Arjun Lakshmipathy

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Research Interests

Robotics: Dexterous Manipulation, Human2Robot Transfer, Contact Modeling, Tactile Sensing, Soft Robotics, Motion Planning
Graphics: Animation, AR / VR, Discrete Differential Geometry, Physics-Based Simulation & Modeling
Optimization: Quadratic Programming, Non-Convex Methods
Artificial Intelligence: Reinforcement Learning, Deep Learning, Heuristic Search, Statistical Inference
Imaging & Vision: 3D Vision, Segmentation & Reconstruction, Stereo Photography

Education

Carnegie Mellon University	**GPA: N/A**	**Graduation: 2025**
Ph.D. Computer Science		
Advisor: Nancy Pollard		
University of California, Los Angeles	**GPA: 3.814**	**Graduation: 2018**
M.S. Computer Science		
Advisor: Demetri Terzopoulos		
University of California, Los Angeles	**GPA: 3.668**	**Graduation: 2016**
B.S. Computer Science & Engineering		
B.S. Mathematics & Economics		

Research Appointments

Visiting Researcher | Meta AI Research	*May 2022 — Present*
Doctoral Research Assistant | CMU Foam Robotics Lab	*September 2020 — Present*
Research Scientist | NeuralX Incorporated	*March 2019 — August 2020*
Staff Research Associate | UCLA Computer Graphics & Vision Lab	*January 2019*
Graduate Student Researcher | UCLA Computer Graphics & Vision Lab	*November 2017 — December 2018*

Publications (Reverse Chronological)

Contact Edit: Artist Tools for Intuitive Modeling of Hand-Object Interactions
Arjun Lakshmipathy, Nicole Feng, Yu Xi Lee, Moshe Mahler, Nancy S. Pollard
ACM Transactions on Graphics (Presented at SIGGRAPH), Los Angeles, USA, August 2023

Contact Transfer: A Direct, User-Driven Method for Human to Robot Transfer of Grasps and Manipulations
Arjun Lakshmipathy, Dominik Bauer, Cornelia Bauer, Nancy S. Pollard
Proc. of IEEE International Conference on Robotics and Automation (ICRA), Philadelphia, USA, May 2022

Towards Very Low-Cost Iterative Prototyping for Fully Printable Dexterous Soft Robotic Hands
Dominik Bauer, Cornelia Bauer, **Arjun Lakshmipathy**, Roberto Shu, Nancy S. Pollard
Proc. of IEEE International Conference on Soft Robotics (ROBOSOFT), Edinburgh, UK, April 2022

Fully Printable Low-Cost Dexterous Soft Robotic Manipulators for Agriculture
Dominik Bauer, Cornelia Bauer, **Arjun Lakshmipathy**, Nancy S. Pollard
AAAI Conference on Artificial Intelligence - AI for Agriculture and Food Systems Workshop (AAAI AIFS), Vancouver, Canada, February 2022

Contact Tracing: A Low Cost Reconstruction Framework for Surface Contact Interpolation
Arjun Lakshmipathy, Dominik Bauer, Nancy S. Pollard
Proc. of IEEE International Conference on Intelligent Robots and Systems (IROS), Prague, Czech Republic, September 2021

Locally-Connected, Irregular Deep Neural Networks for Biomimetic Active Vision in a Simulated Human
Masaki Nakada, Honglin Chen, **Arjun Lakshmipathy**, Demetri Terzopoulos
Proc. of 25th International Conference on Pattern Recognition (ICPR), Milan, Italy, January 2021, 4465–4472

Deep Learning of Neuromuscular and Visuomotor Control of a Biomimetic Simulated Humanoid
Masaki Nakada, Tao Zhou, Honglin Chen, **Arjun Lakshmipathy**, Demetri Terzopoulos
IEEE Robotics and Automation Letters, 5(3), July 2020, 3952–3959. (Date of publication: February 10, 2020.)

Biomimetic Eye Modeling and Deep Neuromuscular Oculomotor Control
Masaki Nakada*, **Arjun Lakshmipathy***, Honglin Chen, Tao Zhou, Xin Ling, Demetri Terzopoulos
ACM Transactions on Graphics (Presented at SIGGRAPH Asia), Brisbane, Australia, November 2019

(* equal contribution)

Teaching Experience

Technical Animation (TA) | CMU CS 15-464 / 15-664   *Spring 2022*

This course introduces techniques for computer animation, including keyframing, procedural methods, motion capture, and simulation. The course addresses character modeling, animation, and simulation, including faces, hair, and cloth; simulation of natural phenomena; and interactions (e.g., collisions, conversations, and crowds). We consider aspects of artistic control and style as well as realism. We consider history, current practice, and state of the art research. After taking this course, students will be able to write their own simulator from scratch, have experience with professional animation and simulation tools, and be prepared for their own exploration of advanced topics in technical animation.

