

# Nathan Jacobs

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## Areas of Expertise

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

## Contents

<b>1</b>	<b>Education</b>	<b>1</b>
<b>2</b>	<b>Appointments and Affiliations</b>	<b>1</b>
<b>3</b>	<b>Awards</b>	<b>2</b>
<b>4</b>	<b>Publications</b>	<b>3</b>
<b>5</b>	<b>Funding</b>	<b>16</b>
<b>6</b>	<b>Talks</b>	<b>19</b>
<b>7</b>	<b>Service</b>	<b>23</b>
<b>8</b>	<b>Teaching and Mentoring</b>	<b>27</b>

## 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) <i>Summa Cum Laude</i> with Honors	University of Missouri

## 2 Appointments and Affiliations

### Active

<b>Professor (with Tenure)</b> 2022–	Dept. of Computer Science & Engineering, Washington University <i>St. Louis, MO</i>
<b>Affiliated Faculty</b> 2022–	Division of Computational & Data Sciences, Washington University <i>St. Louis, MO</i>
<b>Affiliated Faculty</b> 2022–	Imaging Science Program, Washington University <i>St. Louis, MO</i>

<b>Affiliated Faculty</b> 2023–	Electrical and Systems Engineering, Washington University <i>St. Louis, MO</i>
<b>Affiliated Faculty</b> 2023–	AI for Health Institute, Washington University <i>St. Louis, MO</i>
<b>Associate Faculty</b> 2022–	Taylor Geospatial Institute <i>St. Louis, MO</i>
<b>Faculty Scholar</b> 2023–	Center for the Environment, Washington University <i>St. Louis, MO</i>
<b>Biodiversity Fellow</b> 2022–	Living Earth Collaborative <i>St. Louis, MO</i>
<b>Technical Consultant / Owner / Founder</b> 2019–present	Multidomain Vision Research, LLC <i>St. Louis, MO</i>

## Prior

<b>Professor (with Tenure)</b> 2021–2022	Dept. of Computer Science, University of Kentucky <i>Lexington, KY</i>
<b>Director of Graduate Studies (Data Science)</b> 2020–2022	Dept. of Computer Science, University of Kentucky <i>Lexington, KY</i>
<b>Member</b> 2017–2022	Institute for Biomedical Informatics, University of Kentucky <i>Lexington, KY</i>
<b>Associate Professor (with Tenure)</b> 2016–2021	Dept. of Computer Science, University of Kentucky <i>Lexington, KY</i>
<b>Co-Department Chair (interim)</b> 2019–2020	Dept. of Computer Science, University of Kentucky <i>Lexington, KY</i>
<b>Affiliated Faculty</b> 2010–2019	Center for Visualization and Virtual Environments, University of Kentucky <i>Lexington, KY</i>
<b>Visiting Research Scientist (sabbatical)</b> 2017–2018	Orbital Insight, Inc. <i>Mountain View, CA</i>
<b>Assistant Professor</b> 2010–2016	Dept. of Computer Science, University of Kentucky <i>Lexington, KY</i>
<b>Computer Vision Research Intern</b> 2008	ObjectVideo, Inc. <i>Reston, VA</i>
<b>Graduate Research Assistant</b> 2005–2010	Dept. of Computer Science & Engineering, Washington University <i>St. Louis, MO</i>

## 3 Awards

- Best Paper Award (out of 75 valid submissions) [EarthVision Workshop 2024 at IEEE/CVF Computer Vision and Pattern Recognition (CVPR)]
- 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

### Preprints

- [1] F. Qiao, Z. Xiong, E. Xing, and N. Jacobs, *GenStereo: Towards open-world generation of stereo images and unsupervised matching*, Mar. 2025. arXiv: [2503.12720 \[cs.CV\]](#).
- [2] Z. Xiong, W. Xiong, J. Shi, H. Zhang, Y. Song, and N. Jacobs, *GroundingBooth: Grounding text-to-image customization*, Sep. 2024. arXiv: [2409.08520 \[cs.CV\]](#).
- [3] F. Qiao, Z. Xiong, X. Zhu, Y. Ma, Q. He, and N. Jacobs, *MCPDepth: omnidirectional depth estimation via stereo matching from multi-cylindrical panoramas*, Aug. 2024. arXiv: [2408.01653 \[cs.CV\]](#).
- [4] Z. Xiong, X. Xing, S. Workman, S. Khanal, and N. Jacobs, *Mixed-view panorama synthesis using geospatially guided diffusion*, Jul. 2024. arXiv: [2407.09672 \[cs.CV\]](#).
- [5] S. Sastry, X. Xing, A. Dhakal, S. Khanal, A. Ahmad, and N. Jacobs, *LD-SDM: Language-driven hierarchical species distribution modeling*, Dec. 2023. arXiv: [2312.08334 \[cs.CV\]](#).

### Refereed Conference Papers

- [1] A. Dhakal, S. Sastry, S. Khanal, A. Ahmad, E. Xing, and N. Jacobs, “RANGE: Retrieval augmented neural fields for multi-resolution geo-embeddings,” in *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2025. arXiv: [2502.19781 \[cs.CV\]](#).
- [2] E. Xing, P. Kolouju, R. Pless, A. Stylianou, and N. Jacobs, “ConText-CIR: Learning from concepts in text for composed image retrieval,” in *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2025.
- [3] H. Kerner, S. Chaudhari, A. Ghosh, C. Robinson, A. Ahmad, E. Choi, N. Jacobs, C. Holmes, M. Mohr, R. Dodhia, J. M. L. Ferres, and J. Marcus, “Fields of The World: A machine learning benchmark dataset for global agricultural field boundary segmentation,” in *Association for the Advancement of Artificial Intelligence (AAAI)*, vol. 2409.16252, Feb. 2025. arXiv: [2409.16252 \[cs.CV\]](#).
- [4] A. Sarkar, A. DiChristofano, S. Das, P. Fowler, N. Jacobs, and Y. Vorobeychik, “Active geospatial search for efficient tenant eviction outreach,” in *Association for the Advancement of Artificial Intelligence (AAAI)*, Feb. 2025. arXiv: [2412.17854 \[cs.LG\]](#).

