Nathan Jacobs

Dept. of Computer Science & Engineering
McKelvey School of Engineering
Washington University in St. Louis
1 Brookings Drive, St. Louis, MO 63130-4899

jacobsn@wustl.edu
https://jacobsn.github.io/
https://mvrl.cse.wustl.edu/
0000-0002-4242-8967 (ORCID)

Areas of Expertise

Computer Vision, Deep Learning, Remote Sensing, Medical Imaging, Multimodal Integration

Contents

1 Education

2005–2010	Ph.D. in Computer Science Adviser: Robert Pless, Ph.D. Thesis: Calibrating and Using the Global Network of Outdoor Webcams	Washington University in St. Louis
1995–1999	B.S. in Computer Science (Minor in Mathematics) *Summa Cum Laude* with Honors	University of Missouri

2 Appointments and Affiliations

Active

Professor (with Tenure) Dept. of Computer Science & Engineering, Washington University
2022– *St. Louis, MO*

Affiliated Faculty Division of Computational & Data Sciences, Washington University
2022– *St. Louis, MO*

Affiliated Faculty Imaging Science Program, Washington University
2022– *St. Louis, MO*

Faculty Fellow — Taylor Geospatial Institute
2022– — *St. Louis, MO*

Biodiversity Fellow — Living Earth Collaborative
2022– — *St. Louis, MO*

Technical Consultant / Owner / Founder — Multidomain Vision Research, LLC
2019–present — *St. Louis, MO*

Prior

Professor (with Tenure) — Dept. of Computer Science, University of Kentucky
2021–2022 — *Lexington, KY*

Director of Graduate Studies (Data Science) — Dept. of Computer Science, University of Kentucky
2020–2022 — *Lexington, KY*

Member — Institute for Biomedical Informatics, University of Kentucky
2017–2022 — *Lexington, KY*

Associate Professor (with Tenure) — Dept. of Computer Science, University of Kentucky
2016–2021 — *Lexington, KY*

Co-Department Chair (interim) — Dept. of Computer Science, University of Kentucky
2019–2020 — *Lexington, KY*

Affiliated Faculty — Center for Visualization and Virtual Environments, University of Kentucky
2010–2019 — *Lexington, KY*

Visiting Research Scientist (sabbatical) — Orbital Insight, Inc.
2017–2018 — *Mountain View, CA*

Assistant Professor — Dept. of Computer Science, University of Kentucky
2010–2016 — *Lexington, KY*

Computer Vision Research Intern — ObjectVideo, Inc.
2008 — *Reston, VA*

Graduate Research Assistant — Dept. of Computer Science & Engineering, Washington University
2005–2010 — *St. Louis, MO*

3 Awards

- Highlighted Reviewer Recognition (top 8%) [ICLR 2022]
- Outstanding Reviewer Recognition [BMVC 2021]
- Outstanding Reviewer Recognition (top 10%) [NeurIPS 2020]
- Outstanding Reviewer Recognition [ICCV 2019]
- University of Kentucky, College of Engineering Dean's Award for Excellence in Research [2018]
- Google Faculty Research Award [2018]
- Outstanding Reviewer Recognition [CVPR 2017]
- National Science Foundation CAREER Award [2016]

- Google Faculty Research Award [2016]
- Best Student Paper Award at Applied Imagery Pattern Recognition [2009]
- Ph.D. Forum Prize at the ACM/IEEE International Conference on Distributed Smart Cameras [2009]
- Best Talk Award for the Doctoral Student Seminar, Department of Computer Science, the Washington University in St. Louis, [Fall 2006]

4 Publications

Journal Articles

[1] X. X. Zhu, Y. Wang, M. Kochupillai, M. Werner, M. Haberle, E. J. Hoffmann, H. Taubenbock, D. Tuia, A. Levering, N. Jacobs, A. Kruspe, and K. Abdulahhad, "Geo-information harvesting from social media data," *IEEE Geoscience and Remote Sensing Magazine*, 2023, (in press), Impact factor: 8.225.

[2] G. Liang, H. Ganesh, D. Steffe, L. Liu, N. Jacobs, and J. Zhang, "Development of cnn models for the enteral feeding tube positioning assessment on a small scale data set," *BMC Medical Imaging*, vol. 22, Mar. 2022, ISSN: 1471-2342. DOI: 10.1186/s12880-022-00766-w.

[3] R. Padilha, T. Salem, S. Workman, F. A. Andaló, A. Rocha, and N. Jacobs, "Content-based detection of temporal metadata manipulation," *IEEE Transactions on Information Forensics and Security*, pp. 1316–1327, Mar. 2022. DOI: 10.1109/TIFS.2022.3159154.

[4] S.-C. Lin, Y. Su, G. Liang, Y. Zhang, N. Jacobs, and Y. Zhang, "Estimating cluster masses from SDSS multi-band images with transfer learning," *Monthly Notices of the Royal Astronomical Society (MNRAS)*, vol. 512, pp. 3885–3894, 3 Mar. 2022, Impact factor: 5.287. DOI: 10.1093/mnras/stac725.

[5] M. U. Rafique, J. Zhu, and N. Jacobs, "Automatic segmentation of sinkholes using a convolutional neural network," *Earth and Space Science*, p. 19, Dec. 2021, Impact factor: 3.138. DOI: 10.1002/essoar.10509794.1.

[6] G. Liang, C. Greenwell, Y. Zhang, X. Xing, X. Wang, R. Kavuluru, and N. Jacobs, "Contrastive cross-modal pre-training: A general strategy for small sample medical imaging," *IEEE Journal of Biomedical and Health Informatics*, vol. 26, 4 Sep. 2021, Impact factor: 5.223, ISSN: 2168-2184. DOI: 10.1109/JBHI.2021.3110805.

[7] D. Tuia, R. Roscher, J. D. Wegner, N. Jacobs, X. X. Zhu, and G. Camps-Valls, "Towards a collective agenda on ai for earth science data analysis," *IEEE Geoscience and Remote Sensing Magazine*, vol. 9, no. 2, pp. 88–104, Jun. 2021, Impact factor: 8.225. DOI: 10.1109/MGRS.2020.3043504.

[8] J. Zhu, A. Nolte, N. Jacobs, and M. Ye, "Machine learning in identifying karst sinkholes from LiDAR-derived topographic depressions in the Bluegrass region of Kentucky," *Journal of Hydrology*, Sep. 2020, Impact factor: 4.405. DOI: 10.1016/j.jhydrol.2020.125049.

[9] Y. Su, Y. Zhang, G. Liang, J. ZuHone, D. Barnes, N. Jacobs, M. Ntampaka, W. Forman, P. Nulsen, R. Kraft, and C. Jones, "A deep learning view of the census of galaxy clusters in IllustrisTNG," *Monthly Notices of the Royal Astronomical Society (MNRAS)*, Sep. 2020, Impact factor: 5.356. DOI: 10.1093/mnras/staa2690.

[10] T. C. Hammond, X. Xing, C. Wang, D. Ma, K. Nho, P. K. Crane, F. Elahi, D. A. Ziegler, G. Liang, Q. Cheng, L. M. Yanckello, N. Jacobs, and A.-L. Lin, "Beta-amyloid and tau drive early Alzheimer's disease decline while glucose hypometabolism drives late decline," *Communications Biology*, vol. 3, no. 1, p. 352, Jul. 2020, Impact factor: 6.268. DOI: 10.1038/s42003-020-1079-x.

[11] X. Wang, G. Liang, Y. Zhang, H. Blanton, Z. Bessinger, and N. Jacobs, "Inconsistent performance of deep learning models on mammogram classification," *Journal of the American College of Radiology*, Jun. 2020, Impact factor: 3.785. DOI: 10.1016/j.jacr.2020.01.006.

[12] R. V. Maretto, L. M. G. Fonseca, N. B. Jacobs, T. S. Körting, H. N. Bendini, and L. L. Parente, "Spatio-temporal deep learning approach to map deforestation in Amazon rainforest," *IEEE Geoscience and Remote Sensing Letters*, vol. 18, no. 5, pp. 771–775, Apr. 2020, Impact factor: 3.534. DOI: 10.1109/LGRS.2020.2986407.

[13] H. Hamraz, N. B. Jacobs, M. A. Contreras, and C. H. Clark, "Deep Learning for Conifer/Deciduous Classification of Airborne LiDAR 3D Point Clouds Representing Individual Trees," *ISPRS Journal of Photogrammetry and Remote Sensing*, vol. 158, pp. 219–230, Dec. 2019, Impact factor: 6.946, ISSN: 0924-2716. DOI: 10.1016/j.isprsjprs.2019.10.011.

[14] R. P. Mihail, G. Liang, and N. Jacobs, "Automatic hand skeletal shape estimation from radiographs," *IEEE Transactions on NanoBioscience*, vol. 18, no. 3, pp. 296–305, Apr. 2019, Impact factor: 1.927. DOI: 10.1109/TNB.2019.2911026.

[15] H. Sajid, N. Jacobs, and S.-c. S. Cheung, "Motion and appearance based background subtraction for freely moving cameras," *Signal Processing: Image Communication*, 2019, Impact factor: 2.814. DOI: 10.1016/j.image.2019.03.003.

[16] X. Zhang, Y. Zhang, E. Han, N. Jacobs, Q. Han, X. Wang, and J. Liu, "Classification of whole mammogram and tomosynthesis images using deep convolutional neural networks," *IEEE Transactions on NanoBioscience*, Jul. 2018, Impact factor: 1.927. DOI: 10.1109/TNB.2018.2845103.

[17] N. Jacobs, S. Workman, and R. Souvenir, "Cloudmaps from static ground-view video," *Image and Vision Computing (IVC)*, vol. 52, pp. 154–166, Aug. 2016, Impact factor: 1.766. DOI: 10.1016/j.imavis.2016.05.013.

[18] H. Sajid, S.-c. S. Cheung, and N. Jacobs, "Appearance based background subtraction for PTZ cameras," *Signal Processing: Image Communication*, Jul. 2016, Impact factor: 1.602. DOI: 10.1016/j.image.2016.07.008.

[19] M. T. Islam, C. Greenwell, R. Souvenir, and N. Jacobs, "Large-scale geo-facial image analysis," *EURASIP Journal on Image and Video Processing (JIVP)*, vol. 2015, no. 1, pp. 1–14, Jun. 2015, Impact factor: 1.060. DOI: 10.1186/s13640-015-0070-9.

[20] S. Workman, R. Souvenir, and N. Jacobs, "Scene shape estimation from multiple partly cloudy days," *Computer Vision and Image Understanding (CVIU)*, pp. 116–129, Apr. 2015, Impact factor: 1.54. DOI: 10.1016/j.cviu.2014.10.002.

[21] N. Jacobs, A. Abrams, and R. Pless, "Two cloud-based cues for estimating scene structure and camera calibration," *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, vol. 35, no. 10, pp. 2526–2538, Aug. 2013, Impact factor: 5.694, ISSN: 0162-8828. DOI: 10.1109/TPAMI.2013.55.

[22] N. Jacobs and R. Pless, "Time scales in video surveillance," *IEEE Transactions on Circuits and Systems for Video Technology (CSVT)*, vol. 18, no. 8, pp. 1106–1113, Aug. 2008, Impact factor: 2.615. DOI: 10.1109/TCSVT.2008.928215.

