

# Nathan Jacobs

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Dept. of Computer Science  
University of Kentucky  
Lexington, KY, 40506  
(859) 257-5254

[jacobs@cs.uky.edu](mailto:jacobs@cs.uky.edu)  
<http://jacobsn.github.io/>  
<http://mvrl.cs.uky.edu/>  
0000-0002-4242-8967 (ORCID)

## Areas of Expertise

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

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## 1 Education

|           |   |                                    |
|-----------|---|------------------------------------|
| 2005–2010 | Ph.D. in Computer Science<br>Adviser: Robert Pless<br>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)<br><i>Summa Cum Laude</i> with Honors                                     | University of Missouri             |

## Appointments and Affiliations

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| <b>Professor</b><br>2021–present                                   | Dept. of Computer Science, University of Kentucky<br><i>Lexington, KY</i>            |
| <b>Director of Graduate Studies (Data Science)</b><br>2020–present | Dept. of Computer Science, University of Kentucky<br><i>Lexington, KY</i>            |
| <b>Owner</b><br>2019–present                                       | Multidomain Vision Research, LLC<br><i>Lexington, KY</i>                             |
| <b>Member</b><br>2017–present                                      | Institute for Biomedical Informatics, University of Kentucky<br><i>Lexington, KY</i> |

|  |   |
|--|---|
| <b>Affiliated Faculty</b><br>2013–present                    | Unmanned Systems Research Consortium, University of Kentucky<br><i>Lexington, KY</i>              |
| <b>Associate Professor</b><br>2016–2021                      | Dept. of Computer Science, University of Kentucky<br><i>Lexington, KY</i>                         |
| <b>co-Department Chair (interim)</b><br>2019–2020            | Dept. of Computer Science, University of Kentucky<br><i>Lexington, KY</i>                         |
| <b>Affiliated Faculty</b><br>2010–2019                       | Center for Visualization and Virtual Environments, University of Kentucky<br><i>Lexington, KY</i> |
| <b>Visiting Research Scientist</b><br>2017–2018 (sabbatical) | Orbital Insight, Inc.<br><i>Mountain View, CA</i>   |
| <b>Assistant Professor</b><br>2010–2016                      | Dept. of Computer Science, University of Kentucky<br><i>Lexington, KY</i>                         |
| <b>Computer Vision Research Intern</b><br>2008 (May–Aug)     | ObjectVideo, Inc.<br><i>Reston, VA</i>  |
| <b>Graduate Research Assistant</b><br>2005–2010              | Dept. of Computer Science & Engineering, Washington University<br><i>St. Louis, MO</i>            |

## 2 Awards

- 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]

## 3 Publications

### Journal Articles

- [1] 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](https://doi.org/10.1109/MGRS.2020.3043504).
- [2] G. Liang, C. Greenwell, Y. Zhang, *et al.*, “Contrastive cross-modal pre-training: A general strategy for small sample medical imaging,” *IEEE Journal of Biomedical and Health Informatics*, 2021, Impact factor: 5.223. DOI: [10.1109/JBHI.2021.3110805](https://doi.org/10.1109/JBHI.2021.3110805).

- [3] Y. Su, Y. Zhang, G. Liang, *et al.*, “A deep learning view of the census of galaxy clusters in IllustrisTNG,” *Monthly Notices of the Royal Astronomical Society (MNRAS)*, 2020, Impact factor: 5.356. DOI: [10.1093/mnras/staa2690](https://doi.org/10.1093/mnras/staa2690).
- [4] T. C. Hammond, X. Xing, C. Wang, *et al.*, “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](https://doi.org/10.1038/s42003-020-1079-x).
- [5] 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](https://doi.org/10.1016/j.jhydrol.2020.125049).
- [6] 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*, 2020, Impact factor: 3.785. DOI: [10.1016/j.jacr.2020.01.006](https://doi.org/10.1016/j.jacr.2020.01.006).
- [7] 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](https://doi.org/10.1109/LGRS.2020.2986407).
- [8] 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, 2019, Impact factor: 6.946, ISSN: 0924-2716. DOI: [10.1016/j.isprsjprs.2019.10.011](https://doi.org/10.1016/j.isprsjprs.2019.10.011).
- [9] R. P. Mihail, G. Liang, and N. Jacobs, “Automatic hand skeletal shape estimation from radiographs,” *IEEE Transactions on NanoBioscience*, 2019, Impact factor: 1.927. DOI: [10.1109/TNB.2019.2911026](https://doi.org/10.1109/TNB.2019.2911026).
- [10] 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](https://doi.org/10.1016/j.image.2019.03.003).
- [11] X. Zhang, Y. Zhang, E. Han, *et al.*, “Classification of whole mammogram and tomosynthesis images using deep convolutional neural networks,” *IEEE Transactions on NanoBioscience*, 2018, Impact factor: 1.927. DOI: [10.1109/TNB.2018.2845103](https://doi.org/10.1109/TNB.2018.2845103).
- [12] 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](https://doi.org/10.1016/j.image.2016.07.008).
- [13] 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](https://doi.org/10.1016/j.imavis.2016.05.013).
- [14] 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](https://doi.org/10.1186/s13640-015-0070-9).
- [15] 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](https://doi.org/10.1016/j.cviu.2014.10.002).
- [16] 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, 2013, Impact factor: 5.694, ISSN: 0162-8828. DOI: [10.1109/TPAMI.2013.55](https://doi.org/10.1109/TPAMI.2013.55).
- [17] 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, 2008, Impact factor: 2.615. DOI: [10.1109/TCSVT.2008.928215](https://doi.org/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: [10.1007/978-3-319-05833-7\\_9](https://doi.org/10.1007/978-3-319-05833-7_9).

## Refereed Conference Papers

- [1] 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.
- [2] Y. Zhang, G. Liang, and N. Jacobs, “Dynamic feature alignment for semi-supervised domain adaptation,” in *British Machine Vision Conference (BMVC)*, Nov. 2021.
- [3] G. Liang, X. Xing, L. Liu, *et al.*, “2D convolutional neural networks for Alzheimer’s disease MRI classification,” in *International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Oct. 2021.
- [4] 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.
- [5] 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](https://doi.org/10.1109/IGARSS47720.2021.9554405).
- [6] 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](https://doi.org/10.1109/IGARSS47720.2021.9553605).
- [7] 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](https://doi.org/10.1109/ICPR48806.2021.9412498).
- [8] M. U. Rafique, H. Blanton, N. Snively, and N. Jacobs, “Generative Appearance Flow: A hybrid approach for outdoor view synthesis,” in *British Machine Vision Conference (BMVC)*, Sep. 2020.
- [9] G. Liang, Y. Zhang, X. Wang, and N. Jacobs, “Improved trainable calibration method for neural networks,” in *British Machine Vision Conference (BMVC)*, Sep. 2020.
- [10] A. Hadzic, G. Christie, J. Freeman, *et al.*, “Estimating displaced populations from overhead,” in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Sep. 2020. DOI: [10.1109/IGARSS39084.2020.9324617](https://doi.org/10.1109/IGARSS39084.2020.9324617).
- [11] 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](https://doi.org/10.1109/IGARSS39084.2020.9323759).
- [12] 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](https://doi.org/10.1109/IGARSS39084.2020.9323522).