- [5] S. Sastry, S. Khanal, A. Dhakal, A. Ahmad, and N. Jacobs, “TaxaBind: A unified embedding space for ecological applications,” in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Feb. 2025. arXiv: [2411.00683 \[cs.CV\]](#).
- [6] M. Lanier, Y. Xu, N. Jacobs, C. Zhang, and Y. Vorobeychik, “Learning interpretable policies in hindsight-observable POMDPs through partially supervised reinforcement learning,” in *IEEE International Conference on Machine Learning and Applications*, Dec. 2024. arXiv: [2402.09290 \[cs.LG\]](#).
- [7] A. Sarkar, S. Sastry, A. Pirinen, C. Zhang, N. Jacobs, and Y. Vorobeychik, “GOMAA-Geo: Goal modality agnostic active geo-localization,” in *Neural Information Processing Systems (NeurIPS)*, Dec. 2024. arXiv: [2406.01917 \[cs.CV\]](#).
- [8] S. Khanal, E. Xing, S. Sastry, A. Dhakal, Z. Xiong, A. Ahmad, and N. Jacobs, “PSM: Learning probabilistic embeddings for multi-scale zero-shot soundscape mapping,” in *ACM Multimedia*, Oct. 2024. DOI: [10.1145/3664647.3681620](#). arXiv: [2408.07050 \[cs.CV\]](#).
- [9] O. Skea, A. Dhakal, N. Jacobs, and L. G. S. Giraldo, “FroSSL: Frobenius norm minimization for self-supervised learning,” in *European Conference on Computer Vision (ECCV)*, Oct. 2024. arXiv: [2310.02903 \[cs.LG\]](#).
- [10] A. Sarkar, A. DiChristofano, S. Das, P. Fowler, N. Jacobs, and Y. Vorobeychik, “Geospatial active search for preventing evictions,” in *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, May 2024.
- [11] C. Greenwell, M. Leotta, J. Crall, N. Jacobs, M. Purri, K. Dana, A. Hadzic, and S. Workman, “Watch: Wide-area terrestrial change hypercube,” in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Jan. 2024.
- [12] A. Sarkar, M. Lanier, S. Alfeld, J. Feng, R. Garnett, N. Jacobs, and Y. Vorobeychik, “A visual active search framework for geospatial exploration,” in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Jan. 2024.
- [13] S. Sastry, S. Khanal, A. Dhakal, D. Huang, and N. Jacobs, “BirdSat: Cross-view contrastive masked autoencoders for bird species classification and mapping,” in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Jan. 2024.
- [14] M. Shugaev, I. Semenov, K. Ashley, M. Klaczynski, N. Cuntoor, M. W. Lee, and N. Jacobs, “ArcGeo: Localizing limited field-of-view images using cross-view matching,” in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Jan. 2024.
- [15] A. Sarkar, N. Jacobs, and Y. Vorobeychik, “A partially-supervised reinforcement learning framework for visual active search,” in *Neural Information Processing Systems (NeurIPS)*, Dec. 2023.
- [16] S. Khanal, S. Sastry, A. Dhakal, and N. Jacobs, “Learning tri-modal embeddings for zero-shot soundscape mapping,” in *British Machine Vision Conference (BMVC)*, Nov. 2023.
- [17] Z. Xiong, F. Qiao, Y. Zhang, and N. Jacobs, “StereoFlowGAN: Co-training for stereo and flow with unsupervised domain adaptation,” in *British Machine Vision Conference (BMVC)*, Nov. 2023.
- [18] X. Xing, C. Peng, Y. Zhang, A.-L. Lin, and N. Jacobs, “AssocFormer: Association transformer for multi-label classification,” in *British Machine Vision Conference (BMVC)*, Nov. 2022.
- [19] 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. DOI: [10.1109/ICPR56361.2022.9956394](#).
- [20] 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. DOI: [10.1109/CVPR52688.2022.00182](#).
- [21] 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. DOI: [10.1109/ISBI52829.2022.9761584](#).

- [22] 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. DOI: [10.1109/WACV51458.2022.00028](https://doi.org/10.1109/WACV51458.2022.00028).
- [23] Y. Zhang, G. Liang, and N. Jacobs, “Dynamic feature alignment for semi-supervised domain adaptation,” in *British Machine Vision Conference (BMVC)*, Nov. 2021.
- [24] 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. DOI: [10.1109/EMBC46164.2021.9629587](https://doi.org/10.1109/EMBC46164.2021.9629587).
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- [26] 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).
- [27] G. Liang, Y. Zhang, X. Wang, and N. Jacobs, “Improved trainable calibration method for neural networks,” in *British Machine Vision Conference (BMVC)*, Sep. 2020.
- [28] M. U. Rafique, H. Blanton, N. Snaveley, and N. Jacobs, “Generative Appearance Flow: A hybrid approach for outdoor view synthesis,” in *British Machine Vision Conference (BMVC)*, Sep. 2020.
- [29] 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).
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- [33] 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).
- [34] 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](https://doi.org/10.1109/BIBM47256.2019.8983048).
- [35] 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).
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- [37] 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).

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- [39] 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).
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- [42] 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](https://doi.org/10.1109/WACV.2018.00063).
- [43] 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.
- [44] 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).
- [45] 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).
- [46] 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).
- [47] 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).
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- [51] 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).
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- [54] S. Workman, M. Zhai, and N. Jacobs, "Horizon lines in the wild," in *British Machine Vision Conference (BMVC)*, Acceptance rate: 39.4%, 2016.