Patents

[1] N. Jacobs and S. Workman, *Network architecture for generating a labeled overhead image*, US Patent App. 16/045,606, Jan. 2020.

[2] J. A. G. Whitney, J. T. Fessler, Z. C. N. Kratzer, N. B. Jacobs, A. M. Whitney, *et al.*, *Method and system for estimating error in predicted distance using RSSI signature*, Jan. 2016.

Book Chapters

[1] R. P. Mihail, N. Jacobs, J. Goldsmith, and K. Lohr, "Using visual analytics to inform rheumatoid arthritis patient choices," in *Serious Games Analytics*, ser. Advances in Game-Based Learning, C. S. Loh, Y. Sheng, and D. Ifenthaler, Eds., Springer International Publishing, 2015, pp. 211–231, ISBN: 978-3-319-05833-7. DOI: 10.1007/978-3-319-05834-4_9.

Refereed Conference Papers

[1] X. Xing, C. Peng, Y. Zhang, A.-L. Lin, and N. Jacobs, "AssocFormer: Association transformer on multi-label classification," in *British Machine Vision Conference (BMVC)*, Nov. 2022.

[2] E. Xing, X. Xing, L. Liu, N. Jacobs, Y. Qu, and G. Liang, "Neural network decision-making criteria consistency analysis via inputs sensitivity," in *International Conference on Pattern Recognition (ICPR 2022)*, Aug. 2022.

[3] S. Workman, M. U. Rafique, H. Blanton, and N. Jacobs, "Revisiting near/remote sensing with geospatial attention," in *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Acceptance rate: 25.33%, Jun. 2022.

[4] X. Xing, G. Liang, Y. Zhang, S. Khanal, A.-L. Lin, and N. Jacobs, "ADViT: Vision transformer on multi-modality pet images for alzheimer disease diagnosis," in *IEEE International Symposium on Biomedical Imaging (ISBI)*, Mar. 2022.

[5] H. Blanton, S. Workman, and N. Jacobs, "A structure-aware method for direct pose estimation," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Jan. 2022.

[6] Y. Zhang, G. Liang, and N. Jacobs, "Dynamic feature alignment for semi-supervised domain adaptation," in *British Machine Vision Conference (BMVC)*, Nov. 2021.

[7] G. Liang, X. Xing, L. Liu, Y. Zhang, Q. Ying, A.-L. Lin, and N. Jacobs, "Alzheimer's disease classification using 2d convolutional neural networks," in *International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Oct. 2021.

[8] Q. Ying, X. Xing, L. Liu, A.-L. Lin, N. Jacobs, and G. Liang, "Multi-modal data analysis for Alzheimer's disease diagnosis: An ensemble model using imagery and genetic features," in *International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Oct. 2021.

[9] B. Brodie, S. Khanal, M. U. Rafique, C. Greenwell, and N. Jacobs, "Hierarchical probabilistic embeddings for multi-view image classification," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Jul. 2021. DOI: 10.1109/IGARSS47720.2021.9554405.

[10] D. Jones and N. Jacobs, "Intensity harmonization for airborne LiDAR," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Jul. 2021. DOI: 10.1109/IGARSS47720.2021.9553605.

[11] Y. Zhang, G. Liang, Y. Su, and N. Jacobs, "Multi-branch attention networks for classifying galaxy clusters," in *International Conference on Pattern Recognition (ICPR 2020)*, Acceptance rate: 28.47%, Jan. 2021. DOI: 10.1109/ICPR48806.2021.9412498.

[12] A. Hadzic, G. Christie, J. Freeman, A. Dismer, S. Bullard, A. Greiner, N. Jacobs, and R. Mukherjee, "Estimating displaced populations from overhead," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Sep. 2020. DOI: 10.1109/IGARSS39084.2020.9324617.

[13] G. Liang, Y. Zhang, X. Wang, and N. Jacobs, "Improved trainable calibration method for neural networks," in *British Machine Vision Conference (BMVC)*, Sep. 2020.

[14] M. U. Rafique, H. Blanton, N. Snavely, and N. Jacobs, "Generative Appearance Flow: A hybrid approach for outdoor view synthesis," in *British Machine Vision Conference (BMVC)*, Sep. 2020.

[15] H. Blanton, S. Grate, and N. Jacobs, "Surface modeling for airborne LiDAR," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, (oral), 2020. DOI: 10.1109/IGARSS39084.2020.9323522.

[16] G. Liang, X. Wang, Y. Zhang, and N. Jacobs, "Weakly-supervised self-training for breast cancer localization," in *International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, (oral), 2020. DOI: 10.1109/EMBC44109.2020.9176617.

[17] T. Salem, S. Workman, and N. Jacobs, "Learning a dynamic map of visual appearance," in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Acceptance rate: 25%, 2020. DOI: 10.1109/CVPR42600.2020.01245.

[18] S. Workman and N. Jacobs, "Dynamic traffic modeling from overhead imagery," in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Acceptance rate: 5.7% (oral), 2020. DOI: 10.1109/CVPR42600.2020.01233.

[19] S. Workman, M. U. Rafique, H. Blanton, C. Greenwell, and N. Jacobs, "Single image cloud detection via multi-image fusion," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, (oral), 2020. DOI: 10.1109/IGARSS39084.2020.9323759.

[20] Z. Bessinger and N. Jacobs, "A generative model of worldwide facial appearance," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, (oral), 2019. DOI: 10.1109/WACV.2019.00172.

[21] G. Liang, S. Fouladvand, J. Zhang, M. A. Brooks, N. Jacobs, and J. Chen, "GANai: Standardizing CT images using generative adversarial network with alternative improvement," in *IEEE International Conference on Healthcare Informatics (ICHI)*, 2019. DOI: 10.1109/ICHI.2019.8904763.

[22] G. Liang, X. Wang, Y. Zhang, X. Xing, H. Blanton, T. Salem, and N. Jacobs, "Joint 2d-3d breast cancer classification," in *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, Acceptance rate: 18% (oral), 2019. DOI: 10.1109/BIBM47256.2019.8983048.

[23] M. U. Rafique and N. Jacobs, "Weakly supervised building segmentation from aerial images," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2019. DOI: 10.1109/IGARSS.2019.8898812.

[24] T. Salem, C. Greenwell, H. Blanton, and N. Jacobs, "Learning to map nearly anything," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, (oral), 2019. DOI: 10.1109/IGARSS.2019.8900646.

[25] W. Song, T. Salem, H. Blanton, and N. Jacobs, "Remote estimation of free-flow speeds," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, (oral), 2019. DOI: 10.1109/IGARSS.2019.8900286.

[26] Y. Zhang, X. Wang, H. Blanton, G. Liang, X. Xing, and N. Jacobs, "2d convolutional neural networks for 3d digital breast tomosynthesis classification," in *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, Acceptance rate: 18% (oral), 2019. DOI: 10.1109/BIBM47256.2019.8983097.

[27] C. Greenwell, S. Workman, and N. Jacobs, "What goes where: Predicting object distributions from above," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2018. DOI: 10.1109/IGARSS.2018.8519251.

[28] N. Jacobs, A. Kraft, M. U. Rafique, and R. D. Sharma, "A weakly supervised approach for estimating spatial density functions from high-resolution satellite imagery," in *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL)*, Acceptance rate: 22.5% (oral), 2018. DOI: 10.1145/3274895.3274934.

[29] D. Jones, J. Bopaiah, F. Alghamedy, N. Jacobs, H. Weiss, W. A. D. Jong, and S. Ellingson, "Polypharmacology within the full kinome: A machine learning approach," in *AMIA Informatics Summit*, 2018.

[30] R. P. Mihail and N. Jacobs, "Automatic hand skeletal shape estimation from radiographs," in *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, Acceptance rate: 19.6%, 2018. DOI: 10.1109/BIBM.2018.8621196.

[31] T. Salem, M. Zhai, S. Workman, and N. Jacobs, "A multimodal approach to mapping soundscapes," in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2018. DOI: 10.1109/IGARSS.2018.8517977.

[32] S. Schulter, M. Zhai, N. Jacobs, and M. Chandraker, "Learning to look around objects for top-view representations of outdoor scenes," in *European Conference on Computer Vision (ECCV)*, Acceptance rate: 31.8%, 2018. DOI: 10.1007/978-3-030-01267-0_48.

[33] W. Song, S. Workman, A. Hadzic, R. Souleyrette, E. Green, M. Chen, X. Zhang, and N. Jacobs, "FARSA: Fully automated roadway safety assessment," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, 2018. DOI: 10.1109/WACV.2018.00063.

[34] M. Zhai, T. Salem, C. Greenwell, S. Workman, R. Pless, and N. Jacobs, "Learning geo-temporal image features," in *British Machine Vision Conference (BMVC)*, Acceptance rate: 29.5%, 2018.

[35] N. Vo, N. Jacobs, and J. Hays, "Revisiting IM2GPS in the deep learning era," in *IEEE International Conference on Computer Vision (ICCV)*, Acceptance rate: 28.9%, 2017. DOI: 10.1109/ICCV.2017.286.

[36] S. Workman, R. Souvenir, and N. Jacobs, "Understanding and mapping natural beauty," in *IEEE International Conference on Computer Vision (ICCV)*, Acceptance rate: 28.9%, 2017. DOI: 10.1109/ICCV.2017.596.

[37] S. Workman, M. Zhai, D. Crandall, and N. Jacobs, "A unified model for near and remote sensing," in *IEEE International Conference on Computer Vision (ICCV)*, Acceptance rate: 28.9%, 2017. DOI: 10.1109/ICCV.2017.293.

[38] M. Zhai, Z. Bessinger, S. Workman, and N. Jacobs, "Predicting ground-level scene layout from aerial imagery," in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Acceptance rate: 29.2%, 2017. DOI: 10.1109/CVPR.2017.440.

[39] X. Zhang, Y. Zhang, E. Han, N. Jacobs, Q. Han, X. Wang, and J. Liu, "Whole mammogram image classification with convolutional neural networks," in *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, Acceptance rate: 19%, 2017. DOI: 10.1109/BIBM.2017.8217738.

[40] R. Baltenberger, M. Zhai, C. Greenwell, S. Workman, and N. Jacobs, "A fast method for estimating transient scene properties," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Acceptance rate: 42.3%, 2016, pp. 1–8. DOI: 10.1109/WACV.2016.7477713.

[41] Z. Bessinger and N. Jacobs, "Quantifying curb appeal," in *IEEE International Conference on Image Processing (ICIP)*, Acceptance rate: 45%, 2016. DOI: 10.1109/ICIP.2016.7533189.

[42] Z. Bessinger, C. Stauffer, and N. Jacobs, "Who goes there? Approaches to mapping facial appearance diversity," in *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL)*, 2016. DOI: 10.1145/2996913.2996997.

[43] R. P. Mihail, S. Workman, Z. Bessinger, and N. Jacobs, "Sky segmentation in the wild: An empirical study," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Acceptance rate: 42.3%, 2016, pp. 1–6. DOI: 10.1109/WACV.2016.7477637.

[44] T. Salem, S. Workman, M. Zhai, and N. Jacobs, "Analyzing human appearance as a cue for dating images," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Acceptance rate: 42.3%, 2016, pp. 1–8. DOI: 10.1109/WACV.2016.7477678.