- [13] 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](https://doi.org/10.1109/EMBC44109.2020.9176617).
- [14] 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](https://doi.org/10.1109/CVPR42600.2020.01245).
- [15] 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](https://doi.org/10.1109/CVPR42600.2020.01233).
- [16] 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](https://doi.org/10.1109/BIBM47256.2019.8983097).
- [17] G. Liang, X. Wang, Y. Zhang, *et al.*, “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](https://doi.org/10.1109/BIBM47256.2019.8983048).
- [18] 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](https://doi.org/10.1109/IGARSS.2019.8900646).
- [19] 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](https://doi.org/10.1109/IGARSS.2019.8900286).
- [20] 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](https://doi.org/10.1109/IGARSS.2019.8898812).
- [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](https://doi.org/10.1109/ICHI.2019.8904763).
- [22] 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](https://doi.org/10.1109/WACV.2019.00172).
- [23] 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](https://doi.org/10.1109/BIBM.2018.8621196).
- [24] 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](https://doi.org/10.1145/3274895.3274934).
- [25] S. Schuster, 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](https://doi.org/10.1007/978-3-030-01267-0_48).
- [26] 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.
- [27] W. Song, S. Workman, A. Hadzic, *et al.*, “FARSA: Fully automated roadway safety assessment,” in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, 2018. DOI: [10.1109/WACV.2018.00063](https://doi.org/10.1109/WACV.2018.00063).
- [28] 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](https://doi.org/10.1109/IGARSS.2018.8519251).

- [29] 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](https://doi.org/10.1109/IGARSS.2018.8517977).
- [30] D. Jones, J. Bopaiah, F. Alghamedy, *et al.*, "Polypharmacology within the full kinome: A machine learning approach," in *AMIA Informatics Summit*, 2018.
- [31] X. Zhang, Y. Zhang, E. Han, *et al.*, "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](https://doi.org/10.1109/BIBM.2017.8217738).
- [32] 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](https://doi.org/10.1109/ICCV.2017.293).
- [33] 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](https://doi.org/10.1109/ICCV.2017.596).
- [34] 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](https://doi.org/10.1109/ICCV.2017.286).
- [35] 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](https://doi.org/10.1109/CVPR.2017.440).
- [36] 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](https://doi.org/10.1145/2996913.2996997).
- [37] S. Workman, M. Zhai, and N. Jacobs, "Horizon lines in the wild," in *British Machine Vision Conference (BMVC)*, Acceptance rate: 39.4%, 2016.
- [38] 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](https://doi.org/10.1109/ICIP.2016.7532905).
- [39] 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](https://doi.org/10.1109/ICIP.2016.7533189).
- [40] 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](https://doi.org/10.1109/CVPR.2016.610).
- [41] 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](https://doi.org/10.1109/WACV.2016.7477678).
- [42] 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](https://doi.org/10.1109/WACV.2016.7477713).
- [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](https://doi.org/10.1109/WACV.2016.7477637).
- [44] 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](https://doi.org/10.1109/ICCV.2015.451).
- [45] 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](https://doi.org/10.1109/ICCV.2015.85).



- [46] 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](https://doi.org/10.1109/ICIP.2015.7351024).
- [47] 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](https://doi.org/10.1109/ICIP.2015.7351072).
- [48] 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](https://doi.org/10.1007/978-3-319-10602-1_53).
- [49] 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](https://doi.org/10.1109/ICIP.2014.7025362).
- [50] 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](https://doi.org/10.1109/AIM.2014.6878242).
- [51] 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](https://doi.org/10.1109/ICPR.2014.284).
- [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](https://doi.org/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](https://doi.org/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](https://doi.org/10.1109/WACV.2014.6836070).
- [55] 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](https://doi.org/10.1109/ICDSC.2013.6778227).
- [56] 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](https://doi.org/10.1145/2538862.2538898).
- [57] 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](https://doi.org/10.1109/CVPR.2013.177).
- [58] 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](https://doi.org/10.1109/CVPR.2011.5995703).
- [59] 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](https://doi.org/10.1145/1823854.1823867).
- [60] 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](https://doi.org/10.1109/CVPR.2010.5540093).

- [61] 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](https://doi.org/10.1109/ICASSP.2010.5495053).
- [62] N. Jacobs, W. Burgin, N. Fridrich, *et al.*, “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](https://doi.org/10.1145/1653771.1653789).
- [63] 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](https://doi.org/10.1109/ICDSC.2009.5289383).
- [64] 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](https://doi.org/10.1109/ICCV.2007.4408995).
- [65] 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](https://doi.org/10.1109/CVPR.2007.383258).
- [66] 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](https://doi.org/10.1007/3-540-36227-4_52).
- [67] 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](https://doi.org/10.1007/3-540-36227-4_52).

## Workshop Papers

- [1] 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](https://doi.org/10.1109/CVPRW53098.2021.00087).
- [2] X. Xing, G. Liang, H. Blanton, *et al.*, “Dynamic image for 3d MRI image Alzheimer’s disease classification,” in *ECCV Workshop on BioImage Computing (BIC)*, (oral), 2020.
- [3] 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.
- [4] 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](https://doi.org/10.1109/CVPRW50498.2020.00112).
- [5] 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.
- [6] 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](https://doi.org/10.1109/CVPRW.2019.00189).
- [7] 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](https://doi.org/10.1109/CVPRW.2015.7301385).
- [8] 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](https://doi.org/10.1145/2676440.2676443).



- [9] 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.
- [10] 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](https://doi.org/10.1109/WACV.2013.6475021).
- [11] 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.
- [12] 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](https://doi.org/10.1109/WACV.2012.6163032).
- [13] 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](https://doi.org/10.1109/WACV.2011.5711494).
- [14] 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](https://doi.org/10.1109/AIPR.2009.5466314).
- [15] R. Pless, N. Jacobs, M. Dixon, *et al.*, “Persistence and Tracking: Putting vehicles and trajectories in context,” in *IEEE Applied Imagery and Pattern Recognition (AIPR)*, 2009. DOI: [10.1109/AIPR.2009.5466307](https://doi.org/10.1109/AIPR.2009.5466307).
- [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](https://doi.org/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](https://doi.org/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](https://doi.org/10.1109/CVPRW.2009.5204185).
- [19] 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](https://doi.org/10.1109/WMVC.2008.4544061).
- [20] 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](https://doi.org/10.1109/WACV.2008.4544040).
- [21] 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](https://doi.org/10.1109/WMVC.2007.35).
- [22] —, “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](https://doi.org/10.1145/1178782.1178805).
- [23] 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](https://doi.org/10.1109/CVPRW.2006.82).