- [55] 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).
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- [58] 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).
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- [62] 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).
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## Abstracts

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- [2] H. R. Kerner, S. Chaudhari, C. Robinson, A. Ghosh, A. Ahmad, E. Choi, N. Jacobs, C. Holmes, M. Mohr, and J. Marcus, “Fields of The World (FTW!): A new machine learning dataset for agricultural field boundary segmentation on four continents,” in *American Geophysical Union (AGU) Fall Meeting Abstracts*, Dec. 2024.
- [3] S. Sastry, A. Ahmad, A. Dhakal, S. Khanal, E. Xing, and N. Jacobs, “ClimSatDiff: Synthesizing the earth’s surface conditioned on climatic variables using diffusion models,” in *American Geophysical Union (AGU) Fall Meeting Abstracts*, Dec. 2024.
- [4] S. Sastry, X. Xing, A. Dhakal, S. Khanal, A. Ahmad, and N. Jacobs, “LD-SDM: Language-driven hierarchical species distribution modeling,” in *American Geophysical Union (AGU) Fall Meeting Abstracts*, Dec. 2024.
- [5] S. Shen, A. van Donkelaar, N. Jacobs, C. Li, and R. V. Martin, “Enhancing estimation of fine particulate matter species concentrations over north america by including geophysical a priori information in deep learning,” in *American Geophysical Union (AGU) Fall Meeting Abstracts*, Dec. 2024.
- [6] A. Dhakal, S. Khanal, S. Sastry, A. Ahmad, and N. Jacobs, “GeoBind: Binding text, image, and audio through satellite images,” in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, (oral), Jul. 2024. arXiv: [2404.11720](https://arxiv.org/abs/2404.11720).
- [7] P. Jain, D. Marcos, D. Ienco, R. Interdonato, A. Dhakal, N. Jacobs, and T. Berchoux, “Aligning geo-tagged CLIP representations and satellite imagery for few-shot land use classification,” in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, (oral), Jul. 2024.
- [8] C. Archbold, B. Brodie, A. A. Ogholbake, and N. Jacobs, “Fine-grained property value assessment using probabilistic disaggregation,” in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Jul. 2023.
- [9] B. Brodie, S. Sastry, J. Birge, R. Pless, and N. Jacobs, “A cost-sensitive approach to dimensionality reduction for multispectral imagery,” in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Jul. 2023.
- [10] S. Sastry, A. Dhakal, B. Brodie, S. Khanal, and N. Jacobs, “Explorations in self-supervised learning for change detection,” in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, (oral), Jul. 2023.
- [11] S. Sastry, N. Jacobs, M. Belgiu, and R. V. Maretto, “Task agnostic cost prediction module for semantic labeling in active learning,” in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, (oral), Jul. 2023.
- [12] Y. Zhang, M. U. Rafique, G. Christie, and N. Jacobs, “CrossAdapt: Cross-scene adaptation for multi-domain depth estimation,” in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Jul. 2023.
- [13] Y. Zhang, M. U. Rafique, and N. Jacobs, “CrossSeg: Cross-scene few-shot aerial segmentation using probabilistic prototypes,” in *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, (oral), Jul. 2023.
- [14] S. Shen, A. van Donkelaar, R. V. Martin, N. Jacobs, and C. Wang, “Improving representation of the aod to  $PM_{2.5}$  relationship with a convolutional neural network,” in *American Geophysical Union (AGU) Fall Meeting Abstracts*, Dec. 2022.
- [15] 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).
- [16] 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).



- [17] 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.
- [18] 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.
- [19] 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](https://doi.org/10.1109/IGARSS39084.2020.9324617).
- [20] 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).
- [21] 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.
- [22] 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).
- [23] 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](https://doi.org/10.1109/AIPR47015.2019.9174570).
- [24] 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.
- [25] 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.
- [26] 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.
- [27] 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).
- [28] 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).
- [29] 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).
- [30] 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.
- [31] 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.
- [32] 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.
- [33] 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.
- [34] 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.



- [35] 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).
- [36] 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.
- [37] 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.
- [38] 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.
- [39] 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.
- [40] 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.
- [41] 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>.

## 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.

## 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 Kekenos-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, 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. <i>Google Cloud Compute Research Credits</i> | PI: <b>Nathan Jacobs</b> |
| Sponsor: Google                                 | Date: Aug 2018           |
| 2. <i>NVIDIA Titan X GPU</i>                    | PI: <b>Nathan Jacobs</b> |
| Sponsor: NVIDIA                                 | Date: Oct 2016           |
| 3. <i>AWS Research Education Grant</i>          | PI: <b>Nathan Jacobs</b> |
| Sponsor: Amazon                                 | Date: Jul 2015           |
| 4. <i>NVIDIA Tesla K40 GPU</i>                  | PI: <b>Nathan Jacobs</b> |
| Sponsor: NVIDIA                                 | Date: Dec 2014           |

## 6 Talks

1. “Learning to Map Anything, Anywhere, Anytime” (keynote), Nov 2023, The International Conference on Digital Image Computing: Techniques and Applications (DICTA), Port Macquarie, Australia
2. “Learning to Map Anything, Anywhere, Anytime” (keynote), Oct 2023, ACM Multimedia Workshop (UAVs in Multimedia: Capturing the World from a New Perspective), Ottawa, Canada

