

# Lubomir Bourdev

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## Education

Doctor of Philosophy	Thesis: Poselets and Their Applications in High-Level Computer Vision in Computer Science, U.C. Berkeley. Advisor: Prof. Jitendra Malik	09/2007 – 05/2011
Master of Science	in Computer Science, Brown University.	09/1994 – 05/1998
Bachelor of Arts	in Computer Science, Brown University.	09/1994 – 05/1998

## Industry R&D Experience

### Adobe Systems, Advanced Technology Labs (06/98 – present)

Invents and prototypes new technologies for future versions of the Adobe product line, and for future products.  
Author of 50+ pending or issued patents.  
Author of seven major features shipped in Illustrator, Acrobat, InDesign, and Photoshop Elements.

#### Senior Research Scientist (08/07 - present)

- Recent research topics: Detecting/recognizing people in personal photo collections, object recognition and segmentation, action and attribute classification, face localization and editing. (8 related papers)
- Proposed a novel method for detection of articulated objects using [Poselets](#), together with my Ph.D. advisor Prof. Malik. Our method outperforms all others on the person detection competition of the [PASCAL](#) VOC challenges 2009 and 2010.
- Lead architect of the engine behind the [People Recognition](#) feature in Photoshop Elements 8.0.

#### **Senior Computer Scientist** (12/03 – 07/07)

- Invented [the Soft Cascade](#) - a method for detection of faces in digital images, which is shown to be among the most accurate real-time detectors, used in Photoshop Elements, Premiere Elements, Premiere Pro as well as in a camera phone [prototype](#). (9 issued patents)
- Lead author of the [Generic Image Library \(GIL\)](#) – a [Boost](#) image library. See code section below for more.
- Designed and developed the [Face Tagging](#) module in Photoshop Elements 4. To my knowledge this was the first consumer-level application of face detection and has received positive [reviews](#) from PC Magazine, Digital Journal, Imaging Resource and others. (7 issued patents)
- Designed and developed [Symbolism](#) - a creative tool in Illustrator 9 using my particle system to simplify drawing of complex natural scenes, such as grass, trees, shading, hair, clouds. It has received outstanding [reviews](#). (2 issued patents)
- Designed and developed the probabilistic engine in Acrobat forms that suggests default entries in form fields. It can extrapolate appropriate values for fields and forms it has not seen before. (1 issued patent)

#### **Computer Scientist** (06/98 – 11/03)

- Designed and developed the [AGM Flattener](#), a module that converts documents containing semi-transparent graphics into opaque documents. It is used for printing and export across the entire vector graphics product line -- Acrobat, Illustrator, InDesign and various RIPs. (11 issued patents).
- Designed and developed the [Flattening Preview](#) - an interactive transparency-focused print preview, now used in Acrobat, Illustrator and InDesign. (2 issued patents)
- Participated in the definition of the formulas of the Adobe Transparency Model and PDF 1.4. Selected as the Chief Technologist of an internal company committee designed to guide and track evolution of the vector transparency model in Adobe applications.

### **Silicon Graphics, Cosmo Software, Intern** (06/97 - 08/97)

- Participated in the development of CosmoWorlds, a professional VRML authoring tool.
- Designed and implemented a converter from Inventor 2.1 to VRML 2.0.
- Created a VRML Billboard Editor.

## Publications

- Lubomir Bourdev, Subhransu Maji and Jitendra Malik. [\*Describing People: Poselet-Based Approach to Attribute Classification\*](#), International Conference on Computer Vision (ICCV 2011)(oral)
- Bharath Hariharan, Pablo Arbelaez, Lubomir Bourdev, Subhransu Maji and Jitendra Malik, [\*Semantic Contours Using Inverse Detectors\*](#), International Conference on Computer Vision (ICCV 2011)
- Suporn Pongnumkul, Mira Doncheva, Wil Li, Lubomir Bourdev, Shai Avidan, Jue Wang and Michael Cohen, [\*Pause-and-play: Automatically Linking Screencast Video Tutorials with Applications\*](#), ACM Symposium on User Interface Software and Technology (UIST 2011)
- Fei Yang, Jue Wang, Eli Shechtman, Lubomir Bourdev and Dimitris Metaxas, [\*Expression Flow for 3D-Aware Face Component Transfer\*](#), ACM Transactions on Graphics (SIGGRAPH 2011)
- Subhransu Maji, Lubomir Bourdev and Jitendra Malik, [\*Action Recognition From a Distributed Representation of Pose and Appearance\*](#), IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2011)
- Thomas Brox, Lubomir Bourdev, Subhransu Maji and Jitendra Malik, [\*Object Segmentation by Alignment of Poselet Activations to Image Contours\*](#), IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2011)
- Lubomir Bourdev, [\*Poselets and Their Applications in High-Level Computer Vision\*](#), Ph.D. Thesis, University of California at Berkeley, 2011
- Lubomir Bourdev, Subhransu Maji, Thomas Brox and Jitendra Malik, [\*Detecting People Using Mutually Consistent Poselet Activations\*](#), European Conference on Computer Vision (ECCV 2010)
- Lubomir Bourdev and Jitendra Malik, [\*Poselets: Body Part Detectors Trained Using 3D Human Pose Annotations\*](#), International Conference on Computer Vision (ICCV 2009)
- Lubomir Bourdev, [\*Generic Image Library\*](#), Software Developer's Journal, August 2007
- Lubomir Bourdev and Jaakko Järvi, [\*Efficient Run-Time Dispatching in Generic Programming with Minimal Code Bloat\*](#), Science of Computer Programming, 2010
- Lubomir Bourdev and Jaakko Järvi, [\*Efficient Run-Time Dispatching in Generic Programming with Minimal Code Bloat\*](#), LCSD Workshop, OOPSLA 2006
- Lubomir Bourdev and Jonathan Brandt, [\*Robust Object Detection via Soft Cascade\*](#), IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2005)
- Michael Kowalski, Lee Markosian, J.D. Northrup, Lubomir Bourdev, Ronen Barzel, Loring Holden and John Hughes, [\*Art-Based Rendering of Fur, Grass, and Trees\*](#), ACM Transactions on Graphics (SIGGRAPH 1999) (front cover image)
- Lubomir Bourdev, [\*Rendering Non-Photorealistic Strokes with Temporal and Arc-Length Coherence\*](#), Master's Thesis, Brown University 05/08
- Lee Markosian, Michael Kowalski, Sam Trychin, Lubomir Bourdev, Daniel Goldstein and John Hughes, [\*Real-Time Nonphotorealistic Rendering\*](#), ACM Transactions on Graphics (SIGGRAPH 1997)

