, and situations, and because significant evidence exists indicating that human minds utilize simulations in three-dimensions when thinking, it follows that reasoning in spatial environments is an intuitive and important part of artificial intelligence. Using Blender and Dr. Lenhart Schubert's Epilog project, we have been able to create and implement a system which can successfully place and query entities over a small library of objects and predications.

Experience

2013–2014 **MIT Lincoln Labs Summer Research Program**, *Massachusetts Institute of Technology*, *Lincoln Laboratories*, Lexington, MA.

AI in Cyber Security

Remark: first implementation of a firewall policy checker scalable to enterprise needs

- Implemented forward inference engine to find firewall policy anomalies
- First implementation of a firewall policy analyzer engine in linear space
- works with any proprietary firewall

2013–2014 **Research Assistant under Professor Jeffrey Bigham, University of Rochester, Rochester, NY.**

Chorus group consensus project

Utilized crowd-sourced workers to discuss, propose, and vote on solutions to a given question utilizing a text-chat interface.

- Project includes a natural language processing machine learning program which tracks important utterances in the discussion.
- Personally designed and programmed tool for the above program for finding word roots in Ruby.

2013–2014 **Research Assistant under Professor Lenhart Schubert, University of Rochester, Rochester, NY.**

3D Reasoning in Natural Language Processing

Created Specialist program for Epilog natural language processing project.

- “Imagistic Modeling in Story Understanding” (publication in progress).
- Program written in Python, utilizes Blender to build, model, and query 3D simulations from information derived from natural language utterances.
- Built low-level system architecture.
- Designed and build tools for implementing logical predications, object placement, and versatile helping functions.
- Project implemented episodic, incremental, 3D simulation-based reasoning in NLP.
- Project is basis for undergraduate thesis.

2012–2014 **Research Assistant under Professor Jeffrey Bigham, University of Rochester, Rochester, NY.**

Shape Tester

Remark: First attempt in literature to test crowd-sourced humans vs ad-hoc AI agents in Pursuit Domain environment.

- Designed project, led implementation.
- Program written in Python, utilizes Blender to build, model, and query 3D simulations from information derived from natural language utterances.
- Created versatile web game of cat and mouse, which is being used for crowd-sourcing/AI research.
- “Comparing Human and Automated Agents in a Coordinated Navigation Domain” (see publications).
- Designed and programmed multi-threaded Java socket server, HTML5/Javascript/PHP client, and Java client. Also built and designed artificial agents (in Java) to test program.

2009–2009 **Research Assistant under Professor Blaine Pfeifer, Tufts University, Medford, MA.**

E. coli Metabolism Optimizer

Created a program for gauging the effect of genetic engineering on E. coli bacteria in Matlab. Designed and implemented simulation of bacterium’s metabolism.

- Discovered optimal mutations of E. coli metabolism to maximize production of antibiotic precursor 6-DEB.

Publications and Papers

- Scarafoni, D., Bigelow, E., Wilson, A., Schubert, L. “Three dimensional reasoning in natural language processing”. 2014.

- Bigelow, E., Scarafoni, D., Schubert, L., Wilson, A. "Imagistic Modeling in Story Understanding." 2014
- Scarafoni, D., Gordon, M., Lasecki, W., Bigham, J., "Comparing Human and Automated Agents in a Coordinated Navigation Domain", TR989, Computer Science Dept., U. Rochester, January 2014.

Posters and Presentations

- Scarafoni, D., Bigelow, E., Wilson, A., Schubert, L. "Imagistic Modeling in Story Understanding." University of Rochester Undergraduate Research Symposium. April 18th, 2014.
- Scarafoni, D., Gordon, M., Lasecki, W., Bigham, J. "Comparing Human and Automated Agents in a Coordinated Navigation Domain ." University of Rochester Undergraduate Research Symposium. April 18th, 2014.
 - **Winner:** Professors' Choice Award.

Awards and Recognitions

First Robotics Scholarship

Golden Key International Honors Society *Offered to top 15% of students in class*

Portable Research Grant

Donald M. Barnard Prize *research funding granted for outstanding academic achievement*

2014 Undergraduate Research Symposium Professor's Choice Award

HackNY Spring 2014: Best Commandline Interface

Teaching Experience

- CSC171 Introduction to Java Programming
- CSC173 Introduction to Formal Systems
- CSC242 Introduction to Artificial Intelligence

Skills

- Experience programming in over two dozen languages, including Ada, Ocaml, C#, F#, .NET, C, C++, Json, Ajax, Ruby, Haskell, Lisp, Scheme, PHP, CSS.
- Particular experience with in Java, C, C++, HTML (and HTML5) JavaScript, and Python.

Independent Projects and Activities

- Developed new algorithm for lower-bound entropy estimate of English text based on Markov-Chains
- Developed web-crawler to monitor Reddit content using HTML, Javascript, Ajax, and PHP.
- Created slew of non-malicious prank programs for entertainment including: fork bomb in C, file generator bomb in Java and shell script, and a shell script to open up humorous websites at random.

- Created n-gram HMM chat bot to emulate political pundits.
 - **Winner:** “Best Commandline Interface” at HackNY Spring 2014.
- Martial arts practitioner: 4th kyu Shotokan Karate, practice Krav Maga and Thai Boxing.

Languages

Spanish	professional working proficiency
Italian	professional working proficiency
Chinese (Mandarin)	limited working proficiency