3. “A Cost-Sensitive Approach To Dimensionality Reduction for Multispectral Imagery”, Jul 2023, International Geoscience and Remote Sensing Symposium, Pasadena, CA
4. “Explorations in Self-Supervised Learning for Change Detection”, Jul 2023, International Geoscience and Remote Sensing Symposium, Pasadena, CA
5. “Toward Dynamic Multimodal Remote Sensing: From Buildings and Populations to Soundscapes and Aesthetics”, Apr 2023, Living Earth Collaborative, Washington University, St. Louis, MO
6. “Domain-Inspired Deep Learning for Computer Vision, Remote Sensing, and Medical Imaging”, Oct 2022, Imaging Science Seminar, Washington University, St. Louis, MO
7. “Computer Vision for Multimodal Remote Sensing”, Aug 2022, WashU Geospatial Working Group Research Workshop, Washington University, St. Louis, MO
8. “A Structure-Aware Method for Direct Pose Estimation”, Jan 2022, IEEE Winter Conference on Applications of Computer Vision (WACV), Waikoloa Village, HI
9. Panelist for “Non-Traditional Careers in Computer Science” Nov 2021, ACM-W, University of Kentucky, Lexington, KY
10. “Mapping the Visual World Using Webcams, Cell Phones, and Satellites”, Oct 2021, Washington University in St. Louis, MO
11. “Learning Geo-Temporal Scene Models from Webcams, Cell Phones, and Satellites” (Keynote), Oct 2021, International Workshop on Distributed Smart Cameras, an ICCV Workshop (virtual)
12. “Mapping the Visual World Using Webcams, Cell Phones, and Satellites”, Dec 2020, University of Campinas, Unicamp, Brazil (virtual)
13. “Exploring the Intersection of Localization, Mapping, and Image Understanding” (Keynote), Aug 2020, ECCV Workshop on Long-Term Visual Localization (virtual)
14. “Deep Convolutional Neural Networks: Foundations to Frontiers (a 2-day short course)”, Mar 2020, Brazilian Space Agency (INPE), Sao Jose dos Campos, Brazil
15. “What, Where, and When: Mapping the World Using Webcams, Cell Phones, and Satellites”, Mar 2020, Brazilian Space Agency (INPE), Sao Jose dos Campos, Brazil
16. “Learning to Map Visual Appearance”, Feb 2020, Keeping Current Seminar, University of Kentucky (Computer Science), Lexington, KY
17. “Learning to Map Visual Appearance”, Jan 2020, Wageningen University, Netherlands
18. “What, Where, and When: Mapping the World Using Webcams, Cell Phones, and Satellites”, Nov 2019, University of Kentucky (Forestry), Lexington, KY
19. “Learning to Map the Visual World”, Jul 2019, Wright State University, Dayton, OH
20. “Understanding Places Using Ground-Level and Overhead Views” (Keynote), May 2019, Kentucky Geological Society (Annual Symposium), Lexington, KY
21. “Understanding Places Using Ground-Level and Overhead Views”, Feb 2019, Notre Dame University, South Bend, IN
22. “A Generative Model of Worldwide Facial Appearance” (Keynote), Jan 2019, Workshop on Demographic Variations in Performance of Biometric Algorithms, Waikoloa Village, HI



23. “A Generative Model of Worldwide Facial Appearance”, Jan 2019, IEEE Winter Conference on Applications of Computer Vision, Waikoloa Village, HI
24. “A Weakly Supervised Approach for Estimating Spatial Density Functions from High-Resolution Satellite Imagery”, Nov 2018, ACM SIGSPATIAL, Seattle, WA
25. “Understanding Places Using Ground-Level and Overhead Views”, Oct 2018, Commonwealth Computational Summit, Lexington, KY
26. “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 4)”, Sep 2018, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
27. “Understanding Places Using Ground-Level and Overhead Views”, Aug 2018, Oak Ridge National Lab, Oak Ridge, TN
28. “WhatGoesWhere: Predicting Object Distributions from Above”, Jul 2018, IGARSS, Valencia, Spain
29. “Building World Models for Situated Training and Planning”, May 2018, Air Force Science and Technology 2030 Workshop, Bloomington, IN
30. “Recent Advances in Image Understanding”, May 2018, DASC, Lexington, KY
31. “(Tutorial) Recent Advances in Deep Learning: Fusing Overhead and Ground-Level Views for Remote Sensing”, April 2018, USGIF Annual Symposium, Tampa, FL
32. “Understanding Places Using Ground-Level and Overhead Views”, Feb 2018, CVPR Area Chair Meeting, Toronto, Canada
33. “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 3)”, Sep 2017, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
34. “GPU Accelerated Computer Vision, Remote Sensing, and Machine Learning”, Aug 2017, Kentucky Geological Service, Lexington, KY
35. “Fusing Overhead and Ground-Level Imagery to Improve Scene Understanding”, Jul 2017, Planet, San Francisco, CA
36. “Learning about When and Where from Imagery”, Jun 2017, Orbital Insight, Mountain View, CA
37. “(Tutorial) Recent Advances in Deep Learning: Fusing Overhead and Ground-Level Views for Remote Sensing”, Jun 2017, USGIF Annual Symposium, San Antonio, TX
38. “How Computers See People (extended)”, May 2017, CCTS Biomedical Informatics Seminar Series, Lexington, KY
39. “Understanding Places Using Ground-Level and Overhead Views”, May 2017, Midwest Vision Meeting, Chicago, IL
40. “How Computers See People”, Feb 2017, Suds’n’Science Speaker Series, West Sixth Brewing, Lexington, KY
41. “Learning about When and Where from Imagery”, Feb 2017, University of Missouri, Department of Computer Science
42. “Localization, Mapping, and Image Understanding”, Feb 2017, USGIF Machine Learning Symposium
43. “Deep Convolutional Neural Networks: Concepts and Examples (in Computer Vision)”, Nov 2016, University of Kentucky, Society of Industrial and Applied Mathematics