[45] S. Workman, M. Zhai, and N. Jacobs, "Horizon lines in the wild," in *British Machine Vision Conference (BMVC)*, Acceptance rate: 39.4%, 2016.

[46] M. Zhai, S. Workman, and N. Jacobs, "Camera geo-calibration using an MCMC approach," in *IEEE International Conference on Image Processing (ICIP)*, Acceptance rate: 45%, 2016. DOI: 10.1109/ICIP.2016.7532905.

[47] M. Zhai, S. Workman, and N. Jacobs, "Detecting vanishing points using global image context in a non-Manhattan world," in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Acceptance rate: 29.9%, 2016. DOI: 10.1109/CVPR.2016.610.

[48] M. T. Islam, S. Workman, and N. Jacobs, "Face2GPS: Estimating geographic location from facial features," in *IEEE International Conference on Image Processing (ICIP)*, Acceptance rate: 45% (overall), 2015. DOI: 10.1109/ICIP.2015.7351072.

[49] C. Murdock, N. Jacobs, and R. Pless, "Building dynamic cloud maps from the ground up," in *IEEE International Conference on Computer Vision (ICCV)*, Acceptance rate: 30.3%, 2015, pp. 1–9. DOI: 10.1109/ICCV.2015.85.

[50] S. Workman, C. Greenwell, M. Zhai, R. Baltenberger, and N. Jacobs, "DeepFocal: A method for direct focal length estimation," in *IEEE International Conference on Image Processing (ICIP)*, Acceptance rate: 45% (overall), 2015. DOI: 10.1109/ICIP.2015.7351024.

[51] S. Workman, R. Souvenir, and N. Jacobs, "Wide-area image geolocalization with aerial reference imagery," in *IEEE International Conference on Computer Vision (ICCV)*, Acceptance rate: 30.3%, 2015, pp. 1–9. DOI: 10.1109/ICCV.2015.451.

[52] M. T. Islam, S. Workman, H. Wu, R. Souvenir, and N. Jacobs, "Exploring the geo-dependence of human face appearance," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Acceptance rate: 40%, 2014, pp. 1042–1049. DOI: 10.1109/WACV.2014.6835989.

[53] N. Jacobs, J. King, D. Bowers, and R. Souvenir, "Estimating cloud maps from outdoor image sequences," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Acceptance rate: 40%, 2014, pp. 961–968. DOI: 10.1109/WACV.2014.6836000.

[54] R. P. Mihail, G. Blomquist, and N. Jacobs, "A CRF approach to fitting a generalized hand skeleton model," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Acceptance rate: 40%, 2014, pp. 409–416. DOI: 10.1109/WACV.2014.6836070.

[55] F. Shi, M. Zhai, D. Duncan, and N. Jacobs, "MPCA: EM-based PCA for mixed-size image datasets," in *IEEE International Conference on Image Processing (ICIP)*, Acceptance rate: 40%, 2014, pp. 1807–1811. DOI: 10.1109/ICIP.2014.7025362.

[56] A. Whitney, J. Fessler, J. Parker, and N. Jacobs, "Received signal strength indication signature for passive UHF tags," in *IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, 2014, pp. 1183–1187. DOI: 10.1109/AIM.2014.6878242.

[57] S. Workman, R. P. Mihail, and N. Jacobs, "A Pot of Gold: Rainbows as a calibration cue," in *European Conference on Computer Vision (ECCV)*, Acceptance rate: 25%, 2014, pp. 820–835. DOI: 10.1007/978-3-319-10602-1_53.

[58] M. Zhai, F. Shi, D. Duncan, and N. Jacobs, "Covariance-based PCA for multi-size data," in *International Conference on Pattern Recognition (ICPR)*, Acceptance rate: 56.2%, 2014, pp. 1603–1608. DOI: 10.1109/ICPR.2014.284.

[59] N. Jacobs, M. T. Islam, and S. Workman, "Cloud motion as a calibration cue," in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Acceptance rate: 26.2%, 2013, pp. 1344–1351. DOI: 10.1109/CVPR.2013.177.

[60] N. Jacobs, S. Workman, and R. Souvenir, "Scene geometry from several partly cloudy days," in *ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC)*, 2013, pp. 1–6. DOI: 10.1109/ICDSC.2013.6778227.

[61] R. P. Mihail, J. Goldsmith, N. Jacobs, and J. Jaromczyk, "Teaching graphics for games using Microsoft XNA," in *International Conference on Computer Games (CGAMES)*, Best Student Paper Award (runner-up), 2013, pp. 36–40. DOI: 10.1145/2538862.2538898.

[62] M. Dixon, A. Abrams, N. Jacobs, and R. Pless, "On analyzing video with very small motions," in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Acceptance rate: 26.4%, 2011, pp. 1–8. DOI: 10.1109/CVPR.2011.5995703.

[63] N. Jacobs, B. Bies, and R. Pless, "Using cloud shadows to infer scene structure and camera calibration," in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Acceptance rate: 4.5% (oral), Jun. 2010, pp. 1102–1109. DOI: 10.1109/CVPR.2010.5540093.

[64] N. Jacobs, S. Schuh, and R. Pless, "Compressive sensing and differential image motion estimation," in *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Acceptance rate = 10% (oral), Mar. 2010, pp. 718–721. DOI: 10.1109/ICASSP.2010.5495053.

[65] A. Abrams, N. Fridrich, N. Jacobs, and R. Pless, "Participatory integration of live webcams into GIS," in *International Conference on Computing for Geospatial Research and Applications (COM.GEO)*, (oral), 2010, pp. 1–8. DOI: 10.1145/1823854.1823867.

[66] N. Jacobs, W. Burgin, N. Fridrich, A. Abrams, K. Miskell, B. H. Braswell, A. D. Richardson, and R. Pless, "The global network of outdoor webcams: Properties and applications," in *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL)*, Acceptance rate: 20.9%, Nov. 2009, pp. 111–120. DOI: 10.1145/1653771.1653789.

[67] M. Dixon, N. Jacobs, and R. Pless, "An efficient system for vehicle tracking in multi-camera networks," in *ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC)*, Sep. 2009, pp. 1–8. DOI: 10.1109/ICDSC.2009.5289383.

[68] N. Jacobs, S. Satkin, N. Roman, R. Speyer, and R. Pless, "Geolocating static cameras," in *IEEE International Conference on Computer Vision (ICCV)*, Acceptance rate: 23%, Oct. 2007, pp. 1–6. DOI: 10.1109/ICCV.2007.4408995.

[69] N. Jacobs, N. Roman, and R. Pless, "Consistent temporal variations in many outdoor scenes," in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Acceptance rate: 23.4%, Jun. 2007, pp. 1–6. DOI: 10.1109/CVPR.2007.383258.

[70] T. Anderson, A. Hussam, B. Plummer, and N. Jacobs, "Pie charts for visualizing query term frequency in search results," English, in *International Conference on Asian Digital Libraries (ICADL)*, 2002. DOI: 10.1007/3-540-36227-4_52.

[71] A. Hussam, T. Anderson, N. Jacobs, D. Eckhoff, A. Merayyan, and Y. Yang, "Semantic highlighting: Enhancing search engine display and web document interactivity," in *IFIP Conference on Human-Computer Interaction (INTERACT)*, Sep. 1999. DOI: 10.1007/3-540-36227-4_52.

Workshop Papers

[1] S. Khanal, B. Brodie, X. Xing, A.-L. Lin, and N. Jacobs, "Causality for inherently explainable transformers: Cat-xplain," in *XAI4CV: Explainable Artificial Intelligence for Computer Vision (IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops)*, Acceptance rate: 15% (spotlight), Jun. 2022.

[2] S. Khanal, J. Chen, N. Jacobs, and A.-L. Lin, "Alzheimer's disease classification using genetic data," in *Machine Learning and Artificial Intelligence in Bioinformatics and Medical Informatics (MABM)*, Dec. 2021.

[3] M. U. Rafique, Y. Zhang, B. Brodie, and N. Jacobs, "Unifying guided and unguided outdoor image synthesis," in *New Trends in Image Restoration and Enhancement (IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops)*, Jun. 2021, pp. 776–785. DOI: 10.1109/CVPRW53098.2021.00087.

[4] H. Blanton, C. Greenwell, S. Workman, and N. Jacobs, "Extending absolute pose regression to multiple scenes," in *Joint Workshop on Long-Term Visual Localization, Visual Odometry and Geometric and Learning-based SLAM (CVPR Workshop)*, 2020.

[5] A. Hadzic, H. Blanton, W. Song, M. Chen, S. Workman, and N. Jacobs, "RasterNet: Modeling free-flow speed using lidar and overhead imagery," in *EARTHVISION: Large Scale Computer Vision for Remote Sensing Imagery*, Acceptance rate: 26%, 2020. DOI: 10.1109/CVPRW50498.2020.00112.

[6] X. Xing, G. Liang, H. Blanton, M. U. Rafique, C. Wang, A.-L. Lin, and N. Jacobs, "Dynamic image for 3d MRI image Alzheimer's disease classification," in *ECCV Workshop on BioImage Computing (BIC)*, (oral), 2020.

[7] M. U. Rafique, H. Blanton, and N. Jacobs, "Weakly supervised fusion of multiple overhead images," in *IEEE/ISPRS Workshop: Large Scale Computer Vision for Remote Sensing (EARTHVISION)*, Acceptance rate: 23.5%, 2019. DOI: 10.1109/CVPRW.2019.00189.

[8] Y. Zhang, G. Liang, T. Salem, and N. Jacobs, "Defense-PointNet: Protecting pointnet against adversarial attacks," in *The Next Frontier of Big Data From LiDAR Workshop (co-located with IEEE Big Data)*, 2019.

[9] S. Workman and N. Jacobs, "On the location dependence of convolutional neural network features," in *IEEE/ISPRS Workshop: Looking from above: When Earth observation meets vision (EARTHVISION)*, Acceptance rate: 30%, 2015, pp. 1–9. DOI: 10.1109/CVPRW.2015.7301385.

[10] C. Greenwell, S. Spurlock, R. Souvenir, and N. Jacobs, "GeoFaceExplorer: Exploring the geo-dependence of facial attributes," in *ACM SIGSPATIAL International Workshop on Crowdsourced and Volunteered Geographic Information (GEOCROWD)*, 2014, pp. 32–37. DOI: 10.1145/2676440.2676443.

[11] M. T. Islam, N. Jacobs, H. Wu, and R. Souvenir, "Images+Weather: Collection, validation, and refinement," in *IEEE CVPR Workshop on Ground Truth*, Acceptance rate: 67%, 2013, pp. 1–7.

[12] C. Murdock, N. Jacobs, and R. Pless, "Webcam2Satellite: Estimating cloud maps from webcam imagery," in *IEEE Workshop on Applications of Computer Vision (WACV)*, Acceptance rate: 40%, 2013, pp. 214–221. DOI: 10.1109/WACV.2013.6475021.

[13] A. Abrams, J. Tucek, N. Jacobs, and R. Pless, "LOST: Longterm observation of scenes (with tracks)," in *IEEE Workshop on Applications of Computer Vision (WACV)*, Acceptance rate: 44%, 2012, pp. 297–304. DOI: 10.1109/WACV.2012.6163032.