## Projects / Code / Datasets

- [Generic Image Library](#) (Boost.GIL). An open-source C++ library. Abstracts image representation from algorithms and allows us to write an algorithm once and have it work for any image without performance loss. Used by several Adobe products and by other companies and universities. There are many [GIL extensions](#) developed by the open-source community. I prepared a video tutorial [here](#).
- [Poselets](#). A Matlab library for person and object recognition using our method developed at UC Berkeley.
- [ClusterLib](#). A Matlab library for scheduling and managing Matlab jobs on a cluster of computers.
- [H3D](#) (Humans in 3D) Dataset. A dataset of 1200+ people annotated with joints, keypoints, 3D skeleton and part labels.
- [Human Annotation Tool](#). A Java tool for annotating images of people or objects. Infers the 3D pose in real time.
- [Attributes of People Dataset](#). A dataset of 8000+ people annotated with nine attributes – gender, hair style, clothes, etc.

## Issued Patents

- L. Bourdev, *Detecting Objects within an Image by Incrementally Evaluating Subwindows of the Image in Parallel*, U.S. Patent 8077920
- L. Bourdev, *Generation and Usage of Attractiveness Scores*, U.S. Patent 8041076
- L. Bourdev, *Reviewing and Editing Word Processing Documents*, U.S. Patent 7966566
- L. Bourdev, *Facilitating Computer-Assisted Tagging of Object Instances in Digital Images*, U.S. Patent 7889946
- L. Bourdev, *Previewing the Effects of Flattening Transparency*, U.S. Patent 7827485
- L. Bourdev, S. Schiller, M. Newell, *Processing Illustration Artwork*, U.S. Patent 7825941
- L. Bourdev, *Method and System to Monitor Installation of a Software Program*, U.S. Patent 7818741
- L. Bourdev, *Method for Displaying Extracted Faces from Images in Normalized Form*, U.S. Patent 7813526
- L. Bourdev, *Tagging Detected Objects*, U.S. Patent 7813557
- L. Bourdev, J. Brandt, *Image Splitting to Use Multiple Execution Channels of a Graphics Processor to Perform an Operation on Single-Channel Input*, U.S. Patent 7768516
- L. Bourdev, *Detecting Objects within an Image by Incrementally Evaluating Subwindows of the Image in Parallel*, U.S. Patent 7738680
- L. Bourdev, *Incremental Batch-Mode Editing of Digital Media Objects*, U.S. Patent 7730043
- L. Bourdev, C. Shendel, J. Heilesen, *Searching Images with Extracted Objects*, U.S. Patent 7716157
- A. Casillas, L. Bourdev, *Exporting Extracted Faces*, U.S. Patent 7706577
- L. Bourdev, *Indicating a Tag with Visual Data*, U.S. Patent 7694885
- A. Parenteau, L. Bourdev, *Selectively Transforming Overlapping Illustration Artwork*, U.S. Patent 7692652
- L. Bourdev, *Displaying Detected Objects to Indicate Grouping*, U.S. Patent 7636450
- L. Bourdev, J. Brandt, *Detecting Objects in an Image Using a Soft Cascade*, U.S. Patent 7634142
- L. Bourdev, *Method and Apparatus for Calibrating Sampling Operations for an Object Detection Process*, U.S. Patent 7616780
- L. Bourdev, *Facilitating Computer-Assisted Tagging of Object Instances in Digital Images*, U.S. Patent 7587101
- L. Bourdev, G. Wilensky, *Detection of Objects in an Image using Color Analysis*, U.S. Patent 7580563
- P. Asente, T. Pettit, L. Bourdev, M. Schuster, *Assigning Region Attributes in a Drawing*, U.S. Patent 7502028
- L. Bourdev, S. Schiller, M. Newell, *Processing Illustration Artwork*, U.S. Patent 7495675
- L. Bourdev, *Method and Apparatus for Calibrating Sampling Operations for an Object Detection Process*, U.S. Patent 7440587
- L. Bourdev, *Autocompleting Form Fields Based on Previously Entered Values*, U.S. Patent 7343551
- L. Bourdev, M. Newell, *Creating and Manipulating Related Vector Objects in an Image*, U.S. Patent 7339597
- A. Parenteau, L. Bourdev, *Selectively Transforming Overlapping Illustration Artwork*, U.S. Patent 7262782
- L. Bourdev, S. Schiller, *Processing Complex Regions of Illustration Artwork*, U.S. Patent 7256798
- L. Bourdev, *Previewing the Effects of Flattening Transparency*, U.S. Patent 7181687
- L. Bourdev, M. Newell, *Operations on Related Set of Vector Objects*, U.S. Patent 7123269
- P. Louveaux, L. Bourdev, *Hierarchical 2D Compositing with Blending Mode and Opacity Controls at All Levels*, U.S. Patent 7102651
- L. Bourdev, S. Schiller, *Processing Complex Regions of Illustration Artwork*, U.S. Patent 6894704
- L. Bourdev, S. Schiller, *Flattening Images with Abstracted Objects*, U.S. Patent 6859553
- P. Louveaux, L. Bourdev, *Hierarchical 2D Compositing with Blending Mode and Opacity Controls at All Levels*, U.S. Patent 6847380
- L. Bourdev, S. Schiller, M. Newell, *Processing Illustration Artwork*, U.S. Patent 6720977
- L. Bourdev, *Processing Opaque Pieces of Illustration Artwork*, U.S. Patent 6515675