44. “Crossview Convolutional Networks”, Oct 2016, Applied Imagery and Pattern Recognition, Washington, D.C.
45. “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 2)”, Sep 2016, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
46. “Deep Convolutional Neural Networks: Concepts and Examples”, Jul 2016, University of Kentucky: Systems Biology and Omics Integration Seminar
47. “Crossview Methods for Localization and Mapping”, Jun 2016, IEEE CVPR Workshop on “Vision from Satellite to Street” (invited talk)
48. “A Fast Method for Estimating Transient Scene Properties”, Mar 2016, Winter Conference on Applications of Computer Vision, Lake Placid, NY
49. “Novel Cues for Geocalibration”, Feb 2016, Indiana University, Bloomington, IN
50. “Novel Cues for Camera Geocalibration”, Jan 2016, Uber Advanced Technology Center, Pittsburgh, PA
51. “Novel Cues for Geocalibration: Cloudy Days, Rainbows, and More”, Oct 2015, Carnegie Mellon University, Pittsburgh, PA
52. “Using Geotagged Internet Imagery to Understand the World”, Sep 2015, Université Laval, Quebec City, Canada
53. “face2gps: Estimating Geographic Location from Facial Features”, Sep 2015, International Conference on Image Processing, Quebec City, Canada
54. “GeoLookbook: Modeling Worldwide Human Visual Appearance”, Sep 2015, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
55. “Exploring the Geo-Dependence of Human Face Appearance”, Mar 2014, Winter Conference on Applications of Computer Vision, Steamboat Springs, CO
56. “Estimating Cloudmaps from Outdoor Image Sequences”, Mar 2014, Winter Conference on Applications of Computer Vision, Steamboat Springs, CO
57. “Scene Geometry from Several Partly Cloudy Days”, Oct 2013, International Conference on Distributed Smart Cameras, Palm Springs, CA
58. “Unlocking the Potential of the Global Network of Outdoor Webcams”, Apr 2013, Rochester Institute of Technology
59. “Geo-temporal Computer Vision: Applications to the NGA”, Nov 2011, National Geospatial-Intelligence Agency
60. “Geo-temporal Computer Vision: Applications to the Army”, Oct 2011, Army Research Lab
61. “Localizing, Calibrating, and Using Thousands of Outdoor Webcams”, Feb 2011, University of North Carolina–Charlotte
62. “Using Clouds Shadows to Infer Scene Structure and Camera Calibration”, Jun 2010, CVPR, San Francisco, CA
63. “Passive Vision and The Power of Collective Imaging”, Apr 2010, Object Video Inc., Reston, VA
64. “Localizing, Calibrating, and Using Thousands of Outdoor Webcams”, Apr 2010, University of Kentucky
65. “Time-Lapse Vision: Localizing, Calibrating, and Using Thousands Outdoor Webcams”, Apr 2010, Google, Mountain View, CA
66. “Passive Vision and The Power of Collective Imaging”, Jan 2010, Google, Mountain View, CA

67. “Incorporating Domain Constraints in Urban Vehicle Tracking”, Nov 2010, University of Missouri, Columbia, MO
68. “Compressive Sensing and Differential Image-Motion Estimation”, Mar 2010, ICASSP, Dallas, TX
69. “The Global Network of Outdoor Webcams: Properties and Applications ”, Nov 2009, ACM GIS, Seattle, WA
70. “Passive Vision: The Global Webcam Imaging Network”, Oct 2009, AIPR, Washington, DC
71. “Calibrating and Using the Global Network of Outdoor Webcams”, Aug 2009, ICDSC, Italy
72. “Adventures in Archiving and Using Three Years of Webcam Images”, Jun 2009, CVPR Workshop on Internet Vision, Miami, FL
73. “Recent Work: Webcams and Grooves”, Aug 2009, Object Video, Reston, VA
74. “Location-Specific Models for Tracking”, Jan 2008, WMVC, Copper Mountain, CO
75. “Using natural cues to geo-locate and geo-orient distributed cameras”, Jan 2008, VISN, Copper Mountain, CO
76. “Foreground Modeling: The Shape of Things That Came”, Feb 2007, WMVC, Austin, Texas

## 7 Service

### University Service

- Washington University in St. Louis (2022–present)
  - 2023–present: Director of PhD Admissions, Department of Computer Science & Engineering
  - 2023–present: Faculty Advisor, WashU Robomaster Club
  - 2023–present: Faculty Technology Advisory Committee, James McKelvey School of Engineering
  - 2022–present: Leadership Team, Geospatial Working Group
  - 2022–present: Research Council, Taylor Geospatial Institute
  - 2023–present: Faculty Search Committee, Imaging Science Program
  - 2023–present: Curriculum Committee, Imaging Science Program
  - 2022–present: Faculty Search Committee, Computer Science & Engineering Department
  - 2022–2023: Strategic Planning Steering Committee, James McKelvey School of Engineering
- 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

- Senior/Lead Area Chair:
  - IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) [2024,2025]
  - European Conference on Computer Vision (ECCV) [2024]
  - IEEE/CVF International Conference on Computer Vision (ICCV) [2025]
- Area Chair:
  - IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) [2018, 2019, 2021, 2023]
  - European Conference on Computer Vision (ECCV) [2022]
  - IEEE/CVF International Conference on Computer Vision (ICCV) [2023, 2025]
  - Conference on Neural Information Processing Systems (NeurIPS) [2024]
  - IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) [2014, 2022, 2023]
- Organizing Committees:
  - Industrial/Government Relations Chair: IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) [2024]
  - IEEE/ISPRS Workshop on Large Scale Computer Vision for Remote Sensing Imagery (EARTHVISION) [2019, 2020, 2021, 2022, 2023, 2025]
  - Doctoral Consortium Co-Chair: IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) [2017, 2019, 2024]
  - Doctoral Consortium Chair: IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) [2018, 2022]
  - Video Proceedings Chair: IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) [2015]
  - IEEE Workshop on Motion and Video Computing (WMVC) [2011]
- Guest Editor:
  - ISPRS Journal of Photogrammetry and Remote Sensing [2024], Special Issue “Vision Language Models for Remote Sensing Analysis and Interpretation”
  - 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”
- Panelist:

- Roundtable Discussion at 1st Workshop on Computer Vision for Earth Observation (CV4EO) Applications 2024 (Hosted as part of IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2024)
- Session Chair:
  - IEEE International Geoscience and Remote Sensing Symposium (IGARSS) [2020,2023]
  - IEEE/ISPRS Workshop on Large Scale Computer Vision for Remote Sensing Imagery (EARTHVISION) [2019]
  - IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) [2016, 2019, 2022, 2024]
  - IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) [2018, 2024, 2025]
  - IEEE/ACM International Conference on Distributed Smart Cameras [2013]
- Reviewing for Journals:
  - Proceedings of the National Academy of Sciences [2024]
  - 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, 2025]
    - \* IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) [2021,2024,2025]
    - \* IEEE International Geoscience and Remote Sensing Symposium (IGARSS) [2020]
    - \* British Machine Vision Conference (BMVC) [2020]
    - \* IEEE/CVF 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/CVF 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
  - \* ICLR Workshop on Machine Learning for Remote Sensing [2023]
  - \* 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]
- Advisory Committee for:
  - 1st Workshop on Computer Vision for Earth Observation (CV4EO) Applications 2024 (Hosted as part of IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2024)