[14] R. P. Mihail, N. Jacobs, and J. Goldsmith, "Real time gesture recognition with 2 Kinect sensors," in *International Conference on Image Processing, Computer Vision, and Pattern Recognition (IPCV)*, 2012, pp. 1–7.

[15] N. Jacobs, K. Miskell, and R. Pless, "Webcam geo-localization using aggregate light levels," in *IEEE Workshop on Applications of Computer Vision (WACV)*, (oral), 2011, pp. 132–138. DOI: 10.1109/WACV.2011.5711494.

[16] N. Jacobs, M. Dixon, S. Satkin, and R. Pless, "Efficient tracking of many objects in structured environments," in *IEEE ICCV Workshop on Visual Surveillance*, Oct. 2009, pp. 1161–1168. DOI: 10.1109/ICCVW.2009.5457477.

[17] N. Jacobs and R. Pless, "Calibrating and using the global network of outdoor webcams," in *ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC)*, Winner PhD Forum Prize, Sep. 2009, pp. 1–2. DOI: 10.1109/ICDSC.2009.5289404.

[18] N. Jacobs, W. Burgin, R. Speyer, D. Ross, and R. Pless, "Adventures in archiving and using three years of webcam images," in *IEEE CVPR Workshop on Internet Vision*, Jun. 2009, pp. 39–46. DOI: 10.1109/CVPRW.2009.5204185.

[19] N. Jacobs, R. Souvenir, and R. Pless, "Passive Vision: The global webcam imaging network," in *IEEE Applied Imagery and Pattern Recognition (AIPR)*, Best Student Paper, 2009, pp. 1–8. DOI: 10.1109/AIPR.2009.5466314.

[20] R. Pless, N. Jacobs, M. Dixon, R. Hartley, P. Baker, D. Brock, N. Cassimatis, and D. Perzanowski, "Persistence and Tracking: Putting vehicles and trajectories in context," in *IEEE Applied Imagery and Pattern Recognition (AIPR)*, 2009. DOI: 10.1109/AIPR.2009.5466307.

[21] N. Jacobs, M. Dixon, and R. Pless, "Location-specific transition distributions for tracking," in *IEEE Workshop on Motion and Video Computing (WMVC)*, Acceptance rate: 33.3%, Jan. 2008. DOI: 10.1109/WMVC.2008.4544061.

[22] N. Jacobs, N. Roman, and R. Pless, "Toward fully automatic geo-location and geo-orientation of static outdoor cameras," in *IEEE Workshop on Applications of Computer Vision (WACV)*, Acceptance rate: 33.3%, Jan. 2008, pp. 1–6. DOI: 10.1109/WACV.2008.4544040.

[23] N. Jacobs and R. Pless, "Shape Background Modeling: The shape of things that came," in *IEEE Workshop on Motion and Video Computing (WMVC)*, Feb. 2007, pp. 1–6. DOI: 10.1109/WMVC.2007.35.

[24] N. Jacobs and R. Pless, "Real-time constant memory visual summaries for surveillance," in *ACM International Workshop on Visual Surveillance and Sensor Networks (VSSN)*, Oct. 2006. DOI: 10.1145/1178782.1178805.

[25] M. Dixon, N. Jacobs, and R. Pless, "Finding minimal parameterizations of cylindrical image manifolds," in *IEEE CVPR Workshop on Perceptual Organization in Computer Vision (POCV)*, Jun. 2006, pp. 1–8. DOI: 10.1109/CVPRW.2006.82.

Abstracts

[1] M. Chen, A. Hadzic, W. Song, and N. Jacobs, "Applications of deep machine learning to highway safety and usage assessment," in *Transportation Research Board Workshop (Sponsored by AED50)*, (oral), Jan. 2021.

[2] G. Liang, Y. Su, S.-C. Lin, Y. Zhang, Y. Zhang, and N. Jacobs, "Optical wavelength guided self-supervised feature learning for galaxy cluster richness estimate," in *Workshop on Machine Learning and the Physical Sciences at the 34th Conference on Neural Information Processing Systems*, Dec. 2020.

[3] G. Liang, Y. Zhang, and N. Jacobs, "Neural network calibration for medical imaging classification using DCA regularization," in *ICML 2020 workshop on Uncertainty and Robustness in Deep Learning (UDL)*, 2020.

[4] C. Greenwell, S. Workman, and N. Jacobs, "Implicit land use mapping using social media imagery," in *IEEE Applied Imagery and Pattern Recognition (AIPR)*, (oral), 2019. DOI: 10.1109/AIPR47015.2019.9174570.

[5] T. Hammond, X. Xing, N. Jacobs, and A.-L. Lin, "Phase-dependent importance of amyloid-beta, phosphorylated-tau, and hypometabolism in determining mild cognitive impairment and Alzheimer's disease: A machine learning study," in *Alzheimer's Disease Therapeutics: Alternatives to Amyloid*, 2019.

[6] G. Liang, N. Jacobs, J. Liu, K. Luo, W. Owen, and X. Wang, "Translational relevance of performance of deep learning models on mammograms," in *SBI/ACR Breast Imaging Symposium*, 2019.

[7] G. Liang, N. Jacobs, and X. Wang, "Training deep learning models as radiologists: Breast cancer classification using combined whole 2d mammography and full volume digital breast tomosynthesis," in *Radiological Society of North America (RSNA)*, (oral), 2019.

[8] Y. Zhang, G. Liang, N. Jacobs, and X. Wang, "Unsupervised domain adaptation for mammogram image classification: A promising tool for model generalization," in *Conference on Machine Intelligence in Medical Imaging (CMIMI)*, (oral), 2019.

[9] J. Zhu, A. M. Nolte, N. Jacobs, and M. Ye, "Incorporating machine learning with LiDAR for delineating sinkholes," in *Kentucky Water Resources Annual Symposium*, 2019.

[10] D. Jones, N. Jacobs, and S. Ellingson, "Learning deep feature representations for kinase polypharmacology," in *ACM Richard Tapia Celebration of Diversity in Computing Conference*, 2018.

[11] G. Liang, X. Wang, and N. Jacobs, "Evaluating the publicly available mammography datasets for deep learning model training," in *SBI/ACR Breast Imaging Symposium*, 2018.

[12] W. Song, T. Salem, N. Jacobs, and M. Johnson, "Detecting the presence of bird vocalizations in audio segments using a convolutional neural network architecture," in *International Symposium on Acoustic Communication by Animals*, 2017.

[13] N. Jacobs, S. Workman, and M. Zhai, "Crossview convolutional networks," in *IEEE Applied Imagery and Pattern Recognition (AIPR)*, (oral), 2016. DOI: 10.1109/AIPR.2016.8010593.

[14] J. D. Smith, R. Baltenberger, S. Workman, and N. Jacobs, "User-in-the-loop calibration and mensuration," in *National Conference on Undergraduate Research (NCUR)*, 2014.

[15] X. Zhou, S. Workman, M. T. Islam, N. Jacobs, and J. Griffioen, "Cyber infrastructure for the VOEIS project," in *Symposium in the Mathematical, Statistical and Computer Sciences*, Best Student Presentation, 2013.

[16] E. Welty, T. Pfeffer, S. O'Neel, and N. Jacobs, "Calving dynamics of the Columbia Glacier, AK (2000-2011 update)," in *Workshop on the Dynamics and Mass Budget of Arctic Glaciers*, 2012.

[17] S. Workman, J. Knochelmann, N. Jacobs, D. S. White, and R. Hauer, "Registration and visualization of scientific aerial imagery at Kentucky Lake," in *Kentucky EPSCoR Conference*, 2012.

[18] T. Milliman, K. Hufkins, I. Lavine, N. Jacobs, R. Pless, A. Richardson, and S. Frolking, "The PhenoCam Website: Adventures in "crowd-sourcing" data collection, distribution and analysis," in *American Geophysical Union Annual Meeting*, 2011.

[19] P. Wang, S. Bhattacharyya, D. White, and N. Jacobs, "Visualization of Kentucky Lake," in *Kentucky EPSCoR Conference*, 2011.

Technical Reports

[1] A. Abrams, C. Hawley, K. Miskell, A. Stoica, N. Jacobs, and R. Pless, “Shadow estimation method for "the episolar constraint: Monocular shape from shadow correspondence",” *arXiv*, vol. preprint 1304.4112 [cs.CV], 2013.

[2] N. Jacobs, S. Schuh, and R. Pless, “On unusual pixel shapes and image motion,” Computer Science and Engineering, Washington University in St. Louis, MO, USA, Tech. Rep. WUCSE-2009-16, Jun. 2009.

Datasets

[1] A. Abrams, J. Tucek, J. Little, N. Jacobs, and R. Pless, *LOST: Longterm observation of scenes (with tracks)*, http://mvrl.github.io/LOST.

[2] M. T. Islam, C. Greenwell, and N. Jacobs, *GeoFaces: A large database of geolocated face patches*, http://mvrl.github.io/GeoFaces.

[3] N. Jacobs, R. Pless, A. Abrams, and many others (see website for details), *AMOS: The archive of many outdoor scenes*, https://mvrl.github.io/AMOS.

[4] P. Mihail, S. Workman, Z. Bessinger, and N. Jacobs, *SkyFinder: A large dataset of webcam images annotated with sky regions*, https://mvrl.github.io/SkyFinder.

[5] M. U. Rafique, H. Blanton, and N. Jacobs, *Brooklyn Panorama Synthesis: A large dataset of panoramic images suitable for view synthesis evaluation.* https://mvrl.github.io/GAF.

[6] T. Salem, S. Workman, M. Zhai, and N. Jacobs, *Cross-View Time (CVT)*, https://mvrl.github.io/CVT.

[7] T. Salem, S. Workman, M. Zhai, and N. Jacobs, *Face2Year: A large number of images extracted from highschool yearbooks*, https://mvrl.github.io/Face2Year.

[8] S. Workman and N. Jacobs, *Cross-View ScenicOrNot (CVSoN)*, https://mvrl.github.io/CVSoN.

[9] S. Workman and N. Jacobs, *Crossview USA (CVUSA): A large dataset containing millions of pairs of ground-level and aerial/satellite images from across the United States.* https://mvrl.github.io/CVUSA.

[10] S. Workman, M. Zhai, and N. Jacobs, *Horizon Lines in the Wild (HLW): A large database of images with known horizon-line location*, http://mvrl.github.io/HLW.

5 Funding

Summary of funding to University of Kentucky as grants, contracts, or unrestricted gifts (Last updated: Nov 23, 2021):

- Total funding: $10,203,326
  - by role:
    - PI: $4,234,003
    - Co-PI/Co-I: $5,969,323
  - by source:
    - Federal: $9,799,904 (inc. subcontracts on Federal awards)
    - Industry: $199,107
    - Foundation: $159,000
    - Internal: $45,315 (only includes competitively awarded funds)

This excludes a $28,861,434 NIH CTSA grant, on which I don’t deem my contribution essential to the success of this award.

