

## ACADEMIC INFORMATION

### EDUCATION

- Ph.D. (in progress), California Institute of Technology (Caltech)**, in Electrical Engineering working with Prof. Christof Koch on topics in machine and biological vision
- 6/06, M.S., Caltech**, graduated with GPA 3.8 in Electrical Engineering
- 6/03, B.S. with Honors, Caltech**, graduated with GPA 3.9 in Electrical and Computer Engineering

### RESEARCH

#### **7/02-present: Research Assistant and Graduate Student at Caltech**

I started out investigating new forms of approximate Bayesian inference, using "poset belief propagation", an extension of standard iterative inference algorithms. From my interest in artificial intelligence, I started work on attention for the machine recognition of objects, and models of visual attention in general. I am interested in how the brain processes visual data, and ultimately, how to read minds and make brain-machine interfaces. My publication list is included below.

### TEACHING EXPERIENCE

#### **1/08-3/08: Teaching Assistant for CNS 186 at Caltech**

Helped create and grade homework, as well as guide and instruct students, in a graduate-level course in biological and machine vision.

## NON-ACADEMIC EXPERIENCE

### EMPLOYMENT

#### **9/06-7/07: Consultant on DARPA project**

Consultant for Prof. Christof Koch on DARPA-funded project to create a real-time object recognition system. Work involved translating published work (SIFT) into efficient C implementations, and making improvements for robust recognition.

#### **7/04-9/04: Summer Intern at Jet Propulsion Laboratory (JPL)**

Working in the Information Processing department, created tool in C# to optimize LDPC codes for the erasure channel.

#### **7/01-11/01: Software Developer at Cypherus, Inc.**

Helped implement some of the back-end software for Cypherus, an encryption suite similar to WinZip. Work included PHP/MySQL development.

#### **6/00-10/00: Summer Intern at JPL**

Working in the Information Processing department, programmed in C++ and Java creating software tools for the analysis of optical communication links.

### WEBSITES I CREATED

#### **2008, [www.emoochi.com](http://www.emoochi.com)**

a music suggestion site, developed from scratch, on LAMP architecture; it searches and creates playlist suggestions on millions of tracks for use with Rhapsody®

#### **2007, [www.efoodi.com](http://www.efoodi.com) (co-created with Dr. Demetri Spanos)**

a recipe, restaurant, drink, and general food social content network with semantic search engine, developed from scratch on LAMP architecture

#### **2003, [www.lyricalcontent.com](http://www.lyricalcontent.com)**

taken from a project I started freshman year in college, a lyrics search engine; at peak, it received ~1 million visitors/month

### COMPUTER LANGUAGES

C, PHP, Matlab; Working Knowledge: C++, PERL, Java, C#, CSS, HTML, Javascript

## HONORS

**Graduate:** Atwood Fellowship; Caltech Special Institute Fellowship

**Undergraduate:** Invited to Tau Beta Pi; Information Theory Mug Prize (highest grade in information theory)

**High School:** Salutatorian; AP Scholar with Distinction; Rensselaer Medalist for Science; Bank of America Science Plaque

## EXTERNAL PRESENTATIONS

**5/08: Santorini, Greece.** "On the Optimality of Spatial Attention for Object Recognition". At WAPCV 2008

**12/06: Vancouver, Canada.** "Graph-Based Visual Saliency". At NIPS\*2006 (top 3% of conference submissions)

**10/06: Oxnard, California, USA.** "Graph-Based Visual Saliency". At Caltech NESS meeting

**7/03: Yokomaha, Japan.** "Poset Belief Propagation: Experimental Results". At ISIT 2003

## PUBLICATIONS

### peer-reviewed conference papers

- J. Harel and C. Koch, "On the optimality of spatial attention for object detection", *Workshop on Attention and Performance in Computational Vision (WAPCV) at the International Conference on Computer Vision Systems*, 2008.
- M. Cerf\*, J. Harel\*, A. Huth, W. Einhaeuser, and C. Koch, "Decoding what people see from where they look: predicting visual stimuli from scanpaths", *Workshop on Attention and Performance in Computational Vision (WAPCV) at the International Conference on Computer Vision Systems*, 2008. \*equal contribution
- M. Cerf, J. Harel, W. Einhaeuser, and C. Koch. "Predicting human gaze using low-level saliency combined with face detection", *Neural Information Processing Systems (NIPS)*, 2007.
- J. Harel, C. Koch, and P. Perona, "Graph-Based Visual Saliency", *Neural Information Processing Systems (NIPS)*, 2006.
- M. El-Khamy, R.J. McEliece, and J. Harel, "Performance Enhancements for Algebraic Soft Decision Decoding of Reed-Solomon Codes", *IEEE International Symposium on Information Theory (ISIT)*, 2004.
- J. Harel, R.J. McEliece, and R. Palanki, "Poset Belief Propagation - Experimental Results", *IEEE International Symposium on Information Theory (ISIT)*, 2003.
- S. Dolinar, G. Chinn, J. Harel, A. Kiely, M. Klimesh, R. Manduchi, S. Shambayati, M. Vida, "Region-of-Interest Data Compression with Prioritized Buffer Management", *Eath Science Technology Conference (ESTC)*, 2002.

### technical reports

- P. Merkle, C. Koch, P. Perona, C. Fanti, E. DiBernardo, J. Harel, U. Rutishauser. "Attention and Recognition of Humans and Threat Objects in Video", SANDIA Report SAND2005-6646, Official Use Only. Sandia National Laboratories, Albuquerque NM, 2005.

### notes

I have Erdős Number 2 via McEliece.

Full paper text available at <http://www.klab.caltech.edu/~harel/res.html>

**I AM A CITIZEN OF THE U.S.A.**