## 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:

- *Advances in Computer Vision*, CSE 659a, [F2024], Washington University in St. Louis
- *Computer Vision*, CSE 559a, [S2023, S2024, S2025], Washington University in St. Louis
- *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

### Mentoring

#### Postdoctoral Scholars

1. Adeel Ahmad (Ph.D. Geomatics, University of Punjab–Lahore) Dates: 2023–2024  
Research Focus: Remote Sensing, Deep Learning, Land-Use Modeling
2. 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, Kitware Inc.
12. [Yu Zhang](#) Degree: Ph.D., Computer Science  
 Title: Multimodal Domain Generalization Date: Mar 2023
13. Xin Xing [*co-chair* w/ Ai-Ling Lin] Degree: Ph.D., Computer Science  
 Title: Structured Attention for Image Analysis Date: Nov 2023
14. Subash Khanal Degree: Ph.D., Computer Science  
 Title: Soundscape Mapping Using Multimodal Learning Date: May 2025
15. Lydia Reader [*co-chair* w/ Ross Hammond] Degree: Ph.D., Computational & Data Sciences  
 Title: Toward an Understanding of Heterogeneous Effects of Walkability on Children's Physical Activity Date: May 2026 (est)
16. Oscar Skea [*co-chair* w/ Luis Sanchez-Giraldo] Degree: Ph.D., Computer Science  
 Title: TBD [Information-Theoretic Metric Learning] Date: May 2025 (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)
21. Alex Wollam Degree: Ph.D., Computer Science  
 Title: TBD Date: TBD
22. Tong Li Degree: Ph.D., Computational & Data Sciences  
 Title: TBD Date: TBD

23. Nia Hodges	Degree: Ph.D., Electrical and Systems Engineering
Title: TBD	Date: TBD
24. Eric Xing	Degree: Ph.D., Computer Science
Title: TBD	Date: TBD
25. Daniel Cher	Degree: Ph.D., Computational & Data Sciences
Title: TBD	Date: TBD
26. Feng Qiao	Degree: Ph.D., Computer Science
Title: TBD	Date: TBD

### Visiting Ph.D. Students

1. Patrick Tutzauer (University of Stuttgart)	Dates: Fall 2017
Topic: Geospatial Trajectory Modeling	
2. Raian Vargas Maretto (INPE, Brazil)	Dates: 2018–2019
Topic: Deforestation Detection	
3. Rafael Padilha (UNICAMP, Brazil)	Dates: 2019–2020
Topic: Image Forensics	
4. Alex Levering (Wageningen University)	Dates: 2022–2023
Topic: Landscape Quality Assessment	

### Masters Students

1. Feiyu Shi	Degree: MS, Computer Science
Title: Principal Component Analysis For Multi-size Images	Date: Dec 2013
2. Ryan Baltenberger	Degree: MS, Computer Science
Title: Estimating Transient Scene Attributes Using Deep Convolutional Neural Networks	Date: May 2016
3. William “Derek” Jones [ <i>co-chair w/ Sally Ellingson</i> ]	Degree: MS, Computer Science
Title: Scalable Feature Selection and Extraction with Applications in Kinase Polypharmacology	Date: May 2018
4. <a href="#">Weilian “William” Song</a>	Degree: MS, Computer Science
Title: Image-Based Roadway Assessment using Convolutional Neural Networks	Date: May 2019
5. <a href="#">Armin Hadzic</a>	Degree: MS, Computer Science
Title: Estimating Free-Flow Speed with LiDAR and Overhead Imagery	Date: May 2020
6. David Jones	Degree: MS, Computer Science
Title: Intensity Harmonization for Airborne LiDAR	Date: May 2021
7. Jacob Birge	Degree: MS, Computer Science
Title: A Cost-Sensitive Approach To Multimodal Fusion	Date: Dec 2021
8. Alex Greene	Degree: MS, Computer Science
Title: Using Aerial Imagery to Estimate Ground-level Object Distributions	Date: May 2023
9. Alex Wollam	Degree: MS, Computer Science
Title: Exploring Sequential Outdoor Panorama Synthesis with Diffusion Models	Date: Jul 2023

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|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| 10. Hongzhang Wang                                                                                       | Degree: MS, Computer Science                          |
| Title: Monocular Depth Estimation                                                                        | Date: Dec 2023                                        |
| 11. Nia Hodges                                                                                           | Degree: MS, Engineering Data Analytics & Statistics   |
| Title: Wide-Area Image Localization                                                                      | Date: May 2024                                        |
| 12. Wanzhou Liu                                                                                          | Degree: MS, Computer Science                          |
| Title: High Efficiency Generalizable Driving World Model                                                 | Date: Fall 2024                                       |
| 13. Lunchi Guo                                                                                           | Degree: MS, Computer Engineering                      |
| Title: Deep Learning-Based Coordinate Prediction from Medical Fluoroscopic Images for Improved Radiation | Date: Fall 2024                                       |
| 14. Lunchi Guo                                                                                           | Degree: MS, Computer Engineering                      |
| Title: MedVid-Align: Intelligent Analysis of Medical Procedure Videos                                    | Date: Spring 2025                                     |
| 15. Myan Sudharsanan                                                                                     | Degree: MS, Computer Engineering                      |
| Title: VisionLLMs in the Automotive Domain: Finegrained Details of Traffic Signs and Passenger Vehicles  | Date: Spring 2025                                     |
| 16. Ethan Weilheimer                                                                                     | Degree: MS (thesis), Computer Science                 |
| Title: Partially Supervised Reinforcement Learning for GPS-Denied Navigation                             | Date: Spring 2025                                     |
| 17. Jackson McCall                                                                                       | Degree: MS, Computer Science                          |
| Title: GeoSynth++: Large-Scale Satellite Image Synthesis                                                 | Date: May 2025                                        |
| 18. Vinh Pham                                                                                            | Degree: MS, Engineering Data Analytics and Statistics |
| Title: Automated Satellite Imagery Analysis for Global Agricultural Field Boundary Detection             | Date: Spring 2025                                     |
| 19. Shuhan Zhang                                                                                         | Degree: MS, Computer Science                          |
| Title: Query-Specific Feature Transformation for Fine-Grained Image Retrieval                            | Date: Spring 2025                                     |
| 20. Jingyun Ma                                                                                           | Degree: MS, Computer Science                          |
| Title: Large Language Models for MCNP Input Generation                                                   | Date: Spring 2025                                     |