Grants (awarded/active)

1. *Learning-Based Visual Event Demarcation*
   PI: **Nathan Jacobs**
   Co-PI(s)/Co-I(s): Anderson Rocha (UNICAMP)
   Sponsor: Global Incubator Seed Grant (WashU Internal Funding)
   Total Award: $25,000
   Duration: 2022–2023

2. *WATCH: Wide Area Terrestrial Change Hypercube*
   PI: **Nathan Jacobs**
   Sponsor: Kitware / Intelligence Advanced Research Projects Activity (IARPA)
   Total Award: $305,941.48 (Phase 1); $851,489 (Phase 1–3)
   Duration: 2020–2022 (Phase 1); 2020–2024 (Phase 1–3)

3. *Measures of Information via Representation Learning*
   PI: Luis Sanchez-Giraldo
   Co-PI(s)/Co-I(s): **Nathan Jacobs**
   Sponsor: Department of Defense (DEPSCoR)
   Total Award: $582,376
   Duration: 2021–2024

4. *GeoSearch: Image-based Geolocation using Rank Aggregated Hash Index (Phase 2, direct)*
   PI: **Nathan Jacobs**
   Sponsor: Blue Halo / National Geospatial-Intelligence Agency (NGA)
   Total Award: $250,000
   Duration: 2021-2023

5. *Spatio-Temporal Association and Curve Kernel Networks (STACKNet)*
   PI: **Nathan Jacobs**
   Sponsor: Blue Halo / MDA
   Total Award: $483,000 (Phase 1 and 2)
   Duration: 2020–2023

6. *Geolocalization Pipeline for Ground Level Images*
   PI: **Nathan Jacobs**
   Sponsor: Blue Halo / National Geospatial-Intelligence Agency (NGA)
   Total Award: $19,944 (Phase 1), $249,988 (Phase 2), $153,261 (Phase 3, Year 1)
   Duration: 2018–2022

Grants (completed)

1. *NURI: Semantic Representations for Multi-Viewpoint Multimodal Geolocation*
   PI: **Nathan Jacobs**
   Sponsor: Johns Hopkins University, Applied Physics Laboratory / National Geospatial-Intelligence Agency (NGA)
   Total Award: $196,000 (base)
   Duration: 2020–2022

2. *R01: Ex vivo single molecule tools to analyze membrane receptor dynamics*
   PI: Christopher Richards
   Co-PI(s)/Co-I(s): Jim Pauly, Ahmed Abdel-Latif, David Heidary, **Nathan Jacobs**
   Sponsor: National Institutes of Health (NIH)

Total Award: $1,510,803
Duration: 2021–2022 (my role ended when I left the University of Kentucky)

3. *UL1: Kentucky Center for Clinical and Translational Science*
   PI: Philip A. Kern
   Co-PI(s)/Co-I(s): **Nathan Jacobs** and many others
   Sponsor: National Institutes of Health (NIH)
   Total Award: $28,893,663
   Duration: 2021–2022 (my role ended when I left the University of Kentucky)

4. *CCT: Context and Colorization for Tracking (Phase 2)*
   PI: **Nathan Jacobs**
   Sponsor: Intelligent Automation Inc. / Defense Advanced Research Projects Agency (DARPA)
   Total Award: $200,000
   Duration: 2020–2021

5. *Video to Feature Data Association and Geolocation*
   PI: **Nathan Jacobs**
   Sponsor: Novateur Research Solutions / National Geospatial-Intelligence Agency (NGA)
   Total Award: $29,503 (Phase 1), $149,883 (Phase 2)
   Duration: 2018–2021

6. *CAREER: Learning and Using Models of Geo-Temporal Appearance*
   PI: **Nathan Jacobs**
   Sponsor: National Science Foundation (NSF)
   Total Award: $499,426
   Duration: 2016–2021

7. *R01: Monomeric G-proteins and Cardioprotection from Heart Failure*
   PI: John Satin
   Co-PI(s)/Co-I(s): Douglas Andres, Ahmed Abdel-Latif, **Nathan Jacobs**, Peter Kekenes-Huskey
   Sponsor: National Institutes of Health (NIH)
   Total Award: $1,575,279
   Duration: 2016–2020

8. *Group Travel Grant for the Doctoral Consortium to be Held in Conjunction with IEEE Conference on Computer Vision and Pattern Recognition*
   PI: **Nathan Jacobs**
   Sponsor: National Science Foundation (NSF)
   Total Award: $22,500
   Duration: 2019–2020

9. *DLALA: Deep Learning for Airborne LiDAR Analysis*
   PI: **Nathan Jacobs**
   Sponsor: Orbital Insight
   Total Award: $104,927
   Duration: 2019–2020

10. *Listening to Markets: A Temporal Convolutional Net (TCN) Analysis of Conservatism in Company Reporting*
    PI: Dan Stone
    Co-PI(s)/Co-I(s): **Nathan Jacobs**, Mark Lauersdorf, Hong Xie
    Sponsor: University of Kentucky
    Total Award: $33,315
    Duration: 2018–2019

11. *Calibrated Pose Regression Networks*
    PI: **Nathan Jacobs**
    Sponsor: The Design Knowledge Company / Air Force Research Lab (Wright-Patterson AFB)
    Total Award: $155,700 (Phase 3)
    Duration: 2018–2019

12. *Group Travel Grant for the PhD Forum to be Held in Conjunction with IEEE Winter Conference on Applications of Computer Vision*
    PI: **Nathan Jacobs**
    Sponsor: National Science Foundation (NSF)
    Total Award: $13,625
    Duration: 2018–2019

13. *ASER Multi Center Review of Blunt Splenic Trauma: Optimal CT Diagnosis, Characterization*
    PI: James Lee (Radiology)
    Co-PI(s)/Co-I(s): David Nickels, **Nathan Jacobs**, Emily Slade
    Sponsor: American Society of Emergency Radiology
    Total Award: $5,000
    Duration: 2018–2019

14. *Mechanism of a Novel Stable Compensatory Cardiac Hypertrophy Model*
    PI: Jonathan Satin
    Co-PI(s)/Co-I(s): Douglas Andres, **Nathan Jacobs**, Moriel Vandsburger
    Sponsor: American Heart Association
    Total Award: $154,000
    Duration: 2016–2018

15. *NIP: GeoLookbook: Modeling Worldwide Human Visual Appearance*
    PI: **Nathan Jacobs**
    Sponsor: National Geospatial-Intelligence Agency (NGA)
    Total Award: $299,204
    Duration: 2014–2018

16. *Crossview ConvNets for Near/Remote Sensing*
    PI: **Nathan Jacobs**
    Sponsor: Google
    Total Award: $46,209
    Duration: 2016–2017

17. *WALDO: Wide Area Localization of Depicted Objects*
    PI: **Nathan Jacobs**
    Sponsor: Object Video / Intelligence Advanced Research Projects Activity (IARPA)
    Total Award: $373,395
    Duration: 2012–2016

18. *CSSG: ContextualEyes: A Context-Aware Surveillance System*
    PI: **Nathan Jacobs**
    Sponsor: Defense Advanced Research Projects Agency (DARPA)
    Total Award: $743,131
    Duration: 2011–2015

19. *Image-Net: Discriminatory Imaging and Network Advancement for Missiles, Aviation, and Space*
    PI: Brent Seales
    Co-PI(s)/Co-I(s): Ken Calvert, James Griffioen, Jane Hayes, **Nathan Jacobs**, Victor Marek, Thomas Seigler,

Suzanne Smith, Miroslaw Truszczynski, Ruigang Yang
Sponsor: United States Army Space and Missile Defense Command / United States Army Forces Strategic Command
Total Award: $2,092,905
Duration: 2011–2012

Donations

1. *Google Cloud Compute Research Credits* — PI: **Nathan Jacobs**
   Sponsor: Google — Amount/Value: $5,000 — Date: Aug 2018
2. *NVIDIA Titan X GPU* — PI: **Nathan Jacobs**
   Sponsor: NVIDIA — Amount/Value: $778 — Date: Oct 2016
3. *AWS Research Education Grant* — PI: **Nathan Jacobs**
   Sponsor: Amazon — Amount/Value: $5,000 — Date: Jul 2015
4. *NVIDIA Tesla K40 GPU* — PI: **Nathan Jacobs**
   Sponsor: NVIDIA — Amount/Value: $3,900 — Date: Dec 2014

6 Talks

1. "Domain-Inspired Deep Learning for Computer Vision, Remote Sensing, and Medical Imaging", Oct 2022, Imaging Science Seminar, Washington University, St. Louis, MO
2. "Computer Vision for Multimodal Remote Sensing", Aug 2022, WashU Geospatial Working Group Research Workshop, Washington University, St. Louis, MO
3. "A Structure-Aware Method for Direct Pose Estimation", Jan 2022, IEEE Winter Conference on Applications of Computer Vision (WACV), Waikoloa Village, HI
4. Panelist for "Non-Traditional Careers in Computer Science" Nov 2021, ACM-W, University of Kentucky, Lexington, KY
5. "Mapping the Visual World Using Webcams, Cell Phones, and Satellites", Oct 2021, Washington University in St. Louis, MO
6. "Learning Geo-Temporal Scene Models from Webcams, Cell Phones, and Satellites" (Keynote), Oct 2021, International Workshop on Distributed Smart Cameras, an ICCV Workshop (virtual)
7. "Mapping the Visual World Using Webcams, Cell Phones, and Satellites", Dec 2020, University of Campinas, Unicamp, Brazil (virtual)
8. "Exploring the Intersection of Localization, Mapping, and Image Understanding" (Keynote), Aug 2020, ECCV Workshop on Long-Term Visual Localization (virtual)
9. "Deep Convolutional Neural Networks: Foundations to Frontiers (a 2-day short course)", Mar 2020, Brazilian Space Agency (INPE), Sao Jose dos Campos, Brazil
10. "What, Where, and When: Mapping the World Using Webcams, Cell Phones, and Satellites", Mar 2020, Brazilian Space Agency (INPE), Sao Jose dos Campos, Brazil
11. "Learning to Map Visual Appearance", Feb 2020, Keeping Current Seminar, University of Kentucky (Computer Science), Lexington, KY
12. "Learning to Map Visual Appearance", Jan 2020, Wageningen University, Netherlands

13. “What, Where, and When: Mapping the World Using Webcams, Cell Phones, and Satellites”, Nov 2019, University of Kentucky (Forestry), Lexington, KY
14. “Learning to Map the Visual World”, Jul 2019, Wright State University, Dayton, OH
15. “Understanding Places Using Ground-Level and Overhead Views” (Keynote), May 2019, Kentucky Geological Society (Annual Symposium), Lexington, KY
16. “Understanding Places Using Ground-Level and Overhead Views”, Feb 2019, Notre Dame University, South Bend, IN
17. “A Generative Model of Worldwide Facial Appearance” (Keynote), Jan 2019, Workshop on Demographic Variations in Performance of Biometric Algorithms, Waikoloa Village, HI
18. “A Generative Model of Worldwide Facial Appearance”, Jan 2019, IEEE Winter Conference on Applications of Computer Vision, Waikoloa Village, HI
19. “A Weakly Supervised Approach for Estimating Spatial Density Functions from High-Resolution Satellite Imagery”, Nov 2018, ACM SIGSPATIAL, Seattle, WA
20. “Understanding Places Using Ground-Level and Overhead Views”, Oct 2018, Commonwealth Computational Summit, Lexington, KY
21. “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 4)”, Sep 2018, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
22. “Understanding Places Using Ground-Level and Overhead Views”, Aug 2018, Oak Ridge National Lab, Oak Ridge, TN
23. “WhatGoesWhere: Predicting Object Distributions from Above”, Jul 2018, IGARSS, Valencia, Spain
24. “Building World Models for Situated Training and Planning”, May 2018, Air Force Science and Technology 2030 Workshop, Bloomington, IN
25. “Recent Advances in Image Understanding”, May 2018, DASC, Lexington, KY
26. “(Tutorial) Recent Advances in Deep Learning: Fusing Overhead and Ground-Level Views for Remote Sensing”, April 2018, USGIF Annual Symposium, Tampa, FL
27. “Understanding Places Using Ground-Level and Overhead Views”, Feb 2018, CVPR Area Chair Meeting, Toronto, Canada
28. “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 3)”, Sep 2017, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
29. “GPU Accelerated Computer Vision, Remote Sensing, and Machine Learning”, Aug 2017, Kentucky Geological Service, Lexington, KY
30. “Fusing Overhead and Ground-Level Imagery to Improve Scene Understanding”, Jul 2017, Planet, San Francisco, CA
31. “Learning about When and Where from Imagery”, Jun 2017, Orbital Insight, Mountain View, CA
32. “(Tutorial) Recent Advances in Deep Learning: Fusing Overhead and Ground-Level Views for Remote Sensing”, Jun 2017, USGIF Annual Symposium, San Antonio, TX
33. “How Computers See People (extended)”, May 2017, CCTS Biomedical Informatics Seminar Series, Lexington, KY

