

DANIEL RITCHIE

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RESEARCH INTERESTS

Computational creativity support
Artificial intelligence and machine learning systems
Probabilistic programming languages
Deep learning
Procedural modeling
Generative art
Computational design

EDUCATION

Stanford University
PhD, Computer Science
Advisors: Pat Hanrahan, Noah Goodman
Expected completion date: September 2016

Stanford University
MS, Computer Science
Conferred April 2013

University of California Berkeley
BA, Computer Science
Conferred May 2010

REFEREED PUBLICATIONS

C3: Lightweight Incrementalized MCMC for Probabilistic Programs using Continuations and Callsite Caching. Daniel Ritchie, Andreas Stuhlmüller, Noah D. Goodman. In *The Proceedings of AISTATS 2016*.

Controlling Procedural Modeling Programs with Stochastically-Ordered Sequential Monte Carlo. Daniel Ritchie, Ben Mildenhall, Noah D. Goodman, and Pat Hanrahan. In *The Proceedings of SIGGRAPH 2015*.

Generating Design Suggestions under Tight Constraints with Gradient-based Probabilistic Programming. Daniel Ritchie, Sharon Lin, Noah D. Goodman, and Pat Hanrahan. In *The Proceedings of Eurographics 2015*. **Best Paper Honorable Mention**

Quicksand: A Lightweight Embedding of Probabilistic Programming for Procedural Modeling and Design. Daniel Ritchie. In *The 3rd NIPS Workshop on Probabilistic Programming, 2014*.

First-class Runtime Generation of High-performance Types using Exotypes. Zach Devito, Daniel Ritchie, Matthew Fisher, Alex Aiken, and Pat Hanrahan. In *The Proceedings of PLDI 2014*.

Probabilistic Color-by-Numbers: Suggesting Pattern Colorizations Using Factor Graphs. Sharon Lin, Daniel Ritchie, Matthew Fisher, and Pat Hanrahan. In *The Proceedings of SIGGRAPH 2013*.

Example-based Synthesis of 3D Object Arrangements. Matthew Fisher, Daniel Ritchie, Manolis Savva, Thomas Funkhouser, and Pat Hanrahan. In *The Proceedings*

of SIGGRAPH Asia 2012.

d.tour: Style-based Exploration of Design Example Galleries. Daniel Ritchie, Ankita Arvind Kejriwal, and Scott R. Klemmer. In *The Proceedings of UIST 2011*.

Dynamic Local Remeshing for Elastoplastic Simulation. Martin Wicke, Daniel Ritchie, Bryan M. Klingner, Sebastian Burke, Jonathan R. Shewchuk, and James F. O'Brien. In *The Proceedings of SIGGRAPH 2010*.

Interactive Simulation of Surgical Needle Insertion and Steering. Nuttapon Chentanez, Ron Alterovitz, Daniel Ritchie, Lita Cho, Kris K. Hauser, Ken Goldberg, Jonathan R. Shewchuk, and James F. O'Brien. In *The Proceedings of SIGGRAPH 2009*.

TECHNICAL REPORTS

Neurally-Guided Procedural Models: Learning to Guide Procedural Models with Deep Neural Networks. Daniel Ritchie, Anna Thomas, Pat Hanrahan, Noah D. Goodman. *arXiv:1603.06143*.

BOOK CHAPTERS

Probabilistic Programming for Procedural Modeling and Design. Daniel Ritchie, Pat Hanrahan, Noah D. Goodman. In Vikash Mansinghka and Daniel Roy (Eds.), *Probabilistic Programming* (working title; in preparation).

INVITED TALKS

Creative Technologies Lab, Adobe. *Probabilistic Programming for Procedural Modeling and Design.* March 2016

Computer Science, Brown University. *Probabilistic Programming for Procedural Modeling and Design.* February 2016

Computer Science, Harvey Mudd College. *Probabilistic Programming for Procedural Modeling and Design.* February 2016

Computer Science, Yale University. *Probabilistic Programming for Procedural Modeling and Design.* February 2016

EMPLOYMENT

Research Intern San Francisco, CA
ADOBE CREATIVE TECHNOLOGIES LAB Summer 2011
Mentored by Mira Dontcheva. I investigated the creative process for webcomic artists, identified the early planning/layout phase as an opportunity for computational assistance, and prototyped a tablet-based tool for quick composition and manipulation of rough thumbnail sketches. My work resulted in a patent for new methods of creating digital comics.

Technical Director Intern Emeryville, CA
PIXAR ANIMATION STUDIOS Summer 2009
I worked on and am credited in the short film "Day and Night." I co-developed the film's pipeline for integrating 2D-animated characters into 3D scenes, and I also optimized the rendering of shots featuring hundreds of instances of desert vegetation. In addition, I wrote tools that allowed Pixar's in-house volumetric renderer to work with volumetric effects authored in Houdini.

