

DANIEL RITCHIE

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EDUCATION

Stanford University

PhD, Computer Science

Dissertation: *Probabilistic Programming for Procedural Modeling and Design*

Advisors: Pat Hanrahan, Noah Goodman

Conferred September 2016

Stanford University

MS, Computer Science

Conferred April 2013

University of California Berkeley

BA, Computer Science

Conferred May 2010

EMPLOYMENT

Assistant Professor

Brown University Computer Science Department

Providence, RI

2017 – Present

Postdoctoral Researcher

Stanford University Computer Science Department

Stanford, CA

2016 – 2017

Research Intern

Adobe Creative Technologies Lab

San Francisco, CA

Summer 2011

Graduate Research Assistant

Stanford University Computer Science Department

Stanford, CA

2010 – 2016

Technical Director Intern

Pixar Animation Studios

Emeryville, CA

Summer 2009

Software Intern

Hewlett-Packard

Roseville, CA

Summer 2008

REFEREED

PUBLICATIONS

ShapeMOD: Macro Operation Discovery for 3D Shape Programs. R. Kenny

Jones, David Charatan, Paul Guerrero, Niloy Mitra, Daniel Ritchie. *SIGGRAPH 2021*.

Inferring CAD Modeling Sequences using Zone Graphs. Xianghao Xu, Wenzhe

Peng, Chin-Yi Cheng, Karl D. D. Willis, Daniel Ritchie. *CVPR 2021*.

Motion Annotation Programs: A Scalable Approach to Annotating Kine-

matic Articulations in Large 3D Shape Collections. Xianghao Xu, David

Charatan, Sonia Raychaudhuri, Hanxiao Jiang, Mae Heitmann, Vladimir Kim, Sid-

dhartha Chaudhuri, Manolis Savva, Angel X. Chang, Daniel Ritchie. *3DV 2020*.

Shape from Tracing: Towards Reconstructing 3D Object Geometry and

SVBRDF Material from Images via Differentiable Path Tracing. Purvi

Goel, Loudon Cohen, James Guesman, Vikas Thamizharasan, James Tompkin, Daniel

Ritchie. *3DV 2020*.

ShapeAssembly: Learning to Generate Programs for 3D Shape Structure Synthesis. R. Kenny Jones, Theresa Barton, Xianghao Xu, Kai Wang, Ellen Jiang, Paul Guerrero, Niloy Mitra, Daniel Ritchie. *SIGGRAPH Asia 2020*.

GANHopper: Multi-Hop GAN for Unsupervised Image-to-Image Translation. Wallace Lira, Johannes Merz, Daniel Ritchie, Daniel Cohen-Or, Hao Zhang. *ECCV 2020*.

Learning Generative Models of 3D Structures. Siddhartha Chaudhuri, Daniel Ritchie, Jiajun Wu, Kai Xu, Hao Zhang. *Eurographics 2020 State-of-the-art report*.

Learning Style Compatibility Between Objects in a Real-World 3D Asset Database. Yifan Liu, Ruolan Tang, Daniel Ritchie. *Pacific Graphics 2019*.

PlanIT: Planning and Instantiating Indoor Scenes with Relation Graph and Spatial Prior Networks. Kai Wang, Yu-an Lin, Ben Weissmann, Manolis Savva, Angel X. Chang, Daniel Ritchie. *SIGGRAPH 2019*.

Fast and Flexible Indoor Scene Synthesis via Deep Convolutional Generative Models. Daniel Ritchie, Kai Wang, Yu-an Lin. *CVPR 2019*.

Learning to Describe Scenes with Programs. Yunchao Liu, Zheng Wu, Daniel Ritchie, William T. Freeman, Joshua B. Tenenbaum, Jiajun Wu. *ICLR 2019*.

Learning to Infer Graphics Programs from Hand-Drawn Images. Kevin Ellis, Daniel Ritchie, Armando Solar-Lezama, Joshua B. Tenenbaum. *NeurIPS 2018*. SPOTLIGHT PRESENTATION.

Improving Shape Deformation in Unsupervised Image-to-Image Translation Aaron Gokaslan, Vivek Ramanujan, Daniel Ritchie, Kwang In Kim, James Tompkin. *ECCV 2018*.

Deep Convolutional Priors for Indoor Scene Synthesis Kai Wang, Manolis Savva, Angel X. Chang, Daniel Ritchie. *SIGGRAPH 2018*.