## Abstracts

- [1] G. Liang, Y. Su, S.-C. Lin, Y. Zhang, Y. Zhang, and N. Jacobs, “Optical wavelength guided self-supervised featurelearning 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.

- [2] 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.
- [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/AIPR.2019.9174570](https://doi.org/10.1109/AIPR.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] 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.
- [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] J. Zhu, A. M. Nolte, N. Jacobs, and M. Ye, “Incorporating machine learning with LiDAR for delineating sink-holes,” in *Kentucky Water Resources Annual Symposium*, 2019.
- [9] 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.
- [10] 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.
- [11] 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.
- [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](https://doi.org/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] 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.
- [17] 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.
- [18] P. Wang, S. Bhattacharyya, D. White, and N. Jacobs, “Visualization of Kentucky Lake,” in *Kentucky EPSCoR Conference*, 2011.
- [19] T. Milliman, K. Hufkins, I. Lavine, *et al.*, “The PhenoCam Website: Adventures in “crowd-sourcing” data collection, distribution and analysis,” in *American Geophysical Union Annual Meeting*, 2011.

## Technical Reports

- [1] R. Padilha, T. Salem, S. Workman, F. A. Andaló, A. Rocha, and N. Jacobs, “Content-based detection of temporal metadata manipulation,” *arXiv*, vol. preprint 2103.04736 [cs.CV], 2021.

- [2] 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.
- [3] 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] 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>.
- [2] 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>.
- [3] 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>.
- [4] T. Salem, S. Workman, M. Zhai, and N. Jacobs, *Face2Year: A large number of images extracted from highschool yearbooks*, <https://mvrl.github.io/Face2Year>.
- [5] 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>.
- [6] A. Abrams, J. Tucek, J. Little, N. Jacobs, and R. Pless, *LOST: Longterm observation of scenes (with tracks)*, <http://mvrl.github.io/LOST>.
- [7] 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>.
- [8] S. Workman and N. Jacobs, *Cross-View ScenicOrNot (CVSoN)*, <https://mvrl.github.io/CVSoN>.
- [9] T. Salem, S. Workman, M. Zhai, and N. Jacobs, *Cross-View Time (CVT)*, <https://mvrl.github.io/CVT>.
- [10] M. T. Islam, C. Greenwell, and N. Jacobs, *GeoFaces: A large database of geolocated face patches*, <http://mvrl.github.io/GeoFaces>.

## 4 Funding

### Grants (awarded/active)

1. *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)
2. *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
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. *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: 2021–2024

5. *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: 2021–2026

6. *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

7. *GeoSearch: Image-based Geolocation using Rank Aggregated Hash Index (Phase 2, direct)*

PI: **Nathan Jacobs**

Sponsor: Intelligent Automation Inc. / National Geospatial-Intelligence Agency (NGA)

Total Award: \$250,000

Duration: 2021–2023

8. *Spatio-Temporal Association and Curve Kernel Networks (STACKNet)*

PI: **Nathan Jacobs**

Sponsor: \$483,000 (Phase 1 and 2)

Total Award: Intelligent Automation Inc.

Duration: 2020–2023

9. *ToFENet: Topographic Feature Extraction Network*

PI: **Nathan Jacobs**

Sponsor: Intelligent Automation Inc. / National Geospatial-Intelligence Agency (NGA)

Total Award: \$19,944 (Phase 1), \$249,988 (Phase 2), \$153,261 (Phase 3, Year 1)

Duration: 2018–2022

10. *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

## Grants (completed)

1. *CAREER: Learning and Using Models of Geo-Temporal Appearance*

PI: **Nathan Jacobs**

Sponsor: National Science Foundation (NSF)

Total Award: \$499,426

Duration: 2016–2021

2. *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

3. *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

4. *DLALA: Deep Learning for Airborne LiDAR Analysis*

PI: **Nathan Jacobs**

Sponsor: Orbital Insight

Total Award: \$104,927

Duration: 2019–2020

5. *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

6. *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

7. *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

8. *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

9. *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

10. *NIP: GeoLookbook: Modeling Worldwide Human Visual Appearance*

PI: **Nathan Jacobs**

Sponsor: National Geospatial-Intelligence Agency (NGA)

Total Award: \$299,204

Duration: 2014–2018

11. *Crossview ConvNets for Near/Remote Sensing*

PI: **Nathan Jacobs**

Sponsor: Google

Total Award: \$46,209

Duration: 2016–2017

12. *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

13. *CSSG: ContextualEyes: A Context-Aware Surveillance System*

PI: **Nathan Jacobs**

Sponsor: Defense Advanced Research Projects Agency (DARPA)

Total Award: \$743,131

Duration: 2011–2015

14. *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, Mirosław Truszczyński, 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

## Proposals (under review)

This list does not include letters of intent, pre-proposals, or proposals where I was listed as Senior Personnel.

1. *AIM AHEAD Coordinating Center*

PI: Hana Khamfroush

Co-PI(s)/Co-I(s): Sam Heshmati, **Nathan Jacobs**

Sponsor: National Institutes of Health (NIH)

Total Award: \$500,000

Submission Year: 2021

2. *Clinical Translation of an Artificial Intelligence (AI) System for Breast Cancer Screening: Multicenter Retrospective and Prospective Application Studies*

PI: **Nathan Jacobs**

Sponsor: Dept. of the Army (USAMRAA)

Total Award: \$643,325

Submission Year: 2021

3. *Vehicles Identification and Traffic camera Localization (VITAL)*

PI: **Nathan Jacobs**

Sponsor: Intelligent Automation Inc. / National Geospatial-Intelligence Agency (NGA)

Total Award: \$25,000

Submission Year: 2020

4. *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: \$1,510,308

Submission Year: 2020

## Proposals (not funded)

This list does not include letters of intent, pre-proposals, or proposals where I was listed as Senior Personnel.

