

# Nitin Agarwal

## Research Interests

- Computer Graphics
- Computer Vision
- Computational Geometry
- 3D Reconstruction
- Medical Image Processing
- Machine Learning

## Education

- 2014 – Present **PhD in Computer Science**, *University of California, Irvine, CA.*  
Advisor Prof. Gopi Meenakshisundaram
- 2011 – 2013 **MS in Bioengineering**, *University of Washington, Seattle, WA.*  
Thesis *Quantification of DNA in cancer cells using 3D Optical Projection Tomographic Microscopy*  
Advisors Prof. Eric J. Seibel (UW) & Prof. Anthony P. Reeves (Cornell University)
- 2006 – 2010 **BE in Electronics & Instrumentation**, *BITS, Pilani, Rajasthan, India.*

## Journal & Conference Publications

- WACV 2018 **Nitin Agarwal**, Nicola Ferrier, Mark Hereld. Towards Automated Transcription of Label Text from Pinned Insect Collections. In IEEE Winter Conference on Applications of Computer Vision, 2018.  
**Nitin Agarwal**, Xiangmin Xu, Gopi Meenakshisundaram. Geometry Processing of Conventionally Produced Mouse Brain Slice Images. (Submitted to J. Neuroscience Methods)
- eScience 2017 BigDig Workshop on BigDig: High Throughput Digitization for Natural History Collections, 2017. (oral presentation)  
Mark Hereld, Nicola Ferrier, **Nitin Agarwal**, Petra Sierwald. Designing a high-throughput pipeline for digitizing pinned insects. In IEEE 13th International Conference on e-Science, Workshop on BigDig: High Throughput Digitization for Natural History Collections, 2017. (oral presentation)
- ICVGIP 2016 **Nitin Agarwal**, Xiangmin Xu, Gopi Meenakshisundaram. Robust Registration of Mouse Brain Slices with Severe Histological Artifacts. In Indian Conference on Computer Vision, Graphics and Image Processing, 2016.
- MICCAI 2016 MCV Workshop and Computer Assisted Intervention, Workshop on Medical Computer Vision: Algorithms for Big Data, 2016. (long oral presentation)  
**Nitin Agarwal**, Xiangmin Xu, Gopi Meenakshisundaram. Automatic Detection of Histological Artifacts in Mouse Brain Slice Images. In International Conference on Medical Image Computing and Computer Assisted Intervention, Workshop on Medical Computer Vision: Algorithms for Big Data, 2016. (long oral presentation)
- EMBS 2014 **Nitin Agarwal**, Yiting Xie, Florence Patten, Anthony Reeves, Eric Seibel. DNA ploidy measure from individual cancer cells using three-dimensional image cytometry. In International Conference of the IEEE Engineering in Medicine and Biology Society, Special Topic Conference on Healthcare Innovation & Point-of-Care Technologies, 2014. (oral presentation)
- JMI 2014 **Nitin Agarwal**, Alberto Biancardi, Florence Patten, Anthony Reeves, Eric Seibel. Three-dimensional DNA image cytometry by optical projection tomographic microscopy for early cancer diagnosis. In Journal of Medical Imaging, 2014.
- SPIE 2013 **Nitin Agarwal**, Alberto Biancardi, Florence Patten, Anthony Reeves, Eric Seibel. Quantification of relative chromatin content in flow cytometry standards using 3D OPTM imaging technique. In Proceedings of SPIE Medical Imaging, 2013

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## Awards & Honours

- 2017 – 2018 **ICS Innovation Endowed Fellowship**, UC Irvine (\$1500)
  - 2017 **Best Demo Award** at CS Research Showcase, UC Irvine (\$100)
- 2016 – 2017 **Public Impact Fellowship**, UC Irvine (\$1000)
  - 2016 **Winner of Judge's Award** at Graduate Research Symposium (\$400)
- 2014 – 2019 **Dean's Fellowship**, including five years of full financial support, UC Irvine.
  - 2011 International Program and Exchange Award Scholarship, UW.
  - 2005 All India Rank 133 (1st in School) in the 7th National Science Olympiad.

