

# Neel Dey

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## Education

- 2017–present **Ph.D.**, *Computer Science, New York University, Tandon School of Engineering.*  
Advisor: Prof. Guido Gerig.
- 2015–2017 **M.S.**, *Electrical Engineering, New York University, Tandon School of Engineering.*  
Thesis Committee: Profs. Guido Gerig, Yao Wang, R. Theodore Smith.
- 2010–2014 **B.E.**, *Electronics and Telecommunications, University of Mumbai.*

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## Experience

- Summer **Intern**, *Deep Learning Team, Hyperfine Research, Inc.*  
2020 Ph.D. internship working on deep learning research for inverse problems in imaging, with applications to image quality enhancement in low-field brain MRI with strong noise and distortion.
- Summer **Image Data Science Intern**, *Merck Research Laboratories, Merck and Co.*  
2019 Ph.D. internship developing novel group-theoretic deep generative adversarial models applied to cancer research, with general applications in computer vision.
- 2016–present **Research Assistant** (2018–) & **Ph.D. Fellow** (2017–2018) & **Graduate Assistant** (2016–17), *Visualization, Imaging and Data Analysis Lab.*, NYU Computer Science & Engineering.
- **Current Research Interests:**
    - Group-theoretic methods for Vision, Generative Adversarial Networks, Deformable Registration
  - **Microscopic Image Analysis:**
    - Multi-modal spectral image analysis for molecular identification of disease-causing substances.
    - Developed novel algorithms for robust non-negative tensor decomposition and nonlinear motion correction using diffeomorphic atlases.
    - Developed functional data analysis to perform statistical testing on curve-valued data.
  - **High Angular Resolution Diffusion MRI Brain Imaging:**
    - Worked on HARDIPrep for diffusion MRI quality control to restore high-resolution diffusion brain scans corrupted by patient movement.
    - Worked on weakly-supervised discriminative feature learning for analyzing autistic infant brains.
- Spring 2016 **Graduate Assistant**, *Soil Mechanics Lab*, NYU Civil Engineering.  
Part of a team using stereo cameras for tracking quartz particles in oil flowing through a tunnel. Used computer vision techniques for tracking particle displacement under varying tunnel pressure.

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## Honors, Societies, Services

- various Reviewer for IEEE Trans. on Pattern Analysis and Machine Intelligence ('20), MICCAI ('20), IEEE Trans. on Medical Imaging ('20), IEEE ISBI ('18–'20), Neuroinformatics ('17–'18).
- 2020 MICCAI 2020 Outstanding Reviewer.
- 2019 Deborah Rosenthal, MD Award for Outstanding Performance on the Ph.D. Qualifying Exam.
- 2019 Interviewed on NYU's "The Future Of" podcast (link).
- 2018 Invited talk at the ARVO Honolulu conference Special Interest Group: "Next-gen Autofluorescence Imaging: let's get ready!"
- 2018–2020 Co-supervised students: Shijie Li (S18–F19; MS research), Guillaume Gisbert (F19–S20; internship), Michelle La (F19–S20; MS thesis), Shishir Lakshminarayan (F18; MS project).
- 2017–2018 School of Engineering Ph.D. Fellowship from NYU CSE.

- 2017 Featured in NYU press release (link).  
2017 "Extracting *Meaningful* Features", Invited talk for a graduate Machine Learning class.  
2016 Graduate Student Mentor for NYU ECE.  
2015–2017 Graduate Student Scholarship from NYU ECE.

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## Publications

- arXiv'20 **Dey**, et al. "Group Equivariant Generative Adversarial Networks", **arXiv** 2020.
- MICCAI'19 **Dey**, et al. "Robust Non-negative Tensor Factorization, Diffeomorphic Motion Correction, and Functional Statistics to Understand Fixation in Fluorescence Microscopy", **MICCAI**, 2019. (Early accept; top 16% of papers)
- MedIA'19 **Dey**, et al. "Tensor Decomposition of Hyperspectral Images to study Autofluorescence in Age-related Macular Degeneration", **Medical Image Analysis**, 2019 (IF: 11.15)
- SPIE'19 **Dey**, et al. "Multi-modal Image Fusion for Multispectral Super-resolution in Microscopy", **SPIE Medical Imaging**, 2019. (Oral Presentation)
- MICCAI OMIA'20 Gisbert, **Dey**, et al. "Self-supervised Denoising via Diffeomorphic Template Estimation: Application to Optical Coherence Tomography", **MICCAI OMIA**, 2020 (to appear).
- Under Review Ren, **Dey**, et al. "Segmentation-Renormalized Deep Feature Modulation for Unpaired Image Harmonization", under revision at **IEEE TMI**.
- Selected Conference Abstracts Gisbert, **Dey**, et al. "Improved Denoising of Optical Coherence Tomography via Repeated Acquisitions and Unsupervised Deep Learning", **ARVO ISIE**, 2020.
- Dey**, et al. "Consistent Automatic Spectral Signature Recovery of Human retinal pigment epithelium (RPE) Lipofuscin Components and Drusen in Donors with Age-related Macular Degeneration (AMD) using Multi-Excitation Hyperspectral Autofluorescence (AF) Imaging." **Investigative Ophthalmology & Visual Science** 58.8 (2017).
- Ach, et al. "High-resolution and multispectral imaging of autofluorescent retinal pigment epithelium (RPE) granules." **Investigative Ophthalmology & Visual Science** 58.8 (2017).
- Tong, et al. "Hyperspectral Autofluorescence (AF) and Mechanisms of Retinal Pigment Epithelium (RPE) Lipofuscin Loss in Age-Related Macular Degeneration (AMD)." **Investigative Ophthalmology & Visual Science** 58.8 (2017).

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## Skills

- Languages Python, bash, MATLAB; Novice: C++.
- Frameworks PyTorch, Tensorflow 2, ITK/SimpleITK, Tensor Toolbox, ANTs, ITK-SNAP, FSL, Slicer.

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## Selected Academic Projects

- Deform2Atlas: Self-supervised Learning of Diffeomorphic Atlases and Registration, 2020.
- A Robust, Orthogonal, and Semi-supervised Non-negative Matrix Factorization, 2019.
- Deep Recurrent LSTM-networks for Baseball Game Trajectory Prediction, 2018.

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## Relevant Graduate Coursework

Data Analysis Through Optimal Transport, Deep Learning, Probability and Statistics for Data Science, Machine Learning, Computer Vision and Scene Analysis, Artificial Intelligence, Image and Video Processing, DSP I & II, Medical Imaging; Audited: Numerical Methods I.