1. *Clinical Translation of an Artificial Intelligence (AI) System for Breast Cancer Screening: Multicenter Retrospective and Prospective Application Studies*

PI: **Nathan Jacobs**

Sponsor: Dept. of the Army (USAMRAA)

Total Award: \$643,412

Submission Year: 2020

2. *R01: Ketogenic diet for reducing Alzheimer's disease risk in an APOE4 mouse model via gut-brain axis*

PI: Ai-Ling Lin

Co-PI(s)/Co-I(s): Arnold Stromberg, Josh Morganti, **Nathan Jacobs**, Anika Hartz  
Sponsor: National Institutes of Health (NIH)  
Total Award: \$3,481,533  
Submission Year: 2020

3. *Algorithm Performance Evaluation with Low Sample Size*

PI: **Nathan Jacobs**  
Sponsor: Intelligent Automation Inc. / National Geospatial-Intelligence Agency (NGA)  
Total Award: \$30,000  
Submission Year: 2020

4. *GeoRank*

PI: **Nathan Jacobs**  
Sponsor: Intelligent Automation Inc. / National Geospatial-Intelligence Agency (NGA)  
Total Award: \$40,000 (awarded but failed during contract negotiations)  
Submission Year: 2020

5. *Machine and Deep Learning Methods to Identify Potential Targets for Alzheimer's Disease Therapeutics Alternative to Amyloid Hypothesis*

PI: Ai-Ling Lin  
Co-PI(s)/Co-I(s): **Nathan Jacobs**  
Sponsor: National Institutes of Health (NIH)  
Total Award: \$420,750  
Submission Year: 2020

6. *NRT: Intelligent Sensing for Data-Driven Understanding of Complex Systems*

PI: Michael Renfro  
Co-PI(s)/Co-I(s): Suzanne Smith, Michael Sama, Shannon Sampson, Sean Bailey, Marcelo Guzman, Jesse Hoagg, **Nathan Jacobs**, Jian Yang, Christoph Brehm  
Sponsor: National Science Foundation (NSF)  
Total Award: \$1,510,803  
Submission Year: 2020

7. *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  
Submission Year: 2020

8. *Ex vivo single molecule tools to analyze membrane receptor dynamics*

PI: Christopher Richards  
Co-PI(s)/Co-I(s): Jim Pauly, David Heidary, **Nathan Jacobs**  
Sponsor: National Institutes of Health (NIH)  
Total Award: \$1,891,300  
Submission Year: 2019 (Oct)

9. *Assessing molecular and cellular level structural changes in the adolescent brain due to nicotine consumption*

PI: Christopher Richards  
Co-PI(s)/Co-I(s): Jim Pauly, **Nathan Jacobs**  
Sponsor: National Institutes of Health (NIH)  
Total Award: \$2,147,884  
Submission Year: 2019 (Oct)

10. *NSF Engineering Research Center for Precision Meteorology (CPM)*  
PI: Suzanne Smith  
Co-PI(s)/Co-I(s): Michael Sama, Tyler Mark, Sean Bailey, Marcelo Guzman, Jesse Hoagg, **Nathan Jacobs**, Michael Renfro, Simone Silvestri, Hasan Poonawala  
Sponsor: National Science Foundation (NSF)  
Total Award: \$2,147,884  
Submission Year: 2019
11. *Assessing molecular and cellular level structural changes in the adolescent brain due to nicotine consumption*  
PI: Christopher Richards  
Co-PI(s)/Co-I(s): Jim Pauly, **Nathan Jacobs**  
Sponsor: National Institutes of Health (NIH)  
Total Award: \$2,456,763  
Submission Year: 2019 (Feb)
12. *Development of a single molecule methods to monitor changes in protein dimerization in animals*  
PI: Christopher Richards  
Co-PI(s)/Co-I(s): Phoebe Glazer, David Heidary, **Nathan Jacobs**  
Sponsor: National Institutes of Health (NIH)  
Total Award: \$1,886,000  
Submission Year: 2019 (Feb)
13. *Rail Crossing Risk Assessment*  
PI: Reginald Souleyrette  
Co-PI(s)/Co-I(s): **Nathan Jacobs**  
Sponsor: University of Tennessee / Federal Railroad Administration  
Total Award: \$380,230  
Submission Year: 2019
14. *Transfer Learning and Deep Transfer Learning for Military Applications*  
PI: **Nathan Jacobs**  
Sponsor: DZYNE Technologies / Air Force  
Total Award: \$45,000  
Submission Year: 2019
15. *AVA-3D: Accurate Video Alignment for 3D Modeling*  
PI: **Nathan Jacobs**  
Sponsor: Intelligent Automation Inc. / Army  
Total Award: \$40,000  
Submission Year: 2019
16. *Long-term Patterns of Life from Sporadic Observations*  
PI: **Nathan Jacobs**  
Sponsor: Intelligent Automation Inc. / National Geospatial-Intelligence Agency (NGA)  
Total Award: \$20,000  
Submission Year: 2019
17. *Rail Crossing Risk Assessment*  
PI: Reginald Souleyrette  
Co-PI(s)/Co-I(s): **Nathan Jacobs**  
Sponsor: University of Tennessee / Federal Railroad Administration  
Total Award: \$240,031  
Submission Year: 2018

18. *A Multimodal Deep Learning Framework to Reduce Callbacks of Screening Mammography*  
PI: Jennifer Wang  
Co-PI(s)/Co-I(s): **Nathan Jacobs**  
Sponsor: Department of Defense  
Total Award: \$550,261  
Submission Year: 2018
19. *Motion Compensation for Background Estimation from On-The-Move Ground Platforms*  
PI: **Nathan Jacobs**  
Sponsor: Intelligent Automation Inc. / Army  
Total Award: \$30,000  
Submission Year: 2018
20. *Contour Based Image Segmentation*  
PI: **Nathan Jacobs**  
Sponsor: Novateur Research Solutions / Air Force  
Total Award: \$49,869  
Submission Year: 2018
21. *Evaluating the performance of automated LiDAR-based tree detection methods across different forest conditions in Kentucky*  
PI: Marco Contreras  
Co-PI(s)/Co-I(s): **Nathan Jacobs**  
Sponsor: Kentucky Science and Engineering Foundation  
Total Award: \$150,000  
Submission Year: 2018
22. *Geospatial Cloud Analytics TA-2 Proposal*  
PI: **Nathan Jacobs**  
Sponsor: Orbital Insight / Defense Advanced Research Projects Agency (DARPA)  
Total Award: \$347,840  
Submission Year: 2017
23. *Cloud Analytics of Geospatial Imagery (CAGI)*  
PI: **Nathan Jacobs**  
Sponsor: Dzyne Technologies / Defense Advanced Research Projects Agency (DARPA)  
Total Award: \$353,341 (awarded but failed during contract negotiations)  
Submission Year: 2017
24. *Global Video Analysis Network*  
PI: **Nathan Jacobs**  
Co-PI(s)/Co-I(s): James Griffioen, Cody Bumgardner  
Sponsor: NSF  
Total Award: \$999,975  
Submission Year: 2016
25. *NURI: Semantic Segmentation for Improved 3D Scene Generation*  
PI: **Nathan Jacobs**  
Sponsor: Lockheed Martin / Intelligence Advanced Research Projects Activity (IARPA)  
Total Award: \$1,004,562  
Submission Year: 2016
26. *Automatic Joint Verification of Calibration, Motion, and Lighting*  
PI: **Nathan Jacobs**

Sponsor: Washington University in St. Louis / Defense Advanced Research Projects Agency (DARPA)  
Total Award: \$447,828  
Submission Year: 2015

27. *Remote Non-contact Multispectral Imaging for Monitoring of Respiration and End Tidal Carbon Dioxide*  
PI: Abhijit Patwardhan  
Co-PI(s)/Co-I(s): **Nathan Jacobs**, Dong-Sheng Yang  
Sponsor: National Institutes of Health (NIH)  
Total Award: \$363,249  
Submission Year: 2015