34. “Understanding Places Using Ground-Level and Overhead Views”, May 2017, Midwest Vision Meeting, Chicago, IL

35. “How Computers See People”, Feb 2017, Suds’n’Science Speaker Series, West Sixth Brewing, Lexington, KY

36. “Learning about When and Where from Imagery”, Feb 2017, University of Missouri, Department of Computer Science

37. “Localization, Mapping, and Image Understanding”, Feb 2017, USGIF Machine Learning Symposium

38. “Deep Convolutional Neural Networks: Concepts and Examples (in Computer Vision”, Nov 2016, University of Kentucky, Society of Industrial and Applied Mathematics

39. “Crossview Convolutional Networks”, Oct 2016, Applied Imagery and Pattern Recognition, Washington, D.C.

40. “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 2)”, Sep 2016, National Academy of Sciences (IC Academic Research Symposium), Washington, DC

41. “Deep Convolutional Neural Networks: Concepts and Examples”, Jul 2016, University of Kentucky: Systems Biology and Omics Integration Seminar

42. “Crossview Methods for Localization and Mapping”, Jun 2016, IEEE CVPR Workshop on “Vision from Satellite to Street” (invited talk)

43. “A Fast Method for Estimating Transient Scene Properties”, Mar 2016, Winter Conference on Applications of Computer Vision, Lake Placid, NY

44. “Novel Cues for Geocalibration”, Feb 2016, Indiana University, Bloomington, IN

45. “Novel Cues for Camera Geocalibration”, Jan 2016, Uber Advanced Technology Center, Pittsburgh, PA

46. “Novel Cues for Geocalibration: Cloudy Days, Rainbows, and More”, Oct 2015, Carnegie Mellon University, Pittsburgh, PA

47. “Using Geotagged Internet Imagery to Understand the World”, Sep 2015, Université Laval, Quebec City, Canada

48. “face2gps: Estimating Geographic Location from Facial Features”, Sep 2015, International Conference on Image Processing, Quebec City, Canada

49. “GeoLookbook: Modeling Worldwide Human Visual Appearance”, Sep 2015, National Academy of Sciences (IC Academic Research Symposium), Washington, DC

50. “Exploring the Geo-Dependence of Human Face Appearance”, Mar 2014, Winter Conference on Applications of Computer Vision, Steamboat Springs, CO

51. “Estimating Cloudmaps from Outdoor Image Sequences”, Mar 2014, Winter Conference on Applications of Computer Vision, Steamboat Springs, CO

52. “Scene Geometry from Several Partly Cloudy Days”, Oct 2013, International Conference on Distributed Smart Cameras, Palm Springs, CA

53. “Unlocking the Potential of the Global Network of Outdoor Webcams”, Apr 2013, Rochester Institute of Technology

54. “Geo-temporal Computer Vision: Applications to the NGA”, Nov 2011, National Geospatial-Intelligence Agency

55. “Geo-temporal Computer Vision: Applications to the Army”, Oct 2011, Army Research Lab

56. “Localizing, Calibrating, and Using Thousands of Outdoor Webcams”, Feb 2011, University of North Carolina–Charlotte
57. “Using Clouds Shadows to Infer Scene Structure and Camera Calibration”, Jun 2010, CVPR, San Francisco, CA
58. “Passive Vision and The Power of Collective Imaging”, Apr 2010, Object Video Inc., Reston, VA
59. “Localizing, Calibrating, and Using Thousands of Outdoor Webcams”, Apr 2010, University of Kentucky
60. “Time-Lapse Vision: Localizing, Calibrating, and Using Thousands Outdoor Webcams”, Apr 2010, Google, Mountain View, CA
61. “Passive Vision and The Power of Collective Imaging”, Jan 2010, Google, Mountain View, CA
62. “Incorporating Domain Constraints in Urban Vehicle Tracking”, Nov 2010, University of Missouri, Columbia, MO
63. “Compressive Sensing and Differential Image-Motion Estimation”, Mar 2010, ICASSP, Dallas, TX
64. “The Global Network of Outdoor Webcams: Properties and Applications ”, Nov 2009, ACM GIS, Seattle, WA
65. “Passive Vision: The Global Webcam Imaging Network”, Oct 2009, AIPR, Washington, DC
66. “Calibrating and Using the Global Network of Outdoor Webcams”, Aug 2009, ICDSC, Italy
67. “Adventures in Archiving and Using Three Years of Webcam Images”, Jun 2009, CVPR Workshop on Internet Vision, Miami, FL
68. “Recent Work: Webcams and Grooves”, Aug 2009, Object Video, Reston, VA
69. “Location-Specific Models for Tracking”, Jan 2008, WMVC, Copper Mountain, CO
70. “Using natural cues to geo-locate and geo-orient distributed cameras”, Jan 2008, VISN, Copper Mountain, CO
71. “Foreground Modeling: The Shape of Things That Came”, Feb 2007, WMVC, Austin, Texas

7 Service

University Service

- Washington University in St. Louis (2022–present)
  - 2022–present: Research Council, Taylor Geospatial Institute
  - 2022–2023: Computer Science & Engineering Department: Faculty Search Committee
- University of Kentucky (2010–2022)
  - 2021–2022: Institute for Biomedical Informatics: Steering Committee
  - 2019–2022: Computer Science Department: Executive Committee
  - 2019–2022: College of Engineering: Master Planning/Space Committee
  - 2018–2019, 2020–2022: College of Engineering: Research Advisory Committee
  - 2020–2022: College of Engineering: Graduate Studies Team
  - 2013–2017, 2018–2022: Computer Science Department: Faculty Search Committee

- 2020–2021: Computer Science Department: Chair Search Committee
- 2020: College of Engineering: Recruiting Advisory Committee
- 2018–2019: University Senate (Academic Facilities Committee, Technology Committee)
- 2017: Member (Information Technology Task Force for Research Enablement and Outreach)
- 2015–2016: Computer Science Department: ABET Committee
- 2010–2012, 2015–2016: Computer Science Department: Media and Outreach
- 2013: Center for Visualization and Virtual Environment: Director Search Committee
- 2013: Computer Science Department: Chair Search Committee
- 2012–2013: Computer Science Department: Curriculum Development Committee
- 2012–2013, 2015: Engineering Day (oral presentation and/or software demonstration)

Professional Service

- Area Chair:
  - IEEE Conference on Computer Vision and Pattern Recognition (CVPR) [2018, 2019, 2021, 2023]
  - IEEE International Conference on Computer Vision (ICCV) [2023]
  - European Conference on Computer Vision (ECCV) [2022]
  - IEEE Winter Conference on Applications of Computer Vision (WACV) [2014, 2022 (round 2), 2023]
- Organizing Committees:
  - IEEE/ISPRS Workshop on Large Scale Computer Vision for Remote Sensing Imagery (EARTHVISION) [2019, 2020, 2021]
  - Doctoral Consortium Co-Chair: IEEE Conference on Computer Vision and Pattern Recognition (CVPR) [2017, 2019]
  - Doctoral Consortium Chair: IEEE Winter Conference on Applications of Computer Vision (WACV) [2018, 2022]
  - Video Proceedings Chair: IEEE Conference on Computer Vision and Pattern Recognition (CVPR) [2015]
  - IEEE Workshop on Motion and Video Computing (WMVC) [2011]
- Guest Editor:
  - IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (J-STARS) [2021], Special Issue "Integrating User Generated Contents for Remote Sensing Applications"
  - Elsevier Computer Vision and Image Understanding (CVIU) [2019], Special Issue "Computer Vision for Remote Sensing"
- Session Chair:
  - IEEE International Geoscience and Remote Sensing Symposium (IGARSS) [2020]
  - IEEE/ISPRS Workshop on Large Scale Computer Vision for Remote Sensing Imagery (EARTHVISION) [2019]
  - IEEE Winter Conference on Applications of Computer Vision (WACV) [2016, 2019, 2022]
  - IEEE Conference on Computer Vision and Pattern Recognition (CVPR) [2018]
  - IEEE/ACM International Conference on Distributed Smart Cameras [2013]

- Reviewing for Journals:
  - IEEE Transactions on Geoscience and Remote Sensing [2020]
  - ISPRS Journal of Photogrammetry and Remote Sensing [2020]
  - IEEE Transactions on Pattern Analysis and Machine Intelligence [2011, 2011, 2012, 2018, 2019]
  - ISPRS Journal of Photogrammetry and Remote Sensing [2019]
  - IEEE Transactions on Geoscience and Remote Sensing [2017]
  - IEEE Transactions on Multimedia [2011, 2016]
  - Elsevier Computer Vision and Image Understanding [2010, 2013, 2016×2]
  - IEEE Transactions on Computational Imaging [2016]
  - IEEE Journal on Selected Topics in Remote Sensing [2015]
  - Springer Machine Vision and Applications [2014]
  - IEEE Sensors [2014]
  - Elsevier Image and Vision Computing [2013]
  - IEEE Transactions on Circuits and Systems for Video Technology [2007, 2008, 2009, 2010, 2011]
  - IEEE Computer Graphics and Applications [2010]
  - IEEE Transactions on Aerospace and Electronic Systems [2010]
  - Elsevier Computers and Electronics in Agriculture [2010]
  - Cartography and Geographic Information Science [2010]
- Program Committee / Reviewer for:
  - Conferences
    - International Conference on Learning Representations (ICLR) [2022]
    - IEEE Winter Conference on Applications of Computer Vision (WACV) [2021]
    - IEEE International Geoscience and Remote Sensing Symposium (IGARSS) [2020]
    - British Machine Vision Conference (BMVC) [2020]
    - IEEE Conference on Computer Vision and Pattern Recognition (CVPR) [2006–2017, 2020]
    - European Conference on Computer Vision (ECCV) [2010, 2014, 2020]
    - Neural Information Processing Systems (NeurIPS) [2010–2012, 2020]
    - AAAI Conference on Artificial Intelligence (AAAI) [2020]
    - IEEE International Conference on Computer Vision (ICCV) [2007, 2009, 2019, 2021]
    - Asian Conference on Computer Vision (ACCV) [2010, 2016]
    - IEEE International Conference on Robotics and Automation (ICRA) [2016]
    - International Conference on Machine Learning (ICML) [2012]
    - IEEE International Conference on Advanced Video and Signal-Based Surveillance (AVSS) [2010]
  - Workshops
    - IEEE/ISPRS Workshop on Large Scale Computer Vision for Remote Sensing Imagery (EARTHVISION) [2017, 2019, 2020]
    - CVPR Workshop on Photogrammetric Computer Vision [2019]
    - CVPR Workshop on DeepGlobe Satellite Challenge [2018]
    - ACM International Workshop on Geotagging and Its Applications [2013]
    - ICCV Workshop on Computer Vision for Converging Perspectives [2013]