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## Technical Skills

- Languages Matlab, C++, Java, OpenGL, OpenCV, Python (basic), Shell Scripting, HTML & CSS (basic).
- IDE's & Tools Vim, Sublime, Visual Studio, Eclipse, L<sup>A</sup>T<sub>E</sub>X, Git, Subversion.
- Design Tools Adobe Products (Photoshop, Lightroom & Dreamweaver)
- Operating Sys. Linux, MacOS, Windows.

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## Experience

- 2017 – Present **Research Assistant**, *Interactive Visualization & Graphics Lab (iGravi)*, UCI, Irvine, CA.  
Working on modeling 3D scenes from 2D images.
  - June – Sept **Research Intern**, *Argonne National Laboratory*, Lemont, IL.
    - 2016 Developed algorithms for multi-view reconstruction of small bugs with labels using lytro cameras. Traditional MVE problems require hundred's of images with small baselines. We digitized small bugs (from museums) and their multiple labels, using few images with wide baselines.
- 2015 – Present **Teaching Assistant**, *University of California*, Irvine, CA.  
Marked assignments & taught students in a group and on an individual basis. Courses include - Data Structures, Image Processing, Programming in C++, Graph Algorithms, Design of Algorithms.
- 2014 – 2017 **Research Assistant**, *Interactive Visualization & Graphics Lab (iGravi)*, UCI, Irvine, CA.  
Developed algorithms and tools for neuroanatomists to visualize their histology data. This involved registration of thin slices (with artifacts) to their corresponding atlas, 3D reconstruction of these slices, segmentation of neurons and computing their connectivity across slices.
- Sept 13 – July 2014 **Algorithm Developer**, *VisionGate, Inc.*, Phoenix, AZ.  
Developed new methods of non-parametric feature selection in lung cancer cells to better target features which could be used as classifiers. Improved the current 3D segmentation for better feature assessment. Developed tools to increase the throughput of the entire imaging & classification pipeline.
- 2011 – 2013 **Research Assistant**, *Human Photonics Laboratory (HPL)*, UW, Seattle, WA.  
Developed a combined procedure of sample preparation, tomographic imaging and computational processing for quantification of DNA index using 3D-OPTM for early cancer diagnosis. Reconstructed 3D images from 2D images (OPTM) using filtered back projection technique. Performed 3D segmentation & analyzed the nuclear images for morphology and DNA index. Compared different 3D segmentation algorithms for quantification of DNA index of cancer cells.

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## Invited Talks

- Mar 2018 Towards Automated Transcription of Label Text from Pinned Insect Collections, IEEE WACV, Lake Tahoe, CA.
- Oct 2016 Automatic Detection of Histological Artifacts in Mouse Brain Slice Images, MICCAI MCV Workshop, Athens, Greece.
- Oct 2014 DNA ploidy measure from individual cancer cells using three-dimensional image cytometry, IEEE EMBS conference, Seattle, WA.

## Press Coverage

Aug 2014 Cell-CT spots early signs of cancer in cell nuclei. (optics.org)

## Professional Services

reviewer I3D 2015, Visual Computer 2015, IEEE Computational Intelligence Magazine 2016, Trans. of Image Processing (TIP) 2017.

member ACM, MICCAI, IEEE.

## Relevant Courses

- Advanced Computer Graphics
- Visual Computing
- Image Understanding
- Introductions to Algorithms
- Parallel Computing
- Machine Learning
- Computational Geometry
- Scientific Computing
- Optimization
- Artificial Intelligence

## Relevant Course Projects

Machine Learning **Predicting Keypoint location on face images.**

Applied histogram of oriented gradients (HOG) to select features for better complexity control. Adopted SVM, Neural network, CNN with ensemble optimization and GPU implementation.

Image Understanding **Guess the Celebrities in TV Shows !!.**

Implemented haar-cascade features and compared eigen faces for face detection and recognition tasks on Friends dataset. Improved the accuracy by combining convolutional neural net (CNN) and linear SVM.

References available on request.

Résumé last updated • March 16, 2018