28. *US Ignite: Track 1: PERSDN: A Personalized Emergency Response Software Defined Network*  
PI: Jim Griffioen  
Co-PI(s)/Co-I(s): **Nathan Jacobs**, Jeannette Sutton  
Sponsor: National Science Foundation (NSF)  
Total Award: \$599,110  
Submission Year: 2015

29. *Recognizing Objects from the Air*  
PI: **Nathan Jacobs**  
Sponsor: National Geospatial-Intelligence Agency (NGA)  
Total Award: \$745,819  
Submission Year: 2015

30. *Firebrands and Fire Whirls in Large-Scale Wildland Fires*  
PI: James M McDonough  
Co-PI(s)/Co-I(s): **Nathan Jacobs**, Kozo Saito, Sean Bailey, Jian Yang  
Sponsor: National Science Foundation (NSF)  
Total Award: \$1,955,823  
Submission Year: 2014

31. *CAREER: Geo-Temporal Understanding of Outdoor Images and Video*  
PI: **Nathan Jacobs**  
Sponsor: National Science Foundation (NSF)  
Total Award: \$523,850  
Submission Year: 2014

32. *Toward a Geotemporal Model for Human Appearance*  
PI: **Nathan Jacobs**  
Sponsor: Intelligence Community Postdoc Program  
Total Award: \$359,463  
Submission Year: 2014

33. *Remote Non-contact Multispectral Imaging for Monitoring of Respiration and End Tidal Carbon Dioxide*  
PI: Abhijit Patwardhan  
Co-PI(s)/Co-I(s): **Nathan Jacobs**  
Sponsor: Department of Defense  
Total Award: \$259,968  
Submission Year: 2014

34. *Rad-GTPase L-type Calcium Channel Signaling in the Heart*  
PI: Jonathan Satin  
Co-PI(s)/Co-I(s): **Nathan Jacobs**, Douglas Andres, Kenneth Campbell, Moriel Vandsburger, Haining Zhu  
Sponsor: National Institutes of Health (NIH)

Total Award: \$3,338,710

Submission Year: 2014

35. *A Novel Mechanism of Post-Myocardial Infarction Cardioprotection*

PI: Jonathan Satin

Co-PI(s)/Co-I(s): **Nathan Jacobs**, Douglas Andres, Kenneth Campbell, Moriel Vandsburger, Haining Zhu

Sponsor: American Heart Association (AHA)

Total Award: \$118,045

Submission Year: 2014

36. *Novel Inotropic Support By Targeting Rad GTPase*

PI: Jonathan Satin

Co-PI(s)/Co-I(s): **Nathan Jacobs**, Douglas Andres, Kenneth Campbell, Moriel Vandsburger, Haining Zhu

Sponsor: National Institutes of Health (NIH)

Total Award: \$3,060,642

Submission Year: 2013

37. *SCH: INT: Game-based Decision Aid for Rheumatoid Arthritis Patients*

PI: Judy Goldsmith

Co-PI(s)/Co-I(s): **Nathan Jacobs**, Kristine Lohr, Zixue Tai, Melody Carswell

Sponsor: National Science Foundation (NSF)

Total Award: \$1,864,219

Submission Year: 2013

38. *CAREER: Toward a Geo-Temporal Framework for Outdoor Scene Understanding*

PI: **Nathan Jacobs**

Sponsor: National Science Foundation (NSF)

Total Award: \$499,975

Submission Year: 2012

39. *An Interactive Decision Aid for Rheumatoid Arthritis Patients*

PI: Judy Goldsmith

Co-PI(s)/Co-I(s): **Nathan Jacobs**, Malachy Bishop, Kristine Lohr, Gustav Blomquist

Sponsor: National Science Foundation (NSF)

Total Award: \$600,000

Submission Year: 2012

40. *Geo-Temporal Context for Outdoor Scene Understanding*

PI: **Nathan Jacobs**

Co-PI(s)/Co-I(s): National Science Foundation (NSF)

Sponsor: \$341,563

Total Award: 2010

Submission Year:

## 5 Talks

- “Learning Geo-Temporal Scene Models from Webcams, Cell Phones, and Satellites” (Keynote), Oct 2021, International Workshop on Distributed Smart Cameras, an ICCV Workshop (virtual)
- “Mapping the Visual World Using Webcams, Cell Phones, and Satellites”, Dec 2020, University of Campinas, Unicamp, Brazil (virtual)
- “Exploring the Intersection of Localization, Mapping, and Image Understanding” (Keynote), Aug 2020, ECCV Workshop on Long-Term Visual Localization (virtual)



- “Deep Convolutional Neural Networks: Foundations to Frontiers (a 2-day short course)”, Mar 2020, Brazilian Space Agency (INPE), Sao Jose dos Campos, Brazil
- “What, Where, and When: Mapping the World Using Webcams, Cell Phones, and Satellites”, Mar 2020, Brazilian Space Agency (INPE), Sao Jose dos Campos, Brazil
- “Learning to Map Visual Appearance”, Feb 2020, Keeping Current Seminar, University of Kentucky (Computer Science), Lexington, KY
- “Learning to Map Visual Appearance”, Jan 2020, Wageningen University, Netherlands
- “What, Where, and When: Mapping the World Using Webcams, Cell Phones, and Satellites”, Nov 2019, University of Kentucky (Forestry), Lexington, KY
- “Learning to Map the Visual World”, Jul 2019, Wright State University, Dayton, OH
- “Understanding Places Using Ground-Level and Overhead Views” (Keynote), May 2019, Kentucky Geological Society (Annual Symposium), Lexington, KY
- “Understanding Places Using Ground-Level and Overhead Views”, Feb 2019, Notre Dame University, South Bend, IN
- “A Generative Model of Worldwide Facial Appearance” (Keynote), Jan 2019, Workshop on Demographic Variations in Performance of Biometric Algorithms, Waikoloa Village, HI
- “A Generative Model of Worldwide Facial Appearance”, Jan 2019, IEEE Winter Conference on Applications of Computer Vision, Waikoloa Village, HI
- “A Weakly Supervised Approach for Estimating Spatial Density Functions from High-Resolution Satellite Imagery”, Nov 2018, ACM SIGSPATIAL, Seattle, WA
- “Understanding Places Using Ground-Level and Overhead Views”, Oct 2018, Commonwealth Computational Summit, Lexington, KY
- “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 4)”, Sep 2018, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
- “Understanding Places Using Ground-Level and Overhead Views”, Aug 2018, Oak Ridge National Lab, Oak Ridge, TN
- “WhatGoesWhere: Predicting Object Distributions from Above”, Jul 2018, IGARSS, Valencia, Spain
- “Building World Models for Situated Training and Planning”, May 2018, Air Force Science and Technology 2030 Workshop, Bloomington, IN
- “Recent Advances in Image Understanding”, May 2018, DASC, Lexington, KY
- “(Tutorial) Recent Advances in Deep Learning: Fusing Overhead and Ground-Level Views for Remote Sensing”, April 2018, USGIF Annual Symposium, Tampa, FL
- “Understanding Places Using Ground-Level and Overhead Views”, Feb 2018, CVPR Area Chair Meeting, Toronto, Canada
- “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 3)”, Sep 2017, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
- “GPU Accelerated Computer Vision, Remote Sensing, and Machine Learning”, Aug 2017, Kentucky Geological Service, Lexington, KY