Software Intern Roseville, CA
HEWLETT-PACKARD Summer 2008

I prototyped an application for user authentication and permissions management on enterprise networked print devices.

TEACHING & MENTORING

Instructor

Portland, OR
August 2016

PROBABILISTIC PROGRAMMING FOR
ADVANCED MACHINE LEARNING

Designing and presenting curriculum for a summer school tutorial funded by the DARPA program of the same name.

Teaching Assistant

Stanford, CA
Spring 2014

STANFORD CS 348B:
IMAGE SYNTHESIS TECHNIQUES

I held office hours, evaluated student work, and advised students on open-ended final projects for this graduate-level course on advanced physically-based rendering techniques.

Research Mentor

Stanford, CA
Summer 2013

STANFORD CURIS PROGRAM

I mentored an undergraduate student as part of the Stanford CS Undergraduate Research Internship (CURIS) program. The student, Ben Mildenhall, developed a system for ‘Bayesian Policy Search,’ using Markov Chain Monte Carlo to infer high-reward policies for simple 2D game agents. Ben later contributed to my SIGGRAPH 2015 paper, and he is now a Ph.D. student at UC Berkeley.

Teaching Assistant

Stanford, CA
Fall 2011

STANFORD CS 148:
INTRODUCTION TO COMPUTER GRAPHICS AND IMAGING

For this course, in addition to my office hours and grading responsibilities, I also designed a new raytracing assignment from the ground-up and gave a guest lecture on raytracing.

Teaching Assistant

Berkeley, CA
Fall 2009, Spring 2010

UC BERKELEY CS 184:
FOUNDATIONS OF COMPUTER GRAPHICS

I led student discussion sections for this introductory computer graphics course, where I designed small group activities, gave mini-lectures, and discussed the nuts and bolts of programming assignments.

Student Facilitator

Berkeley, CA
Spring 2009, Fall 2009, Spring 2010

UCBUGG

For three semesters, I was part of the leadership team for the UC Berkeley Undergraduate Graphics Group (UCBUGG), an entirely student-run program that helps students learn the principles of 3D animation and guides them through the creation of their first animated short film. I designed exercises, gave lectures, and provided technical support for 3D software such as Maya.

Tutor

Berkeley, CA
Fall 2008

UC BERKELEY SELF-PACED CENTER

I tutored students at UC Berkeley’s Computer Science Self-Paced Center, an organization offering university-recognized courses that allow self-directed students to learn a new programming language at their own pace.

PROFESSIONAL ACTIVITIES

Journal Reviewer: Computer Aided Design, IEEE Transactions on Computer Graphics and Visualization

Conference Proceedings Reviewer: SIGGRAPH 2016, SIGGRAPH Asia 2016, UIST 2016, NIPS 2016

OPEN-SOURCE SOFTWARE

WebPPL

<http://webppl.org>

I am a contributor to WebPPL, a state-of-the-art probabilistic programming language that uses continuation passing style to support enumeration-based, sampling-based, and variational inference algorithms. My C3 system is available in WebPPL as the **IncrementalMH** inference method. I have also used WebPPL to implement an open-source demo of my Stochastically-Ordered Sequential Monte Carlo algorithm that runs entirely in the browser (<http://dritchie.github.io/web-procmod>).

adnn

<https://github.com/dritchie/adnn>

I am the author of adnn, a pure Javascript library for neural network computation using reverse-mode automatic differentiation on general-purpose computation graphs. The library has been incorporated into WebPPL and used for research projects.

probabilistic-js

<https://github.com/dritchie/probabilistic-js>

I am the author of probabilistic-js, a lightweight embedding of probabilistic programming in Javascript. Like WebPPL, probabilistic-js can run in-browser, and it is the inference engine behind the online course *Probabilistic Models of Cognition* (<https://probmods.org>).

Quicksand

<http://dritchie.github.io/quicksand/>

I am the author of Quicksand, a lightweight embedding of probabilistic programming in the high-performance Terra language. Quicksand uses Terra's metaprogramming and code-generation constructs to compile fast machine code for MCMC inference on probabilistic programs.

PATENTS

Methods and Apparatus for Comic Creation (US 20130073952 A1)

AWARDS & HONORS

Eurographics Best Paper Honorable Mention, 2015

Stanford Graduate Fellowship, 2010-2015

UC Berkeley EECS Departmental Citation, 2010

UC Berkeley Computer Science Highest Achievement Award, 2010

CRA Outstanding Undergraduate Researcher Honorable Mention, 2010

UC Berkeley Edward Frank Kraft Scholarship, 2007