

Lubomir Bourdev

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Education

Doctor of Philosophy in Computer Science, U.C. Berkeley 09/2007 – present.
Master of Science in Computer Science, Brown University 09/1994 – 05/1998.
Bachelor of Arts in Computer Science, Brown University 09/1994 – 05/1998.

Computer Science Experience

Senior Research Scientist, Advanced Technology Labs, [Adobe Systems](#) (06/98 - present)

Invents and prototypes new technologies for future versions of the Adobe product line, and for future products.
Author of 32 patent applications (ten issued; sole author of thirteen, primary author of twelve and co-author of seven).
Author of six major features shipped in Illustrator, Acrobat, InDesign, and Photoshop Elements.

Face detection research:

- [The Soft Cascade](#) (CVPR 2005) - 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)
- A Bayesian color analyzer to improve the accuracy of object detection. (used in Photoshop Elements)
- Statistical methods to maximize the speed of object detectors with a small controlled loss in accuracy.
- Applications of face detection in [camera phones](#).
- Algorithms for GPU acceleration of the Soft Cascade object detection.
- Active research and research interests include computer-assisted tagging, multi-view and multi-object detection.

Other research (graphics, algorithms, learning machines, NLP, generic programming):

- Particle-based system for creation and global operations on sets of graphical elements. (used in Adobe Illustrator)
- Probabilistic engine to suggest default entries in form fields. It can extrapolate appropriate values for fields and forms it has not seen before. (used in Adobe Acrobat)
- Algorithms to perform selective planar mapping of vector graphics that dynamically trade-off quality for speed. (used in Acrobat, Illustrator, InDesign)
- Method for using generic programming in C++ to create efficient and run-time flexible code while minimizing code bloat.
- Other projects and pending patents include vision applications on the mobile platform, document review & collaboration workflow, software anti-piracy and digital rights management.

Software engineering experience:

- The Face Tagging module in Photoshop Elements 4.0. An implementation of the Soft Cascade to extract faces from images and present them to the user for tagging. ([example](#)). It has received positive [reviews](#) from PC Magazine, Digital Journal, Imaging Resource and others.
- [Symbolism](#) - a creative tool in Illustrator using my particle system to simplify drawing of complex natural scenes, such as grass, trees, shading, hair, clouds. It has received outstanding [reviews](#).
- Primary author of the [Generic Image Library \(GIL\)](#) – a library that separates image representations from algorithms on images and allows writing algorithms that can apply on any image without compromising performance. GIL was recently accepted in [boost](#).
- [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 future RIPs).
- [Flattening Preview](#) - an interactive transparency-focused print preview, now used in Acrobat, Illustrator and InDesign.
- 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.

Computer Graphics Researcher, [Brown University Graphics Group](#) (09/96 - 05/98)

- Project: *Rendering Non-Photorealistic Strokes with Temporal and Arc-Length Coherence*. Exploring methods for preserving coherence in NPR animations.
- Project: *Constant Frame Rate Terrain Rendering*. Group research in rendering height-fields and dynamically simplifying the mesh to preserve constant frame rates.
- Project: *Real-Time Non-Photorealistic Rendering*. Group project for extracting silhouette and NPR rendering of meshes. (SIGGRAPH 97)
- Project: *Art-Based Rendering of Fur, Grass and Trees*. Continuation of our work, allowing for selective control of the level of detail. (SIGGRAPH 99)
- Other graphics [projects](#).

Software Engineer, Cosmo Software, [Silicon Graphics](#) (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.

Cognition Research Assistant, [Cognitive Science Department](#) Brown University (12/95 - 06/96)

- Researched models of categorization and concept formation in humans.
- Implemented a neural network to simulate and statistically evaluate the models.
- Awarded Undergraduate Research Assistantship.
- Related class [projects](#) include HMMs for part of speech tagging, rule-based tri-language machine translation (by constructing the Lambda Calculus expression), and a Prolog NL parser/expert system.

Head Teaching Assistant, [Computer Science Department](#) Brown University

[Algorithms and Data Structures](#), [Prof. Roberto Tamassia](#) (01/97 - 05/97)

- Managed a team of 10 Teaching Assistants in a class of over 100 students.
- Conducted weekly help sessions to the entire class.
- Developed significant part of the support code and the programming assignments.

Teaching Assistant, [Computer Science Department](#) Brown University

[Introduction to Computer Graphics](#), [Prof. Andries van Dam](#) (09/96 - 12/96)

[Algorithms and Data Structures](#), [Prof. Roberto Tamassia](#) (01/96 - 05/96)

[Concepts and Challenges of Computer Science](#), [Prof. Peter Wegner](#) (01/95 - 05/95)

- Participated in the course reorganization and development.
- Handled electronic broadcasting of the course.
- Held office hours; graded student assignments.

Java Developer, [Computer Science Department](#) Brown University, (09/96 – 01/97)

- Project: Applications of Java in Data Structure visualization.
- Implemented an interactive data structure environment in Java.
- Built time manager for user-controlled forward/backward animation.

University Tutor, Brown University, (09/95 – 12/95)

- Taught object-oriented programming and introductory calculus.

Publications

- L. Bourdev, *Generic Image Library*, Software Developer's Journal, August 2007.
- L. Bourdev, J. Järvi, *Efficient Run-Time Dispatching in Generic Programming with Minimal Code Bloat*, LCSD Workshop, OOPSLA 2006.
- L. Bourdev, J. Brandt, *Robust Object Detection via Soft Cascade*, CVPR 2005.
- M. Kowalski, L. Markosian, J.D. Northrup, L. Bourdev, R. Barzel, L. Holden, J. Hughes, *Art-Based Rendering of Fur, Grass, and Trees*, SIGGRAPH 1999. (front cover image)
- L. Markosian, M. Kowalski, S. Trychin, L. Bourdev, D. Goldstein, J. Hughes, *Real-Time Nonphotorealistic Rendering*, SIGGRAPH 1997.

Patents

- L. Bourdev, *Previewing the Effects of Flattening Transparency*, U.S. Patent 7181687
- L. Bourdev, S. Schiller, *Flattening Images with Abstracted Objects*, U.S. Patent 6859553
- L. Bourdev, S. Schiller, *Processing Complex Regions of Illustration Artwork*, U.S. Patent 6894704
- L. Bourdev, S. Schiller, *Processing Complex Regions of Illustration Artwork*, U.S. Patent 7256798
- 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
- P. Louveaux, L. Bourdev, *Hierarchical 2D Compositing with Blending Mode and Opacity Controls at All Levels*, U.S. Patent 6847380
- L. Bourdev, M. Newell, *Operations on Related Set of Vector Objects*, U.S. Patent 7123269
- A. Parenteau, L. Bourdev, *Selectively transforming overlapping illustration artwork* U.S. Patent 7262782
- L. Bourdev, *Autocompleting Form Fields Based on Previously Entered Values*, U.S. Patent 7343551

Invited Talks

- L. Bourdev, [Generic Image Library](#), Parasol Lab, Texas A&M University ([Prof. Bjarne Stroustrup](#)), 03/06
- L. Bourdev, [Generic Image Library](#), Open Systems Lab, Indiana University ([Prof. Andrew Lumsdaine](#)), 01/06

Awards and Affiliations

- One of eight students in a class of 1300+ elected into 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.
- The Soros Foundation Educational Grant, 1994.
- National Competition of Computational Linguistics in Bulgaria, Second place, 1994.
- National Competition of Computational Linguistics in Bulgaria, First place, 1992.
- Member of Sigma Xi and Mensa.