- “Fusing Overhead and Ground-Level Imagery to Improve Scene Understanding”, Jul 2017, Planet, San Francisco, CA
- “Learning about When and Where from Imagery”, Jun 2017, Orbital Insight, Mountain View, CA
- “(Tutorial) Recent Advances in Deep Learning: Fusing Overhead and Ground-Level Views for Remote Sensing”, Jun 2017, USGIF Annual Symposium, San Antonio, TX
- “How Computers See People (extended)”, May 2017, CCTS Biomedical Informatics Seminar Series, Lexington, KY
- “Understanding Places Using Ground-Level and Overhead Views”, May 2017, Midwest Vision Meeting, Chicago, IL
- “How Computers See People”, Feb 2017, Suds’n’Science Speaker Series, West Sixth Brewing, Lexington, KY
- “Learning about When and Where from Imagery”, Feb 2017, University of Missouri, Department of Computer Science
- “Localization, Mapping, and Image Understanding”, Feb 2017, USGIF Machine Learning Symposium
- “Deep Convolutional Neural Networks: Concepts and Examples (in Computer Vision)”, Nov 2016, University of Kentucky, Society of Industrial and Applied Mathematics
- “Crossview Convolutional Networks”, Oct 2016, Applied Imagery and Pattern Recognition, Washington, D.C.
- “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 2)”, Sep 2016, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
- “Deep Convolutional Neural Networks: Concepts and Examples”, Jul 2016, University of Kentucky: Systems Biology and Omics Integration Seminar
- “Crossview Methods for Localization and Mapping”, Jun 2016, IEEE CVPR Workshop on “Vision from Satellite to Street” (invited talk)
- “A Fast Method for Estimating Transient Scene Properties”, Mar 2016, Winter Conference on Applications of Computer Vision, Lake Placid, NY
- “Novel Cues for Geocalibration”, Feb 2016, Indiana University, Bloomington, IN
- “Novel Cues for Camera Geocalibration”, Jan 2016, Uber Advanced Technology Center, Pittsburgh, PA
- “Novel Cues for Geocalibration: Cloudy Days, Rainbows, and More”, Oct 2015, Carnegie Mellon University, Pittsburgh, PA
- “Using Geotagged Internet Imagery to Understand the World”, Sep 2015, Université Laval, Quebec City, Canada
- “face2gps: Estimating Geographic Location from Facial Features”, Sep 2015, International Conference on Image Processing, Quebec City, Canada
- “GeoLookbook: Modeling Worldwide Human Visual Appearance”, Sep 2015, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
- “Exploring the Geo-Dependence of Human Face Appearance”, Mar 2014, Winter Conference on Applications of Computer Vision, Steamboat Springs, CO
- “Estimating Cloudmaps from Outdoor Image Sequences”, Mar 2014, Winter Conference on Applications of Computer Vision, Steamboat Springs, CO

- “Scene Geometry from Several Partly Cloudy Days”, Oct 2013, International Conference on Distributed Smart Cameras, Palm Springs, CA
- “Unlocking the Potential of the Global Network of Outdoor Webcams”, Apr 2013, Rochester Institute of Technology
- “Geo-temporal Computer Vision: Applications to the NGA”, Nov 2011, National Geospatial-Intelligence Agency
- “Geo-temporal Computer Vision: Applications to the Army”, Oct 2011, Army Research Lab
- “Localizing, Calibrating, and Using Thousands of Outdoor Webcams”, Feb 2011, University of North Carolina–Charlotte
- “Using Clouds Shadows to Infer Scene Structure and Camera Calibration”, Jun 2010, CVPR, San Francisco, CA
- “Passive Vision and The Power of Collective Imaging”, Apr 2010, Object Video Inc., Reston, VA
- “Localizing, Calibrating, and Using Thousands of Outdoor Webcams”, Apr 2010, University of Kentucky
- “Time-Lapse Vision: Localizing, Calibrating, and Using Thousands Outdoor Webcams”, Apr 2010, Google, Mountain View, CA
- “Passive Vision and The Power of Collective Imaging”, Jan 2010, Google, Mountain View, CA
- “Incorporating Domain Constraints in Urban Vehicle Tracking”, Nov 2010, University of Missouri, Columbia, MO
- “Compressive Sensing and Differential Image-Motion Estimation”, Mar 2010, ICASSP, Dallas, TX
- “The Global Network of Outdoor Webcams: Properties and Applications ”, Nov 2009, ACM GIS, Seattle, WA
- “Passive Vision: The Global Webcam Imaging Network”, Oct 2009, AIPR, Washington, DC
- “Calibrating and Using the Global Network of Outdoor Webcams”, Aug 2009, ICDSC, Italy
- “Adventures in Archiving and Using Three Years of Webcam Images”, Jun 2009, CVPR Workshop on Internet Vision, Miami, FL
- “Recent Work: Webcams and Grooves”, Aug 2009, Object Video, Reston, VA
- “Location-Specific Models for Tracking”, Jan 2008, WMVC, Copper Mountain, CO
- “Using natural cues to geo-locate and geo-orient distributed cameras”, Jan 2008, VISN, Copper Mountain, CO
- “Foreground Modeling: The Shape of Things That Came”, Feb 2007, WMVC, Austin, Texas

## 6 Service

### University Service

- 2019–present: Computer Science Department: Executive Committee
- 2019–present: College of Engineering: Master Planning/Space Committee
- 2018–2019, 2020–present: College of Engineering: Research Advisory Committee
- 2020–present: College of Engineering: Graduate Studies Team

- 2013–2017, 2018–present: 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: University of Kentucky Engineering Day (oral presentation and/or software demonstration)

## Professional Service

- Area Chair:
  - IEEE Conference on Computer Vision and Pattern Recognition (CVPR) [2018, 2019, 2021, 2022]
  - IEEE Winter Conference on Applications of Computer Vision (WACV) [2014, 2022 (round 2)]
- Organizing Committees:
  - IEEE/ISPRS Workshop on Large Scale Computer Vision for Remote Sensing Imagery (EARTHVISION) [2019, 2020]
  - 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]
  - 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