## Undergraduate Research Students

- |                                                 |                  |
|-------------------------------------------------|------------------|
| 1. Jim Knochenmann                              | 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   |                  |

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|----------------------------------------------------------------------------------------|------------------|
| 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: Multi-Object Tracking                                                           |                  |
| 15. Evan Bolton                                                                        | Dates: 2021      |
| Title: Generating Synthetic Training Data using a Game Engine                          |                  |
| 16. Julia Stekardis                                                                    | Dates: 2021–2022 |
| Title: Large-Scale Image Geo-Localization                                              |                  |
| 17. Gareth Walker                                                                      | Dates: 2022      |
| Title: Remote Sensing for Social Good                                                  |                  |
| 18. Matthew Mitchell                                                                   | Dates: 2022      |
| Title: Remote Sensing for Social Good                                                  |                  |
| 19. Cohen Archbold                                                                     | Dates: 2020–2022 |
| Title: Automatic Real-Estate Price Estimation                                          |                  |

## High School Research Students

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|-------------------------------------------------------------------------------------|------------------|
| 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            |                  |

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|--------------------------------------------------------------------------|------------------|
| 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: 2021–2022 |
| Title: Deep Learning for Computer Vision                                 |                  |
| 11. Krishna Bhatraju                                                     | Dates: 2021–2022 |
| Title: Deep Motion Estimation                                            |                  |

## Graduate Committees (as regular member or external examiner)

- |                                                                                                        |                                       |
|--------------------------------------------------------------------------------------------------------|---------------------------------------|
| 1. Edwin Prem Kumar Sathiyamoorthy                                                                     | Degree: M.S., 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: M.S., 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: M.S., 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: M.S., 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: M.S., 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: M.S., Computer Science  
 Role: member Date: May 2017  
 Title: 3D Body Tracking using Deep Learning
16. Xiaofei Zhang Degree: M.S., 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: M.S., 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: M.S., 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: M.S., 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: M.S., 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. Yuan Liu Degree: M.S., Computer Science  
 Role: member Date: Dec 2022  
 Title: Skeleton-Based Analysis of Melt Networks
45. Aiden McIlraith Degree: M.S., Computer Science  
 Role: member Date: Dec 2022  
 Title: Spatial Transcriptome Visualizer
46. Zhou Chu Degree: M.S., Computer Science  
 Role: member Date: Dec 2022  
 Title: Adapting at time series machine learning models to a real informatics pipe
47. Zihao Zou Degree: M.S., Computer Science  
 Role: member Date: Dec 2022  
 Title: Deep Model-Based Architectures using Explicit Regularizers for Computational Imaging
48. Ashutosh Timilsina Degree: Ph.D., Computer Science  
 Role: member Date: Apr 2023  
 Title: Peer-to-peer Energy Trading in Smart Residential Environment with User Behavioral Modeling
49. Nan Huang Degree: M.S., Computer Science  
 Role: member Date: Apr 2023  
 Title: Toward Continuous Regularizer for Imaging Inverse Problems
50. Md Selim Degree: Ph.D., Computer Science  
 Role: member Date: Apr 2023  
 Title: Deep Learning Models for CT Image Standardization

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|-----------------------------------------------------------------------------------------------|---------------------------------|
| 51. Di Huang                                                                                  | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Apr 2023                  |
| Title: Deep Neural Networks for Infant Pose Estimation                                        |                                 |
| 52. Peizhen Tong                                                                              | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Apr 2023                  |
| Title: Adversarial Patch Attacks on Deep Reinforcement Learning                               |                                 |
| 53. David Sarpong                                                                             | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: May 2023                  |
| Title: Adversarial Defenses against Interpolation Attacks on Semi-Supervised Learning Systems |                                 |
| 54. Yihang Xu                                                                                 | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: May 2023                  |
| Title: Real-Time Action Segmentation in a Smart Kitchen System                                |                                 |
| 55. Stephen Parsons                                                                           | Degree: Ph.D., Computer Science |
| Role: member                                                                                  | Date: Jul 2023                  |
| Title: Hard-Hearted Scrolls: A Noninvasive Method for Reading the Herculaneum Papyri          |                                 |
| 56. Brian Chao                                                                                | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Aug 2023                  |
| Title: Adversarial Attacks on AI Systems in Medical Applications                              |                                 |
| 57. Chang Ti                                                                                  | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Dec 2023                  |
| Title: Handwritten Digit Recognition Web Plugin                                               |                                 |
| 58. Emma McMillian                                                                            | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Dec 2023                  |
| Title: Convolutional Neural Networks for Hyperspectral Image-to-Image Microscopy Translation  |                                 |
| 59. Fiona Xu                                                                                  | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Dec 2023                  |
| Title: Adversarial Attack on Graph Embeddings from Text Dataset                               |                                 |
| 60. Kyle Montgomery                                                                           | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Apr 2024                  |
| Title: Exploring the Reasoning Abilities of Large Language Models                             |                                 |
| 61. Joshua Tang                                                                               | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Apr 2024                  |
| Title: Autonomous Vehicle Object Classification with Uncertainty                              |                                 |
| 62. Patrick Lynch                                                                             | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Apr 2024                  |
| Title: An Automated System for Detecting Errors in Oatmeal-Making Research Task               |                                 |
| 63. Owen Ma                                                                                   | Degree: M.S., Computer Science  |
| Role: member                                                                                  | Date: Dec 2024                  |
| Title: Towards Verified Vision-Based Neural Network Controllers for Autonomous Lane-Following |                                 |
| 64. Minoos Hosseinzadeh                                                                       | Degree: Ph.D., Computer Science |
| Role: member                                                                                  | Date: Dec 2024                  |
| Title: Smart QoS-Aware Resource Management For Edge Intelligence Systems                      |                                 |

