

# Rajbir Kataria

📍 Boston, Massachusetts

📞 408-991-2899 • ✉ raj.kataria@gmail.com

🌐 [www.linkedin.com/in/rajbir-kataria](http://www.linkedin.com/in/rajbir-kataria) • 🌐 [www.rajbirkataria.com](http://www.rajbirkataria.com)

## Summary

**Software Architect** and **Computer Vision Researcher** with 10+ years of experience in designing and developing software systems, 5+ years of experience as a researcher, and 2+ years of experience in managing and leading software engineering teams.

## Education

**Ph.D. in Computer Science: Computer Vision, University of Illinois** 2016 - 2023

*Committee:* Dr. Derek Hoiem (Chair), Dr. David Forsyth, Dr. Yasutaka Furukawa, Dr. Mani Golparvar-Fard

*Relevant Courses:* Computer Vision, Deep Learning I/II, Cutting-Edge Trends in Deep Learning and Recognition

*GPA:* 3.44

**Master of Science: Electrical Engineering, Stanford University** 2012 - 2013

*Relevant Courses:* Machine Learning, Applied Vision and Image Systems, Design and Analysis of Algorithms

*GPA:* 3.84

**Bachelor of Science: Computer Engineering, University of Waterloo** 2001 - 2006

*Relevant Courses:* Applied Artificial Intelligence, Database Systems, Algorithms and Data Structures

*GPA:* 81% (Graduated with Honours)

## Research Experience

**Researcher** 2021  
**Microsoft Inc.** Remote

- Explored techniques to improve image-based localization by enforcing rotation consistency between retrieved images
- Employed multi-task learning to learn a representation suitable for image retrieval and pose estimation
- Outperformed baselines in image retrieval and pose estimation on several datasets

*Skills:* 3D Computer Vision, Algorithms, Deep Learning, Multi-task Learning, Image Retrieval, PyTorch, Azure, Python, OpenCV

**Computer Vision Engineer** 2017  
**Reconstruct Inc.** Champaign, IL

- Parallelized structure from motion (SfM) by enabling individual clusters of images to be reconstructed on separate nodes
- Developed an algorithm to determine the most relevant captured image using scene camera pose and visible points
- Implemented next-best-view resectioning algorithm to account for the entropy of matches for improved resectioning

*Skills:* 3D Computer Vision, Structure from Motion, Algorithms, OpenSfM, COLMAP, AWS, Python, OpenCV

## Industry Experience

**Software Architect** 2015 - 2016  
**Reconstruct Inc.** Champaign, IL

- Led development efforts for a web-based viewer of construction site point clouds to monitor ongoing progress
- Architected the system for production and scalability using Amazon Web Services (AWS)
- Mentored employees on different technologies and helped improve their programming skills via extensive code reviews
- Implemented an alignment module to align 3D site models and point clouds to track the progress of ongoing work

*Skills:* Leadership, Software Project Management, 3D Computer Vision, Algorithms, Software Engineering, AWS, Node.js, React, MongoDB, Node.js, Python, JavaScript, HTML, OpenCV, Three.js

**Senior Software Engineer** 2014 - 2015  
**Iodine Inc.** San Francisco, CA

- Recognized pills in images using deep learning to ensure users are taking the correct pills
- Designed a natural language processing system to extract pharmaceutical side effects from unstructured datasets

- Inferred drug efficacy ratings using semantic analysis on user reviews
- Designed and implemented Iodine's iOS app - featured in the Apple App Store

**Skills:** *Computer Vision, Deep Learning, Algorithms, Software Engineering, GCP, Node.js, React, MongoDB, Caffe, Python, JavaScript, HTML*

## Senior Machine Learning Engineer

LiveMagic Inc.

2013 - 2014

Mountain View, CA

- Built a data collection pipeline using the publish-subscribe architecture to decouple back-end services
- Designed a recommendation system to provide relevant video clips to users based on their history
- Implemented a Truecasing algorithm to determine the correct case for words
- Designed and implemented a context-aware spell checker to clean closed captioning data

**Skills:** *Machine Learning, Algorithms, Software Engineering, AWS, Python, JavaScript, HTML*

## Software Engineer

Microsoft Inc.

2006 - 2012

Mountain View, CA

- Optimized Kinect skeletal tracking algorithm to determine the feasibility of next-gen hardware
- Developed diagnosis tools and system-level tests to verify new functionality and diagnose hardware failures
- Led software development efforts for Southbridge silicon that shipped in 2011 Xbox
- Collaborated with chip design and verification teams to assess risks to functionality and schedule
- Traveled to international contract manufacturing and repair facilities to support engineering development builds

**Skills:** *Leadership, Software Project Management, Algorithms, Software Engineering, C++*

## Publications

### Improving Robustness of 3D Reconstruction for Sparse Captures and Challenging Environments

*Rajbir Kataria, Doctoral Thesis, In Submission (2023).*

### Addressing Low-Shot MVS by Detecting and Completing Planar Surfaces

*Rajbir Kataria, Zhizhong Li, Joseph DeGol, Derek Hoiem, In Submission (2023).*

### Improving Structure from Motion with Reliable Resectioning

*Rajbir Kataria, Joseph DeGol, Derek Hoiem, 3DV 2020.*

### FEATS: Synthetic Feature Tracks for Structure from Motion Evaluation

*Joseph DeGol, Jae Yong Lee, **Rajbir Kataria**, Daniel Yuan, Timothy Bretl, Derek Hoiem, 3DV 2018.*

## Academic Projects

### Cutting-Edge Trends in Deep Learning and Recognition, University of Illinois Urbana-Champaign, 2017

Learned to detect small objects by identifying salient locations in an image

**Skills:** *Deep Learning, Reinforcement Learning, Object Detection, PyTorch*

### Computer Vision, University of Illinois Urbana-Champaign, 2017

Trained a Siamese network to improve matching between feature descriptors

**Skills:** *Deep Learning, Classification, PyTorch*

### Deep Learning, University of Illinois Urbana-Champaign, 2016

Implemented the two-stream network to classify activities in videos

**Skills:** *Deep Learning, Computer Vision, Activity Recognition, TensorFlow*

## Skills Summary

### Programming Languages

Python, C++

### Deep Learning Frameworks

PyTorch, TensorFlow

### Open-source software and Libraries

OpenSfM, COLMAP, OpenCV, Open3D, NumPy, scikit-learn, PIL, OpenGL, Three.js

### Cloud Platforms

AWS, Azure, GCP

### Databases

MySQL, PostgreSQL, MongoDB

### Web Development

Node.js, HTML, CSS, JavaScript, React

### Development Tools

Sublime, Git, SSH, Docker, tmux

*\*Skills with a high level of proficiency are underlined*