## 7 Teaching and Mentoring

### Courses 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
- *Independent Work in Computer Science*, CS 395/612, University of Kentucky:
  - F2019, “Applied Deep Learning”
  - S2019, “Applied Deep Learning” (×5)
  - F2018, “Applied Deep Learning” (×5)
  - S2018, “Applied Deep Learning” (×4)
  - F2017, “Applied Deep Learning”



- F2016, “Applied Deep Learning” (×6)
- S2016, “Applied Deep Learning: Understanding Urban Areas”
- S2015, “Understanding Real-Estate Imagery”
- F2014, “Recent Techniques in Machine Learning” (×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

| Name            | Degree                                    | Research Focus                                      | Dates |
|-----------------|---|---|-------|
| Benjamin Brodie | Ph.D. Mathematics, University of Kentucky | Object Tracking, Re-Identification, Metric Learning | 2020– |

### Ph.D. Students

| Student Name                | Role                         | Thesis Title  | Date     |
|-----------------------------|------------------------------|---|----------|
| <a href="#">Paul Mihail</a> | <i>co-chair</i> w/ Goldsmith | Visualizing and Predicting the Effects of Rheumatoid Arthritis on Hands                         | May 2014 |
| Ju Shen                     | member                       | Computational Multimedia for Video Self Modeling  | May 2014 |
| Chenxi Zhang                | member                       | Depth-assisted Image Segmentation, Enhancement and Visualization                                | Dec 2014 |
| Mao Ye                      | member                       | 3D Reconstruction and Motion Analysis of Deformable Objects with Consumer Depth Cameras         | Dec 2014 |
| Yan Huang                   | member                       | Novel Computational Methods for Transcript Reconstruction and Quantification using RNA-SEQ Data | Dec 2014 |
| Shaoceng Wei                | outside examiner             | Multi-state Models for Interval Censored Data with Competing Risk                               | May 2015 |
| Bo Fu                       | member                       | Towards Intelligent Telerobotics: Visualization and Control of Remote Robot                     | May 2015 |
| Harikrishnan Unnikrishnan   | member                       | Analysis of Vocal Fold Kinematics using High Speed Video  | Dec 2015 |
| Mohammad T. Islam           | <i>chair</i>                 | Analyzing the Geo-Dependence of Human Face Appearance and Its Applications                      | Jul 2016 |
| Hasan Sajid                 | member                       | Robust Background Subtraction for Moving Cameras and their Applications in Ego-vision Systems   | Jul 2016 |
| Wesley Hough                | outside examiner             | On Independence, Matching, and Homomorphism Complexes   | May 2017 |

|  |                              |   |          |
|--|------------------------------|---|----------|
| Yajie Zhao   | member                       | 3D Human Face Reconstruction and 2D Appearance Synthesis  | Dec 2017 |
| Po-Chang Su  | member                       | Real-time Capture and Rendering of Physical Scene with an Efficiently Calibrated RGB-D Camera Network             | Dec 2017 |
| Hamid Hamraz   | <i>co-chair</i> w/ Contreras | Computational Forest Modeling using Airborne LiDAR  | Apr 2018 |
| <a href="#">Scott Workman</a>                            | <i>chair</i>                 | Leveraging Overhead Imagery for Localization, Mapping, and Understanding  | Apr 2018 |
| Anthony Rios   | member                       | Deep Neural Networks for Multi-Label Text Classification: Application to Coding Electronic Medical Records        | Jun 2018 |
| Ethan Welty (University of Colorado–Boulder)             | member                       | High-Precision Photogrammetry for Glaciology  | Jul 2018 |
| Yannick Hold-Geoffroy (Laval University, Quebec, CA)     | member                       | Learning Geometric and Lighting priors from Natural Images  | Aug 2018 |
| Nkiruka Uzuegbunam                                       | member                       | Self-Image Multimedia Technologies for Feedforward Observational Learning   | Oct 2018 |
| Menghua “Ted” Zhai                                       | <i>chair</i>                 | Deep Probabilistic Models for Camera Geo-Calibration  | Dec 2018 |
| <a href="#">Zach Bessinger</a>                           | <i>chair</i>                 | Modeling and Mapping Location-Dependent Human Appearance  | Dec 2018 |
| Nam Vo (Georgia Institute of Technology)                 | member                       | Image Geolocalization with Deep Learning  | May 2019 |
| Jinping Zhuge  | outside examiner             | Boundary layers in periodic homogenization  | May 2019 |
| Tawfiq Salem   | <i>chair</i>                 | Learning to Map the Visual and Auditory World   | Jul 2019 |
| Sifei Han  | member                       | Text Mining Methods for Analyzing Online Health Information and Communication                                     | Dec 2019 |
| Shivangi Srivastava (Wageningen University, Netherlands) | member                       | Mapping of urban landuse and landcover with multiple sensors: joining close and remote sensing with deep learning | Feb 2020 |
| Raian Maretto (National Institute for Space Research)    | member                       | Deep Learning techniques applied to classification of Remote Sensing Images                                       | Feb 2020 |
| Kyle Helfrich  | member                       | Orthogonal Recurrent Neural Networks and Batch Normalization in Deep Neural Networks                              | Apr 2020 |
| Xinxin Zuo   | member                       | Depth Enhancement and Surface Reconstruction with RGB-D sequence  | Oct 2019 |
| Narjes Bozorg  | member                       | Articulatory-Wavenet: Deep Autoregressive Model for Acoustic-to-Articulatory Inversion                            | Nov 2020 |
| <a href="#">Gongbo Liang</a>                             | <i>chair</i>                 | Clinical-Inspired Multi-Modal Deep Learning Medical Imaging Analysis  | Oct 2020 |