    - IEEE Workshop on Applications of Computer Vision [2012–2013]
    - ECCV Workshop on Visual Analysis and Geo-Localization of Large-Scale Imagery [2012]
    - ACM Workshop on Geotagging and Its Applications in Multimedia [2012]
    - IEEE Workshop on Motion and Video Computation [2009–2011]

- Reviewing for Funding Agencies:
  - Panelist for NSF Information and Intelligent Systems Division [2019]
  - Panelist for NSF Information and Intelligent Systems Division [2018]
  - Panelist for NSF Information and Intelligent Systems Division [2017]
  - Panelist for NSF Division of Industrial Innovation and Partnerships [2016]
  - Panelist for NSF Information and Intelligent Systems Division [2016]
  - Panelist for NSF Information and Intelligent Systems Division [2015]
  - External reviewer for NSF Information and Intelligent Systems Division [2015]
  - External reviewer for Fonds de recherche du Quebec [2014]

Memberships

- Senior Member: Institute of Electrical and Electronics Engineers
- Full Member: British Machine Vision Association and Society for Pattern Recognition
- Affiliate Member: International Association of Pattern Recognition

8 Teaching and Mentoring

Courses Taught

The following list summarizes the traditional, classroom courses I have taught:

- *Introduction to Machine Learning*, CS 460g, [F2012, F2013, F2014, F2016, F2018, F2019], University of Kentucky
- *Computer Vision*, CS 636, [S2011, S2013, S2017], University of Kentucky
- *Learning-Based Methods for Computer Vision*, CS 585/685, [S2015], University of Kentucky
- *Advanced Topics in Computer Science: Machine Learning*, CS 685, [S2012], University of Kentucky
- *Intermediate Topics in Computer Science: Computational Photography*, CS 585, [F2010, F2011], University of Kentucky
- *Theory of Computation*, CECS 341, [F2002], University of Missouri

The following list summarizes the independent study courses (UKy CS 395 or 612) I have supervised:

- F2019, "Applied Deep Learning"
- S2019, "Applied Deep Learning" ($\times 5$)
- F2018, "Applied Deep Learning" ($\times 5$)
- S2018, "Applied Deep Learning" ($\times 4$)

- F2017, “Applied Deep Learning”
- F2016, “Applied Deep Learning” ($\times 6$)
- S2016, “Applied Deep Learning: Understanding Urban Areas”
- S2015, “Understanding Real-Estate Imagery”
- F2014, “Recent Techniques in Machine Learning” ($\times 4$)
- F2014, “Learning-Based Methods for Background Subtraction”
- F2014, “A Novel Approach for Category-Level Object Detection from Partial Pose Estimation of Symmetric Objects”
- S2013, “Extracting Geo-Temporal Image Appearance Patterns from Flickr Imagery”
- S2013, “Automatic Camera Calibration Methods”
- S2013, “Deep-Learning Architectures for Computer Vision”
- F2012, “Automatic Image Geolocalization”
- S2012, “Image Calibration using Natural Scene Variations”
- F2011, “Practical Methods in Crowd Sourcing”

Mentoring

Postdoctoral Scholars

1. Benjamin Brodie (Ph.D. Mathematics, University of Kentucky) Dates: 2020–2022
   Research Focus: Change Detection, Object Tracking, Re-Identification, Metric Learning
   Employment: Research Scientist, Blue Halo

Ph.D. Students

1. Paul Mihail [*co-chair* w/ Judy Goldsmith] Degree: Ph.D., Computer Science
   Title: Visualizing and Predicting the Effects of Rheumatoid Arthritis on Hands Date: May 2014
   Employment: Associate Professor, Computer Science, Valdosta State University

2. Mohammad T. Islam Degree: Ph.D., Computer Science
   Title: Analyzing the Geo-Dependence of Human Face Appearance and Its Applications Date: Jul 2016
   Employment: Associate Professor, Computer Science, Southern Connecticut State University

3. Hamid Hamraz Degree: Ph.D., Computer Science
   Title: Computational Forest Modeling using Airborne Remote Sensing LiDAR Date: Apr 2018
   Employment: Computational and Data Scientist, Microsoft

4. Scott Workman Degree: Ph.D., Computer Science
   Title: Leveraging Overhead Imagery for Localization, Mapping, and Understanding Date: Apr 2018
   Employment: Research Scientist, DZYNE Technologies

5. Menghua “Ted” Zhai Degree: Ph.D., Computer Science
   Title: Deep Probabilistic Models for Camera Geo-Calibration Date: Dec 2018
   Employment: Computer Vision Engineer, MatrixTime (startup)

6. Zach Bessinger — Degree: Ph.D., Computer Science
   Title: Modeling and Mapping Location-Dependent Human Appearance — Date: Dec 2018
   Employment: Senior Applied Scientist, Zillow

7. Tawfiq Salem — Degree: Ph.D., Computer Science
   Title: Learning to Map the Visual and Auditory World — Date: Jul 2019
   Employment: Visiting Assistant Professor, Computer and Information Technology, Purdue University

8. Gongbo Liang — Degree: Ph.D., Computer Science
   Title: Clinical-Inspired Multi-Modal Deep Learning Medical Imaging Analysis — Date: Oct 2020
   Employment: Assistant Professor, Computer Science, Eastern Kentucky University

9. Usman Rafique [*co-chair* w/ Samson Cheung] — Degree: Ph.D., Electrical Engineering
   Title: Weakly Supervised Learning for Multi-Image Synthesis — Date: Jul 2021
   Employment: Research Scientist, Kitware Inc.

10. Hunter Blanton — Degree: Ph.D., Computer Science
    Title: Revisiting Absolute Pose Regression — Date: Aug 2021
    Employment: Senior Computer Vision Engineer, Yembo (startup)

11. Connor Greenwell — Degree: Ph.D., Computer Science
    Title: Probabilistic Cross-Domain Representation Learning — Date: Jun 2022
    Employment: Senior R&D Engineer

12. Yu Zhang — Degree: Ph.D., Computer Science
    Title: Multimodal Domain Generalization — Date: May 2022 (est)

13. Xin Xing [*co-chair* w/ Ai-Ling Lin] — Degree: Ph.D., Computer Science
    Title: TBD [Medical Imaging and Attention] — Date: Jun 2023 (est)

14. Subash Khanal — Degree: Ph.D., Computer Science
    Title: TBD — Date: Jun 2024 (est)

15. Aram Ansary Ogholbake — Degree: Ph.D., Computer Science
    Title: TBD [Remote Sensing, Change Detection] — Date: Dec 2023 (est)

16. Oscar Skean [*co-chair* w/ Luis Sanchez-Giraldo] — Degree: Ph.D., Computer Science
    Title: TBD [Information-Theoretic Metric Learning] — Date: Dec 2023 (est)

17. Aayush Dhakal — Degree: Ph.D., Computer Science
    Title: TBD — Date: May 2026 (est)

18. Srikumar Sastry — Degree: Ph.D., Imaging Science
    Title: TBD — Date: May 2027 (est)

19. Michael Lanier [*co-chair* w/ Yevgeniy Vorobeychik] — Degree: Ph.D., Computer Science
    Title: TBD — Date: May 2027 (est)

20. Zhexiao Xiong — Degree: Ph.D., Computer Science
    Title: TBD — Date: May 2027 (est)

Masters Students

1. Feiyu Shi — Degree: MS, Computer Science
   Title: Principal Component Analysis For Multi-size Images — Date: Dec 2013
   Employment: Senior Software Engineer, Microsoft

2. Ryan Baltenberger — Degree: MS, Computer Science
   Title: Estimating Transient Scene Attributes Using Deep Convolutional Neural Networks — Date: May 2016
   Employment: Computer Vision Research Engineer, Badger Technologies

3. William "Derek" Jones [*co-chair* w/ Sally Ellingson] — Degree: MS, Computer Science
   Title: Scalable Feature Selection and Extraction with Applications in Kinase Polypharmacology — Date: May 2018
   Employment: Research Data Scientist, Lawrence Livermore National Laboratory, ATOM

4. Weilian "William" Song — Degree: MS, Computer Science
   Title: Image-Based Roadway Assessment using Convolutional Neural Networks — Date: May 2019
   Employment: Ph.D. student, Simon Fraser University

5. Armin Hadzic — Degree: MS, Computer Science
   Title: Estimating Free-Flow Speed with LiDAR and Overhead Imagery — Date: May 2020
   Employment: Machine Learning Research Scientist, DZYNE Technologies

6. David Jones — Degree: MS, Computer Science
   Title: Intensity Harmonization for Airborne LiDAR — Date: May 2021
   Employment: Machine Learning Engineer, Kinetic Vision

7. Jacob Birge — Degree: MS, Computer Science
   Title: A Cost-Sensitive Approach To Multimodal Fusion — Date: Dec 2021
   Employment: UPS

8. Alex Wollam — Degree: MS, Computer Science
   Title: TBD (image synthesis) — Date: May 2023

9. Nia Hodges — Degree: MS, Engineering Data Analytics & Statistics
   Title: TBD — Date: May 2024

Undergraduate Research Students

1. Jim Knochelmann — Dates: 2011–2012
   Title: User-Tools for Aerial Image Registration

2. Kyle Kolpek — Dates: 2012
   Title: Aerial Image Registration

3. Noora Aljabi — Dates: 2013
   Title: Using Flickr to Map Phenological Trends

4. J. David Smith — Dates: 2013–2015
   Title: User-in-the-loop Camera Calibration

5. Angelo Stekardis — Dates: 2014–2015
   Title: Understanding Facial Expressions

6. Ryan Baltenberger — Dates: 2012–2015
   Title: Understanding Outdoor Scene Appearance

7. Connor Greenwell — Dates: 2014–2016
   Title: Interactive Methods for Aerial Imagery Understanding
8. Sam Davidson — Dates: 2016–2017
   Title: Applications of Generative Adversarial Networks to Social Media Imagery
9. Aaron Mueller — Dates: 2018
   Title: Deep Learning for Educational Data
10. Weilian Song — Dates: 2016–2019
    Title: Applications of Deep Convolutional Neural Networks to Geometric Computer Vision
11. Yuhan Long — Dates: 2019
    Title: Deep Learning for Medical Imaging
12. Thomas Barber — Dates: 2019
    Title: Deep Learning for Remote Sensing
13. Sean Grate — Dates: 2019–2020
    Title: Deep Learning for Point Clouds
14. Shashank Bhatt — Dates: 2020–2022
    Title: TBD
15. Cohen Archbold — Dates: 2020–2022
    Title: TBD
16. Evan Bolton — Dates: 2021
    Title: Generating Synthetic Training Data using a Game Engine
17. Julia Stekardis — Dates: 2021–2022
    Title: Large-Scale Image Geo-Localization
18. Gareth Walker — Dates: 2022
    Title: Remote Sensing for Social Good
19. Matthew Mitchell — Dates: 2022
    Title: Remote Sensing for Social Good