ScanComplete: Large-Scale Scene Completion and Semantic Segmentation for 3D Scans Angela Dai, Daniel Ritchie, Martin Bokeloh, Scott Reed, Jürgen Sturm, Matthias Nießner. *CVPR 2018*.

Example-based Authoring of Procedural Modeling Programs with Structural and Continuous Variability Daniel Ritchie, Sarah Jobalia, Anna Thomas *Eurographics 2018*.

An Improved Training Procedure for Neural Autoregressive Data Completion. Maxime Voisin, Daniel Ritchie. *NIPS 2017 Bayesian Deep Learning Workshop*.

Neurally-Guided Procedural Models: Amortized Inference for Procedural Graphics Programs using Neural Networks. Daniel Ritchie, Anna Thomas, Pat Hanrahan, Noah D. Goodman. *NIPS 2016*.

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

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

Generating Design Suggestions under Tight Constraints with Gradient-based Probabilistic Programming. Daniel Ritchie, Sharon Lin, Noah D. Goodman, and Pat Hanrahan. *Eurographics 2015*. BEST PAPER HONORABLE MENTION.

Quicksand: A Lightweight Embedding of Probabilistic Programming for Procedural Modeling and Design. Daniel Ritchie. *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. *PLDI 2014*.

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

Example-based Synthesis of 3D Object Arrangements. Matthew Fisher, Daniel Ritchie, Manolis Savva, Thomas Funkhouser, and Pat Hanrahan. *SIGGRAPH Asia 2012*.

d.tour: Style-based Exploration of Design Example Galleries. Daniel Ritchie, Ankita Arvind Kejriwal, and Scott R. Klemmer. *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. *SIGGRAPH 2010*.

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

TECHNICAL REPORTS

Learning to Infer Shape Programs Using Latent Execution Self Training. Homer Walke, R. Kenny Jones, Daniel Ritchie. *arXiv:2011.13045, 2020*.

Deep Amortized Inference for Probabilistic Programs. Daniel Ritchie, Paul Horsfall, Noah D. Goodman. *arXiv:1610.05735, 2016*.

INVITED TALKS

Neurosymbolic Generative Models for Structured 3D Content
3DGV, *3D Geometry and Vision Seminar* February 2021

Learning Neurosymbolic 3D Models
PROBPROG, *International Conference on Probabilistic Programming* March 2020

Everything You Need to Know About Deep Fakes
Full Stack at Brown, *Hack@Home* October 2020

Neurosymbolic 3D Models: Learning to Generate 3D Shape Programs
GAMES, *Graphics and Mixed Environment Seminar* August 2020

Toward Synthesizing Training Data for 3D Scene Understanding CVPR, <i>3D Scene Understanding Workshop</i>	June 2020
From Neural to Neurosymbolic 3D Modeling CVPR, <i>Neurosymbolic Visual Learning & Program Induction Workshop</i>	June 2020
Neurosymbolic 3D Models MIT, <i>Vision Seminar</i>	March 2020
Learning to Generate 3D Structures Brown Department of Biostatistics, <i>Deep Learning Seminar</i>	February 2020
Deep Learning for Graph(ic)s Simon Fraser University, <i>Visual Computing Group</i>	December 2019
Learning to Generate Visual Structures Carney Institute for Brain Science, <i>Lunch Seminar</i>	October 2019
Indoor Scene Synthesis: Past, Present, and Future Shenzhen University, <i>Visual Computing Summer School</i>	July 2019
Probabilistic Programming Brown ICERM, <i>Computer Vision Semester Program</i>	February 2019
Virtual Indoor Scene Synthesis: Past, Present, and Future MIT, <i>Graphics Lunch</i>	December 2018
Toward Style-Aware Generative Models of Virtual Indoor Scenes Wayfair LLC, <i>Computer Vision / Data Science Team</i>	December 2018
Visual Program Induction Brown Applied Math, <i>Pattern Theory Seminar</i>	November 2018
Probabilistic Programming for Computer Graphics MIT, <i>PROBPROG 2018</i>	October 2018
Learning Procedural Modeling Programs from Examples MIT, <i>New England Symposium on Graphics</i>	April 2018
Microsoft Research Cambridge, <i>New England Machine Learning Day</i>	May 2018
Learning from Large-Scale Synthetic 3D Scene Data Brown University Data Science Initiative, <i>Datathon</i>	March 2018
Inferring Graphics Programs University of Washington, <i>ML+PL Workshop</i>	February 2018
Learning and Inferring Graphics Programs MIT, <i>Vision Seminar</i>	September 2017
Creative AI for Computer Graphics (It's More Than Just Style Transfer) Google Brain, <i>Magenta Group</i>	January 2017
Probabilistic Programming for Procedural Modeling and Design Adobe Systems, <i>Creative Technologies Lab</i>	March 2016

