

# MICHAEL TAO

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## EDUCATION

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### College of Engineering · University of California, Berkeley

**Ph.D. in EECS** (Electrical Engineering and Computer Sciences) · **Spring 2014**

Emphasis: Computer Vision and Computational Photography

Adviser: Ravi Ramamoorthi

### College of Engineering · University of California, Berkeley

**B.S. in EECS** w/ honors (Electrical Engineering and Computer Sciences) · **Spring 2010**

Emphasis: Communications, Networks and Systems, Signal Processing

Eta Kappa Nu (EECS Honor Society Member: Former Tutoring Officer)

### Related Courses

#### Graphics

**CS184** - **Foundations of Computer Graphics:** rendering pipeline, algorithms, anti-aliasing, ray-tracing, transformations, lighting

**CS283** - **Advanced Computer Graphics:** mesh processing, subdivision, inverse kinematics, computational photography

#### Computer Vision

**CS188** - **Introduction to Artificial Intelligence:** heuristic search, learning, logical inference, planning, expert systems

**CS280** - **Computer Vision:** image processing and segmentation, line drawing analysis, object models for prediction, recognition

**CS294** - **Visual Search Engines:** sensory, semantic, model, query-context, and interface gap

#### Signals and Systems

**EE120** - **Signals and Systems:** LTI, Fourier, Laplace, Z-transforms, stability control, AM, FM, feedbacks

**EE121** - **Introduction to Digital Communication Systems:** source coding, channel coding, band modulations, receiver design

**EE123** - **Digital Signal Processing:** FFT, Z-transforms, DFT, wavelets, quantization, digital filter designs

**EE126** - **Probability and Random Processes:** probability in signal processing, distribution, density function, Markov Chains

## RESEARCH INTERESTS AND AREAS OF EXPERTISE

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· My research interests incorporate *computational photography* with *signal processing*, *computer vision*, *user interface*, and *machine learning* to develop practical applications and algorithms. Most of my work focuses on improving applications such as cameras, mobile devices, Adobe Photoshop, and Adobe Photoshop Lightroom. Projects that I am interested in include but are not exclusive to *localized editing* (e.g. *matting*, *adaptive brush tools*), *blurring algorithms* (e.g. *bilateral filter* and *depth of field*), *e-commerce solutions*, *detection and recognition*, and *optical flow*

· fluent in *theory*, *implementation*, and *execution* in research and development and consumer level products

· strong in *business and engineering*

· experienced via internships and start-ups

## PROFESSIONAL EXPERIENCE

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### Qualcomm, San Diego, California

*3A Camera Team Engineering Intern*, (June 2010 – August 2010)

· Developed new frameworks for auto-white balancing (AWB) and auto-focus systems in mobile cameras

· *Designed a pipeline framework for new AWB algorithms and submitted an IDF for the new auto-focus system*

### Zoran Corporation, Sunnyvale, California

*Digital Television Engineering Intern*, (June 2009 – July 2009)

· Developed verification tools for video/image processing algorithms programmed in MATLAB, C, and C++

· *Designed a full video-pipeline simulator that improved efficiency and verification for digital image processing algorithms*

### Adobe Systems Incorporated, San Jose, California

*Photoshop Technology Transfer Engineer and Researcher Intern*, (May 2008- August 2008)

· Developed new tools and image filter algorithms

· *Co-authored and filed two patents for the company, U.S. patent applications 61/091,239 and 61/091,223*

### Perfect 2400 SAT Preparation, Fremont, California

*Co-Founder and President*, (April 2006- Present)

· Directed in a group-oriented environment with several employees and marketing associates

- Technology and website manager of [www.perfect2400.com](http://www.perfect2400.com)
- *Expanded the company to Southern California and boosted the company's revenue to six digits*

## RESEARCH AND PROJECT EXPERIENCE

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### **Optimized PatchMatch for Internet Images**, Berkeley, California

*Research Apprentice for Professor Ravi Ramamoorthi*, (December 2009- Present)

- Developing algorithms that improve the speed of PatchMatch by Barnes et. al.
- Writing, testing, and comparing PatchMatch algorithms
- *Sped up PatchMatch to an order of  $O(n)$ -  $n$  as in number of pixels*

### **Clothes Fitting for an E-commerce Solution**, Berkeley, California

*Project Researcher*, (October 2009- December 2009)

- Class research project under Professor Trevor Darrell
- Using puppetry algorithms and joint detection algorithms, we are developing a technique to place clothes on common self-portrait photographs
- Determining how to emulate the 3-D effects/wrinkles of clothes on people
- Focusing on performance and convenience for a viable e-commerce solution

### **Error-tolerant Image Compositing**, Berkeley, California

*Researcher*, (July 2009- November 2009)

- Partnered with Sylvain Paris and Kimo Johnson
- Developed and verified algorithms for gradient-based image compositing that is robust to errors in matting
- *"Error-tolerant Image Compositing" accepted to ECCV 2010 with oral presentation*

### **Depth of Field Postprocessing for Layered Scenes**, Berkeley, California

*Research Apprentice for Todd Kosloff and Brian Barsky*, (September 2007- May 2009)

- Made several efficient algorithms for depth of field blurring using a spreading approach that inhibits artifacts
- Worked with image processing, contrast processing, Gaussian blur, square blur, variation blur, and circle blur
- *Paper accepted at Graphics Interface 2009 Graphics Track, Published a technical report No.UCB/ECS-2008-187*

## ACTIVITIES

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### **Engineering 98**, Berkeley, California

*Instructor and Course Designer*, (August 2009- Present)

- Taught engineering students about research, internships, and success in Berkeley
- *Guided several students in their educational goals*

### **MandMPhotographs.com and TDPhotos.com**, Fremont, California

*Photographer and Web Designer*, (August 2008- Present)

- Marketing and website manager
- *Increased publicity of the websites, and learned photography*

## MAJOR PUBLICATIONS

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[1] **Michael W. Tao**, Micah K. Johnson, and Sylvain Paris. "Error-tolerant Image Compositing". In *European Conference on Computer Vision (ECCV)*, 2010. **(with oral presentation, ~ 3.2% papers accepted as oral)**

[2] Todd J. Kosloff, **Michael W. Tao**, and Brian A. Barsky. "Depth of Field Postprocessing For Layered Scenes Using Constant-Time Rectangle Spreading". In *Graphics Interface*, May 2009.

## PATENTS

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[1] U.S. Patent Application No. *61/091,239*, Unpublished (filing date Aug. 22, 2008) (**Michael W. Tao**, Jen-Chan Chien).

[2] U.S. Patent Application No. *61/091,223*, Unpublished (filing date Aug. 22, 2008) (Jen-Chan Chien, **Michael W. Tao**, Sylvain Paris).

## SKILLS

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Very familiar with coding in MATLAB and C/C++: Microsoft Visual Studio environment