## Teaching Experience

- Graduate Student Instructor, U.C. Berkeley, CS188, [Artificial Intelligence](#), [Prof. Pieter Abbeel](#) (01/11 – 05/11)
- Head Teaching Assistant, Brown University CS016 [Algorithms and Data Structures](#), [Prof. Roberto Tamassia](#) (01/97 - 05/97)
- Teaching Assistant, Brown University CS123 [Introduction to Computer Graphics](#), [Prof. Andries van Dam](#) (09/96 - 12/96)
- Teaching Assistant, Brown University CS016 [Algorithms and Data Structures](#), [Prof. Roberto Tamassia](#) (01/96 - 05/96)
- Teaching Assistant, Brown University CS002 [Concepts and Challenges of Computer Science](#), [Prof. Peter Wegner](#) (01/95 - 05/95)
- Tutor in Computer Science and Mathematics, Brown University (09/94 – 12/94)

## Interns Mentored / Co-mentored

- [Kevin Dale](#), Harvard University, 2010, 2011
- [Fei Yang](#), Rutgers University, 2010, 2011
- [Vuong Le](#), UIUC, 2011
- [Joseph Lim](#), MIT, 2010
- [Suporn Pongnumkul](#), University of Washington, 2010
- [Ali Farhadi](#), UIUC, 2009
- [Jiang Xu](#), Northwestern University, 2009
- [Rob Arnold](#), CMU, 2004, 2005

## Invited Talks

- *Image Understanding with Poselets*, NEC Labs ([Dr. Kai Yu](#)), Cupertino, CA 07/11
- *Poselets and Their Applications in High-Level Computer Vision*, UCSD ([Prof. Serge Belongie](#)), San Diego, CA 05/11
- *Poselets and Their Applications in High-Level Computer Vision*, Caltech ([Prof. Pietro Perona](#)), Pasadena, CA 05/11
- *Poselets: A distributed representation for visual recognition*, [Vision Sciences Society](#), Naples, Florida 05/11
- *From PostScript to Face Detectors: How Computer Vision is Transforming Adobe*, [Special ECCV10 Session on Vision and Industry](#), Crete, Greece 09/10
- *Using Poselets for Detection and Segmentation*, [The PASCAL Visual Object Classes Challenge Workshop](#) Kyoto, Japan 10/09
- *Generic Image Library*, [CVPR 2010 Tutorial on Open Source](#), San Francisco, CA 06/10
- *Generic Image Library*, Parasol Lab, Texas A&M University ([Prof. Bjarne Stroustrup](#)), College Station, TX 03/06
- *Generic Image Library*, Open Systems Lab, Indiana University ([Prof. Andrew Lumsdaine](#)), Bloomington, IN 01/06

## Awards, Affiliations, Professional Activities

- One of two Adobe employees accepted into the University Sabbatical program, which allowed me to pursue a Ph.D. while employed (completed in four years).
- The only student from the Computer Science department in 1998 accepted to the Brown University Combined Program, which allowed me to complete both Bachelor's and Master's degrees in a total of four years.
- Undergraduate Teaching and Research Assistantship, Brown University, 1995.
- National Competition of Computational Linguistics in Bulgaria, Second place, 1994. First place, 1992.
- Member of Sigma Xi and Mensa.
- Reviewer of conferences/journals in computer vision and graphics.