High School Research Students

1. Ryan Baltenberger — Dates: 2011–2012
   Title: Gesture-Based User Interaction with the Microsoft Kinect
2. Alex Lucas — Dates: 2014–2013
   Title: Evaluation of Automatic Face Detection Methods
3. Andrew Tapia — Dates: 2014–2015
   Title: Estimating Surface Reflectivity
4. Andrew Albrecht — Dates: 2016–2017
   Title: Mapping Social Media Imagery
5. C. J. Labianca — Dates: 2016–2017
   Title: Evaluation of Optimization Algorithms for Deep Convolutional Neural Networks
6. Ryan Landry — Dates: 2017–2018
   Title: RRADCL: Rapid Roadway Assessment with Deep Convolutional Learning

7. Cohen Archbold — Dates: 2017–2018
   Title: Photo-Geolocation using Convolutional Neural Networks
8. Nicole Wong — Dates: 2019–2020
   Title: Learning-Based View Synthesis
9. Chris Wang — Dates: 2019–2021
   Title: Multimodal Medical Imaging for Alzheimer's Disease Classification
10. William Greenlee — Dates: 2021–present
    Title: TBD
11. Krishna Bhatraju — Dates: 2021–present
    Title: TBD

Graduate Committees (as regular member or external examiner)

1. Edwin Prem Kumar Sathiyamoorthy — Degree: MS, Electrical Engineering
   Role: member — Date: Mar 2011
   Title: Global Change Reactive Background Subtraction
2. Ju Shen — Degree: Ph.D., Electrical Engineering
   Role: member — Date: May 2014
   Title: Computational Multimedia for Video Self Modeling
3. Hasan Sajid — Degree: MS, Electrical Engineering
   Role: member — Date: Jul 2014
   Title: A Universal Background Subtraction System
4. Chenxi Zhang — Degree: Ph.D., Computer Science
   Role: member — Date: Dec 2014
   Title: Depth-assisted Image Segmentation, Enhancement and Visualization
5. Mao Ye — Degree: Ph.D., Computer Science
   Role: member — Date: Dec 2014
   Title: 3D Reconstruction and Motion Analysis of Deformable Objects with Consumer Depth Cameras
6. Yan Huang — Degree: Ph.D., Computer Science
   Role: member — Date: Dec 2014
   Title: Novel Computational Methods for Transcript Reconstruction and Quantification using RNA-SEQ Data
7. Shaoceng Wei — Degree: Ph.D., Statistics
   Role: outside examiner — Date: May 2015
   Title: Multi-state Models for Interval Censored Data with Competing Risk
8. Bo Fu — Degree: Ph.D., Computer Science
   Role: member — Date: May 2015
   Title: Towards Intelligent Telerobotics: Visualization and Control of Remote Robot
9. Harikrishnan Unnikrishnan — Degree: Ph.D., Electrical Engineering
   Role: member — Date: Dec 2015
   Title: Analysis of Vocal Fold Kinematics using High Speed Video
10. Sean Karlage — Degree: MS, Computer Science
    Role: member — Date: May 2016
    Title: Diachronic Volume Registration for Analysis of Antiquities

11. Hasan Sajid — Degree: Ph.D., Electrical Engineering
Role: member — Date: Jul 2016
Title: Robust Background Subtraction for Moving Cameras and their Applications in Ego-vision Systems

12. Stanley Rosenbaum — Degree: MS, Computer Science
Role: member — Date: Dec 2016
Title: A method for presenting volume and color of 3D objects via audio for the visually impaired

13. DhiShankar Bhattacharya — Degree: MS, Computer Science
Role: member — Date: Apr 2017
Title: Analyzing Sybil Attacks and Similar Phenomena in Twitter Data

14. Wesley Hough — Degree: Ph.D., Computer Science
Role: outside examiner — Date: May 2017
Title: On Independence, Matching, and Homomorphism Complexes

15. Qingguo Xu — Degree: MS, Computer Science
Role: member — Date: May 2017
Title: 3D Body Tracking using Deep Learning

16. Xiaofei Zhang — Degree: MS, Computer Science
Role: member — Date: Jul 2017
Title: Mammogram and Tomosynthesis Classification Using Convolutional Neural Networks

17. Yajie Zhao — Degree: Ph.D., Computer Science
Role: member — Date: Dec 2017
Title: 3D Human Face Reconstruction and 2D Appearance Synthesis

18. Po-Chang Su — Degree: Ph.D., Electrical Engineering
Role: member — Date: Dec 2017
Title: Real-time Capture and Rendering of Physical Scene with an Efficiently Calibrated RGB-D Camera Network

19. Anthony Rios — Degree: Ph.D., Computer Science
Role: member — Date: Jun 2018
Title: Deep Neural Networks for Multi-Label Text Classification: Application to Coding Electronic Medical Records

20. Ethan Welty (University of Colorado–Boulder) — Degree: Ph.D., Environmental Studies
Role: member — Date: Jul 2018
Title: High-Precision Photogrammetry for Glaciology

21. Yannick Hold-Geoffroy (Laval University, Quebec, CA) — Degree: Ph.D., Computer Science
Role: member — Date: Aug 2018
Title: Learning Geometric and Lighting priors from Natural Images

22. Nkiruka Uzuegbunam — Degree: Ph.D., Electrical Engineering
Role: member — Date: Oct 2018
Title: Self-Image Multimedia Technologies for Feedforward Observational Learning

23. Nam Vo (Georgia Institute of Technology) — Degree: Ph.D., Computer Science
Role: member — Date: May 2019
Title: Image Geolocalization with Deep Learning

24. Jinping Zhuge — Degree: Ph.D., Math
Role: outside examiner — Date: May 2019
Title: Boundary layers in periodic homogenization

25. Ryan Zembrodt — Degree: MS, Computer Science
Role: member — Date: May 2019
Title: Open-World Story Generation with Sequence-to-Sequence and Hierarchical Recurrent Encoder-Decoder Models

26. Jonathan Dingess — Degree: MS, Computer Science
Role: member — Date: May 2019
Title: Epsilon-Superposition and Truncation Dimension in Average and Probabilistic Settings for Infinite-Variate Linear Problems

27. Genghis Goodman — Degree: MS, Computer Science
Role: member — Date: Jul 2019
Title: A Machine Learning Approach to Artificial Floorplan Generation

28. Xinxin Zuo — Degree: Ph.D., Computer Science
Role: member — Date: Oct 2019
Title: Depth Enhancement and Surface Reconstruction with RGB-D sequence

29. Sifei Han — Degree: Ph.D., Computer Science
Role: member — Date: Dec 2019
Title: Text Mining Methods for Analyzing Online Health Information and Communication

30. Shivangi Srivastava (Wageningen University, Netherlands) — Degree: Ph.D., Computer Science
Role: member — Date: Feb 2020
Title: Mapping of urban landuse and landcover with multiple sensors: joining close and remote sensing with deep learning

31. Raian Maretto (National Institute for Space Research) — Degree: Ph.D., Geoinformation Science
Role: member — Date: Feb 2020
Title: Deep Learning techniques applied to classification of Remote Sensing Images

32. Kyle Helfrich — Degree: Ph.D., Math
Role: member — Date: Apr 2020
Title: Orthogonal Recurrent Neural Networks and Batch Normalization in Deep Neural Networks

33. Subash Khanal — Degree: MS, Electrical Engineering
Role: member — Date: May 2020
Title: Mispronunciation Detection and Diagnosis in Mandarin Accented English Speech

34. Narjes Bozorg — Degree: Ph.D., Electrical Engineering
Role: member — Date: Nov 2020
Title: Articulatory-Wavenet: Deep Autoregressive Model for Acoustic-to-Articulatory Inversion

35. Céline Portenier (University of Bern) — Degree: Ph.D., Computer Science
Role: external referee — Date: May 2021
Title: High-resolution snow cover retrieval using public webcams

36. Ahmed Nassar (IRISA, Université Bretagne Sud, Vannes) — Degree: Ph.D., Computer Science
Role: external referee — Date: May 2021
Title: Learning to map street-side objects using multiple views

37. Alireza Shirvani — Degree: Ph.D., Computer Science
Role: member — Date: Aug 2021
Title: Personality and Emotion for Virtual Characters in Strong-story Narrative Planning

38. Sajad Javadinasab Hormozabad — Degree: Ph.D., Civil Engineering
Role: member — Date: Nov 2021
Title: Artificial Intelligence and Soft Computing in Smart Structural Systems

39. Chengxi Li — Degree: Ph.D., Computer Science
Role: member — Date: Mar 2022
Title: Supporting Stylized Language Models using Multi-Modality Features

40. Tarannum Shaila Zaman — Degree: Ph.D., Computer Science
Role: member — Date: Apr 2022
Title: An Automated Framework to Debug System-Level Concurrency Failures

41. David Adeniji — Degree: Ph.D., Mechanical Engineering
Role: member — Date: Apr 2022
Title: Establishing a Digital Process Twin for Aerospace Alloy Machining using In-situ Process Characterization and Physics Embedded Machine Learning Models

42. Eike Jens Hoffmann (Technical University of Munich) — Degree: Ph.D., Data Science in Earth Observation
Role: reviewer — Date: Oct 2022
Title: Predicting Building Functions on Large Scale by Fusing Social Media and Remote Sensing Data

43. Arnab Sarkar — Degree: Ph.D., Physics
Role: member — Date: Aug 2022
Title: Understanding the Physics of Galaxy Clusters Out to their Virial Radii and Beyond

44. Md Sultan Al Nahian — Degree: Ph.D., Computer Science
Role: member — Date: in progress
Title: Value Aligned AI Agent with Explainability

45. Sidrah Liaqat — Degree: Ph.D., Electrical Engineering
Role: member — Date: in progress
Title: Model-based Deep Learning Techniques for Detecting Behaviors Related to Autism Spectrum Disorder from Video

46. Stephen Parsons — Degree: Ph.D., Computer Science
Role: member — Date: in progress
Title: TBD

47. Minoo Hosseinzadeh — Degree: Ph.D., Computer Science
Role: member — Date: in progress
Title: TBD

48. Ashutosh Timilsina — Degree: Ph.D., Computer Science
Role: member — Date: in progress
Title: TBD

49. Sheng-Chieh Lin — Degree: Ph.D., Physics
Role: member — Date: in progress
Title: TBD

50. Seth Parker — Degree: Ph.D., Computer Science
    Role: member — Date: in progress
    Title: TBD

51. Yuan Liu — Degree: MS, Computer Science
    Role: member — Date: in progress
    Title: Skeleton-Based Analysis of Melt Networks

52. Aiden McIlraith — Degree: MS, Computer Science
    Role: member — Date: in progress
    Title: Spatial Transcriptome Visualizer

53. Zihao Zou — Degree: MS, Computer Science
    Role: member — Date: in progress
    Title: Deep Model-Based Architectures using Explicit Regularizers for Computational Imaging

54. Zhou Chu — Degree: MS, Computer Science
    Role: member — Date: Adapting at time series machine learning models to a real informatics pipe
    Title: TBD