Brown University, <i>Computer Science Department</i>	February 2016
Harvey Mudd College, <i>Computer Science Department</i>	February 2016
Yale University, <i>Computer Science Department</i>	February 2016

PANELIST	Advances in Software for Approximate Bayesian Inference. <i>NIPS 2016 Workshop on Advances in Approximate Bayesian Inference.</i>
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TUTORIALS & WORKSHOPS	Synthetic 3D Scene Datasets: Needs & Opportunities	August 2020
	Daniel Ritchie, Angel Chang, Manolis Savva SIGGRAPH 2020 Birds of a Feather	

Learning 3D Generative Models	June 2020
Daniel Ritchie, Florian Golemo, Angel Chang, Siddhartha Chaudhuri, Aaron Courville, Qixing Huang, Derek Nowrouzezahrai, Pedro O. Pinheiro, Sai Rajeswar, Manolis Savva, David Vasquez, Kai Xu, Hao Zhang	
CVPR 2020 Workshop	

3D Scene Generation	June 2019
Angel Chang, Qixing Huang, Daniel Ritchie, Manolis Savva	
CVPR 2019 Workshop	

Learning Generative Models of 3D Structures	May 2019
Siddhartha Chaudhuri, Daniel Ritchie, Kai Xu, Hao Zhang	
Eurographics 2019 Tutorial	

TEACHING	Instructor	Fall 2021
	Brown CSCI 1230: Introduction to Computer Graphics	

Instructor	Fall 2018 – 2020
Brown CSCI 1470/2470: Deep Learning	

Instructor	Spring 2018 – 2020
Brown CSCI 2240: Interactive Computer Graphics	

Instructor	Fall 2017
Brown CSCI 2951-W: Creative Artificial Intelligence for Computer Graphics	

Instructor	Summer 2016
DARPA Probabilistic Programming for Advanced Machine Learning Summer School	

Course Assistant	Spring 2014
Stanford CS 348b: Image Synthesis Techniques	

Course Assistant	Fall 2011
Stanford CS 148: Introduction to Computer Graphics and Imaging	

Graduate Student Instructor	Fall 2009, Spring 2010
UC Berkeley CS 184: Foundations of Computer Graphics	

Student Facilitator	Spring 2009 – Spring 2010
UC Berkeley Undergraduate Graphics Group	

Tutor
UC Berkeley Self-Paced Center

Fall 2008

**RESEARCH
MENTORING**

Current Students

Kai Wang	Brown CS PhD
Russell (Kenny) Jones	Brown CS PhD
Xianghao Xu	Brown CS PhD
Aditya Ganeshan	Brown CS PhD
Arman Maesumi	Brown CS PhD
Bryce Blinn	Brown CS ScB + ScM (expected 2022)
David Charatan	Brown Computer Engineering ScB, CS ScM (expected 2022)
Yuchen Zhou	Brown CS ScM (expected 2022)
Caleb Trotz	Brown Math-CS ScB (expected 2022)
Zhouqi Gong	Brown CS ScM (expected 2022)
David Han	Brown CS ScB (expected 2023)
Adam Wang	Brown CS + Applied Math ScB (expected 2023)
Sean Zhan	Brown CS + Applied Math + Econ ScB (expected 2023)

Alumni

Andrew Peterson <i>Next position: Disney Animation</i>	Brown CS + Applied Math ScB, CS ScM 2021
Maggie Wu <i>Next position: Microsoft</i>	Brown CS + Econ ScB 2021
Homer Walke <i>Next position: PhD Student, UC Berkeley</i>	Brown CS ScB 2021
Theresa Barton <i>Next position:</i>	Brown CS ScM 2021
Naveen Srinivasan <i>Next position: Amazon Lab126</i>	Brown CS ScB + ScM 2020
Brian Oppenheim <i>Next position: Google</i>	Brown CS ScB 2020
Brad Guesman <i>Next position: NVIDIA</i>	Brown CS AB + Physics AB 2020