|   |                              |   |             |
|---|------------------------------|---|-------------|
| Céline Portenier<br>(University of Bern)                          | external referee             | High-resolution snow cover retrieval using public webcams   | May 2021    |
| Ahmed Nassar<br>(IRISA,<br>Université<br>Bretagne Sud,<br>Vannes) | external referee             | Learning to map street-side objects using multiple views  | May 2021    |
| <a href="#">Usman Rafique</a>                                     | <i>co-chair</i> w/<br>Cheung | Weakly Supervised Learning for Multi-Image Synthesis  | Jul 2021    |
| <a href="#">Hunter Blanton</a>                                    | <i>chair</i>                 | Explicit Constraints for CNN Based Absolute Pose Regression   | in progress |
| Sajad Javadinasab<br>Hormozabad                                   | member                       | Artificial Intelligence and Soft Computing in Smart Structural Systems  | in progress |
| Tarannum Shaila<br>Zaman  | member                       | Debugging Concurrent Programs   | in progress |
| Arnab Sarkar  | member                       | Machine Learning for Astro-Physics  | in progress |
| <a href="#">Connor Greenwell</a>                                  | <i>chair</i>                 | Probabilistic Cross-Domain Representation Learning  | in progress |
| <a href="#">Yu Zhang</a>  | <i>chair</i>                 | Multimodal Domain Generalization  | in progress |
| Paul Eberhart   | member                       | TBD   | in progress |
| Chengxi Li  | member                       | TBD   | in progress |
| Mohammad<br>Soleymanpour  | member                       | Parallel and non-parallel voice conversion based data augmentation for dysarthric speech applications   | in progress |
| David Adeniji   | member                       | Establishing a Digital Process Twin for Aerospace Alloy Machining using In-situ Process Characterization and Physics Embedded Machine Learning Models | in progress |
| Alireza Shirvani  | member                       | A Model of Personality and Emotion for Believable Story Characters  | in progress |
| Anastasia Kazadi  | member                       | Depth Map Processing for Accurate Face Reconstruction and Modeling  | in progress |
| Md Sultan Al<br>Nahian  | member                       | Value Aligned AI Agent with Explainability  | in progress |
| Sidrah Liaqat   | member                       | Model-based Deep Learning Techniques for Detecting Behaviors Related to Autism Spectrum Disorder from Video   | in progress |
| Xin Xing  | <i>chair</i>                 | TBD   | in progress |
| Subash Khanal   | <i>chair</i>                 | TBD   | in progress |
| Hui Lin   | member                       | TBD   | in progress |
| Chao Du   | member                       | TBD   | in progress |
| Shunnan Chen  | member                       | TBD   | in progress |
| Yong Song   | member                       | TBD   | in progress |
| Fujun Liu   | member                       | TBD   | in progress |
| Stephen Parsons   | member                       | TBD   | in progress |
| Minoo<br>Hosseinizadeh  | member                       | TBD   | in progress |
| Ashutosh<br>Timilsina   | member                       | TBD   | in progress |
| Sheng-Chieh Lin   | member                       | TBD   | in progress |
| Sairam Sri<br>Vatsavai  | member                       | TBD   | in progress |

## Masters Students

| Student Name                    | Role                         | Thesis/Project Title  | Date        |
|---------------------------------|------------------------------|---|-------------|
| Edwin Prem Kumar Sathiyamoorthy | member                       | Global Change Reactive Background Subtraction   | Mar 2011    |
| Feiyu Shi                       | <i>chair</i>                 | Principal Component Analysis For Multi-size Images  | Dec 2013    |
| Hasan Sajid                     | member                       | A Universal Background Subtraction System   | Jul 2014    |
| Ryan Baltenberger               | <i>chair</i>                 | Estimating Transient Scene Attributes Using Deep Convolutional Neural Networks  | May 2016    |
| Sean Karlage                    | member                       | Diachronic Volume Registration for Analysis of Antiquities  | May 2016    |
| Stanley Rosenbaum               | member                       | A method for presenting volume and color of 3D objects via audio for the visually impaired                                | Dec 2016    |
| DhiShankar Bhattacharya         | member                       | Analyzing Sybil Attacks and Similar Phenomena in Twitter Data   | Apr 2017    |
| Xiaofei Zhang                   | member                       | Mammogram and Tomosynthesis Classification Using Convolutional Neural Networks  | Jul 2017    |
| Qingguo Xu                      | member                       | 3D Body Tracking using Deep Learning  | May 2017    |
| William “Derek” Jones           | <i>co-chair</i> w/ Ellingson | Scalable Feature Selection and Extraction with Applications in Kinase Polypharmacology                                    | May 2018    |
| Weilian “William” Song          | <i>chair</i>                 | Image-Based Roadway Assessment using Convolutional Neural Networks  | May 2019    |
| Ryan Zembrodt                   | member                       | Open-World Story Generation with Sequence-to-Sequence and Hierarchical Recurrent Encoder-Decoder Models                   | May 2019    |
| Jonathan Dingess                | member                       | Epsilon-Superposition and Truncation Dimension in Average and Probabilistic Settings for Infinite-Variate Linear Problems | May 2019    |
| Genghis Goodman                 | member                       | A Machine Learning Approach to Artificial Floorplan Generation  | Jul 2019    |
| <a href="#">Armin Hadzic</a>    | <i>chair</i>                 | Estimating Free-Flow Speed with LiDAR and Overhead Imagery  | May 2020    |
| Subash Khanal                   | member                       | Mispronunciation Detection and Diagnosis in Mandarin Accented English Speech  | May 2020    |
| David Jones                     | <i>chair</i>                 | TBD   | in progress |

## Undergraduate Research Students

| Student Name      | Project Title   | Dates     |
|-------------------|---|-----------|
| Jim Knochelmann   | User-Tools for Aerial Image Registration  | 2011–2012 |
| Kyle Kolpek       | Aerial Image Registration   | 2012      |
| Noora Aljabi      | Using Flickr to Map Phenological Trends   | 2013      |
| J. David Smith    | User-in-the-loop Camera Calibration   | 2013–2015 |
| Angelo Stekardis  | Understanding Facial Expressions  | 2014–2015 |
| Ryan Baltenberger | Understanding Outdoor Scene Appearance  | 2012–2015 |
| Connor Greenwell  | Interactive Methods for Aerial Imagery Understanding                            | 2014–2016 |
| Sam Davidson      | Applications of Generative Adversarial Networks to Social Media Imagery         | 2016–2017 |
| Aaron Mueller     | Deep Learning for Educational Data  | 2018      |
| Weilian Song      | Applications of Deep Convolutional Neural Networks to Geometric Computer Vision | 2016–2019 |

|                     |                                   |           |
|---------------------|-----------------------------------|-----------|
| Yuhan Long          | Deep Learning for Medical Imaging | 2019      |
| Thomas Barber       | Deep Learning for Remote Sensing  | 2019      |
| Sean Grate          | Deep Learning for Point Clouds    | 2019–2020 |
| Shashank Bhatt      | TBD                               | 2020–     |
| Cohen Archbold      | TBD                               | 2020–     |
| Aurek Chattopadhyay | Multimodal Retrieval              | 2020–     |

## High School Research Students

| Student Name      | Project Title  | Dates        |
|-------------------|--|--------------|
| Ryan Baltenberger | Gesture-Based User Interaction with the Microsoft Kinect                     | 2011–2012    |
| Alex Lucas        | Evaluation of Automatic Face Detection Methods                               | 2014–2013    |
| Andrew Tapia      | Estimating Surface Reflectivity  | 2014–2015    |
| Andrew Albrecht   | Mapping Social Media Imagery   | 2016–2017    |
| C. J. Labianca    | Evaluation of Optimization Algorithms for Deep Convolutional Neural Networks | 2016–2017    |
| Ryan Landry       | RRADCL: Rapid Roadway Assessment with Deep Convolutional Learning            | 2017–2018    |
| Cohen Archbold    | Photo-Geolocation using Convolutional Neural Networks                        | 2017–2018    |
| Nicole Wong       | Learning-Based View Synthesis  | 2019–2020    |
| Chris Wang        | Multimodal Medical Imaging for Alzheimer’s Disease Classification            | 2019–2021    |
| William Greenlee  | TBD  | 2021–ongoing |