Introduction to Computer Graphics (TA) | UCLA CS 174A   *Fall 2017, Winter 2018*

Basic principles behind modern two- and three-dimensional computer graphics systems, including complete set of steps that modern graphics pipelines use to create realistic images in real time. How to position and manipulate objects in scene using geometric and camera transformations. How to create final image using perspective and orthographic transformations. Basics of modeling primitives such as polygonal models and implicit and parametric surfaces. Basic ideas behind color spaces, illumination models, shading, and texture mapping.

Computer Networks: The Physical Layer (TA) | UCLA CS 117   *Spring 2018, Summer 2018, Fall 2018*

Introduction to fundamental computer communication concepts underlying and supporting modern networks, with focus on wireless communications and media access layers of network protocol stack. Systems include wireless LANs (IEEE802.11) and ad hoc wireless and personal area networks (e.g., Bluetooth, ZigBee). Experimental project based on mobile radio-equipped devices (smart phones, tablets, etc.) as sensor platforms for personal applications such as wireless health, positioning, and environment awareness, and experimental laboratory sessions included.

Technical Skills

C++ (Point Cloud Library, OpenSceneGraph, Eigen, ImGUI, OpenGL + GLUT), Python (NumPy, Open3D, Tensorflow, PyTorch, SciPy), C, ROS, Blender, AWS (EC2, S3, EKS, ELB, ECS, CloudFront, Cognito, DynamoDB, MediaConvert, Route 53, ACM, SES, SNS), JavaScript (NodeJS / Express, ReactJS, AngularJS), Docker + Kubernetes, NGINX, Jenkins, Java / Spring, Scala / Play, ElasticSearch, Git

Relevant Graduate Coursework

Hands: Design and Control for Dexterous Manipulation (CMU 16-848)	*Spring 2022*
Discrete Differential Geometry (Audit) (CMU 15-858)	*Spring 2022*
Graduate Artificial Intelligence (CMU 15-780)	*Spring 2022*
Mobile and Pervasive Computing (CMU 15-821)	*Fall 2021*
Graduate Algorithms (CMU 15-750)	*Spring 2021*
Biomechanics and Motor Control (CMU 16-868)	*Fall 2020*
Computational Photography (CMU 15-862)	*Fall 2020*
Problem Solving and Search (UCLA CS 261A)	*Spring 2018*
Artificial Life for Computer Graphics and Vision (UCLA CS 275)	*Winter 2018*
Neural Networks and Deep Learning (UCLA EE 239AS)	*Winter 2018*
Embedded Systems (UCLA CS M213A)	*Fall 2017*

Non-Research Professional Appointments*

Guru Tutor (Part Time) *March 2021 — Present*
Cambridge Coaching

Technical Advisor (Part Time) *September 2020 — December 2020*
NeuralX Incorporated

Founding Engineer *March 2019 — August 2020*
NeuralX Incorporated

Full Stack Software Engineer *January 2017 — September 2017*
Rally Health Incorporated

Software Engineering Intern *June 2015 — September 2015*
Yahoo! Incorporated

Software Engineering Intern *June 2014 — September 2014*
ViaSat Incorporated

iOS Development / Quality Control Intern *July 2013 — September 2013*
Sandia National Laboratories

(*job titles only - full description and contributions available on LinkedIn)

Service

Reviewer: ICRA, IROS, Robosoft, RA-L, TVCG, 3DV

CMU CSD Open House Planning Committee (2022)

CMU CSD Introductory Course Planning Committee (2021)

UCLA UPE + TBP Free Tutoring (2016,2015,2014,2013)

Honors and Awards

Cum Laude Honors (BS), Upsilon Pi Epsilon Member, Tau Beta Pi Member

References

1. **Nancy Pollard**
   Professor
   Computer Science Department, Robotics Institute
   Carnegie Mellon University
   npollard@andrew.cmu.edu

2. **Jessica Hodgins**
   Professor of Computer Science
   Computer Science Department, Robotics Institute
   Carnegie Mellon University
   jkh@andrew.cmu.edu

3. **Demetri Terzopoulos**
   Distinguished Professor and Chancellor's Professor of Computer Science
   Computer Science Department
   University of California, Los Angeles
   dt@cs.ucla.edu