Miles Freeman <i>Next position: Winnie</i>	Brown CS + Applied Math ScB 2020
Siqi Wang <i>Next position: PhD Student, Boston University</i>	Brown CS ScM 2020
Loudon Cohen <i>Next position: NVIDIA</i>	Brown CS ScB + ScM 2020
Purvi Goel <i>Next position: PhD Student, Stanford University</i>	Brown CS ScB + ScM 2020
Natalie Lindsay <i>Next position: Apple</i>	Brown CS ScB + ScM 2020
Leon Lei <i>Next position: Amazon</i>	Brown CS ScB + ScM 2020
Ellen Jiang <i>Next position: Google Brain, Big Picture Group</i>	Brown CS ScB 2020
Ruolan Tang <i>Next position: Two Sigma</i>	Brown CS ScM 2019
Ben Weissmann <i>Next position: Down Dog</i>	Brown CS ScB 2019
Mae Heitmann <i>Next position: AirBnB</i>	Brown Math+CS ScB 2019
Montana Fowler <i>Next position: PhD Student, UC Santa Cruz</i>	Brown CS AB + Visual Art AB 2019
Yu-An (Andy) Lin <i>Next position: Microsoft</i>	Brown ECE ScM 2018
Yifan Liu <i>Next position: Google</i>	Brown CS ScM 2018
Shreya Shankar <i>Next position: Machine Learning Engineer, Viaduct</i>	Stanford CS BS 2019
Maxime Voisin <i>Next position: Research Assistant, Stanford University</i>	Stanford MS&E MS 2018
Anna Thomas <i>Next position: Masters Student, University of Cambridge (Churchill Scholar)</i>	Stanford CS BS 2018
Sarah Jobalia <i>Next position: Microsoft</i>	Stanford CS MS 2018
Ben Mildenhall <i>Next position: PhD Student, UC Berkeley</i>	Stanford CS BS 2015

Visitors

Hameed Abdul-Rashid Visiting Researcher Summer 2019
Home institution: University of Southern Mississippi

FUNDING

Google exploreCSR 2020
Unrestricted Gift
Co-PIs: James Tompkin, Jeff Huang, Amy Greenwald. \$18,000

Adobe Inc. 2020
Unrestricted Gift
Sole PI. \$20,000

NSF CCRI Planning #2016532 2020
A Community-Standard, Large-Scale Synthetic 3D Scene Dataset for Scene Analysis and Synthesis
Sole PI. \$50,000

Autodesk Inc. 2020
Unrestricted Gift
Sole PI. \$30,000

NSF CAREER #1941808 2020
Learning Neurosymbolic 3D Models
Sole PI. \$549,999

NSF CHS Small #1907547 2019
Learning to Automatically Design Interior Spaces
Sole PI. \$498,333

DARPA GAILA HR00111990064 2019
Cognitively-Motivated Word Learning in Embodied Virtual Agents
Co-PIs: Ellie Pavlick, Roman Fieinan, Stefanie Tellex, Carsten Eickhoff. \$954,509

Brown University OVPR Research Seed Fund Award 2019
Building a Large Dataset of Articulated 3D Object Models
Sole PI. \$42,500

NSF CRII #1753684 2018
Learning Procedural Modeling Programs for Computer Graphics from Examples
Sole PI. \$175,000

AWARDS & HONORS

NSF CAREER Award 2020
Eurographics Best Paper Honorable Mention 2015
Stanford Graduate Fellowship 2010
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

SERVICE

Program Committee Member / Area Chair
SIGGRAPH: 2021
SIGGRAPH Asia: 2018, 2019

SIGGRAPH Asia Courses: 2020
NeurIPS: 2019
ICLR: 2021
Eurographics: 2020, 2021

Conflict of Interest Coordinator
SIGGRAPH Asia: 2020

Conference Proceedings Reviewer
SIGGRAPH: 2016 – 2020
SIGGRAPH Asia: 2016 – 2020
CVPR: 2019, 2020
UIST: 2016
NeurIPS: 2016, 2018, 2019
Eurographics: 2017, 2018, 2019
Graphics Interface: 2019
ICCV: 2019, 2021
ECCV: 2020
ICML: 2018
ICLR: 2018

Journal Editor
Computer Graphics Forum (Associate Editor): 2021-2024

Journal Reviewer
ACM TOG: 2019
TVCG: 2016, 2019
Computer Graphics Forum: 2017, 2020
Pattern Recognition: 2019
Computer Aided Design: 2016
Transactions on Games: 2020

Grant Reviewer
NSF Proposal Reviewer: 2018, 2020, 2021

PATENTS **Methods and Apparatus for Comic Creation** (US 20130073952 A1)

FILM CREDITS **Day & Night** 2010
Pixar Animation Studios
Shading Technical Director