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|--------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 65. Junlin Wu                                                                                                      | Degree: Ph.D., Computer Science       |
| Role: member                                                                                                       | Date: Spring 2025                     |
| Title: Trustworthy Autonomy Through Robust Control and Alignment                                                   |                                       |
|                                                                                                                    |                                       |
| 66. Evin Jaff                                                                                                      | Degree: M.S., Computer Science        |
| Role: member                                                                                                       | Date: Dec 2024                        |
| Title: SwiftFake: Real-Time Defense Against Deepfake Calls                                                         |                                       |
|                                                                                                                    |                                       |
| 67. Yin Li                                                                                                         | Degree: M.S., Computer Science        |
| Role: member                                                                                                       | Date: Dec 2024                        |
| Title: 3D Analysis of Spatial Transcriptome                                                                        |                                       |
|                                                                                                                    |                                       |
| 68. Sizhe Zhang                                                                                                    | Degree: A.M., Statistics              |
| Role: member                                                                                                       | Date: Dec 2024                        |
| Title: ProofTutor: LLM-based formal math proving model                                                             |                                       |
|                                                                                                                    |                                       |
| 69. Ye Htet                                                                                                        | Degree: Ph.D., Computer Science       |
| Role: member                                                                                                       | Date: Dec 2024                        |
| Title: System Design and Task Scheduling for Real-Time Scientific Sensing Applications in Space                    |                                       |
|                                                                                                                    |                                       |
| 70. Md Sultan Al Nahian                                                                                            | Degree: Ph.D., Computer Science       |
| Role: member                                                                                                       | Date: TBD                             |
| Title: Value Aligned AI Agent with Explainability                                                                  |                                       |
|                                                                                                                    |                                       |
| 71. Sidrah Liaqat                                                                                                  | Degree: Ph.D., Electrical Engineering |
| Role: member                                                                                                       | Date: TBD                             |
| Title: Model-based Deep Learning Techniques for Detecting Behaviors Related to Autism Spectrum Disorder from Video |                                       |
|                                                                                                                    |                                       |
| 72. Sheng-Chieh Lin                                                                                                | Degree: Ph.D., Physics                |
| Role: member                                                                                                       | Date: TBD                             |
| Title: TBD                                                                                                         |                                       |
|                                                                                                                    |                                       |
| 73. Seth Parker                                                                                                    | Degree: Ph.D., Computer Science       |
| Role: member                                                                                                       | Date: TBD                             |
| Title: TBD                                                                                                         |                                       |
|                                                                                                                    |                                       |
| 74. Gustavo Gratacós                                                                                               | Degree: Ph.D., Computer Science       |
| Role: member                                                                                                       | Date: TBD                             |
| Title: TBD                                                                                                         |                                       |
|                                                                                                                    |                                       |
| 75. Pan Xiao                                                                                                       | Degree: Ph.D., Imaging Science        |
| Role: member                                                                                                       | Date: TBD                             |
| Title: Text and Image Representation Learning for Radiology Image Analysis                                         |                                       |
|                                                                                                                    |                                       |
| 76. Nischal Khanal                                                                                                 | Degree: Ph.D., Imaging Science        |
| Role: member                                                                                                       | Date: TBD                             |
| Title: Cortical Motor Programs as Biomarkers for Functional Impairment and Recovery After Stroke                   |                                       |
|                                                                                                                    |                                       |
| 77. Christoph Gerhardt (Technische Universität Ilmenau)                                                            | Degree: Ph.D., Computer Science       |
| Role: member                                                                                                       | Date: TBD                             |
| Title: Outdoor Appearance Transfer                                                                                 |                                       |
|                                                                                                                    |                                       |
| 78. Weijie Gan                                                                                                     | Degree: Ph.D., Computer Science       |
| Role: member                                                                                                       | Date: TBD                             |
| Title: Deep Learning-based Computational Imaging                                                                   |                                       |

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|-------------------------------------------------------------------------------------------------|------------------------------------|
| 79. Hao Liu                                                                                     | Degree: Ph.D., Computer Science    |
| Role: member                                                                                    | Date: TBD                          |
| Title: Graph Neural Networks in Limited Data Regimes: Exploring Few-Shot and Zero-Shot Learning |                                    |
|                                                                                                 |                                    |
| 80. Anindya Sarkar                                                                              | Degree: Ph.D., Computer Science    |
| Role: member                                                                                    | Date: TBD                          |
| Title: TBD                                                                                      |                                    |
|                                                                                                 |                                    |
| 81. Rachel Badzioch (Notre Dame University)                                                     | Degree: Ph.D., Biological Sciences |
| Role: member                                                                                    | Date: TBD                          |
| Title: Detecting Visual Features in Permafrost                                                  |                                    |
|                                                                                                 |                                    |
| 82. Yiwen Ju                                                                                    | Degree: Ph.D., Computer Science    |
| Role: member                                                                                    | Date: TBD                          |
| Title: Implicit Surface Reconstruction                                                          |                                    |
|                                                                                                 |                                    |
| 83. Ruiqi Wang                                                                                  | Degree: Ph.D., Computer Science    |
| Role: member                                                                                    | Date: TBD                          |
| Title: Real-time and Embedded Systems and Efficient Human Activity Recognition                  |                                    |
|                                                                                                 |                                    |
| 84. Kyle Welford                                                                                | Degree: M.S., Computer Science     |
| Role: member                                                                                    | Date: Spring 2025                  |
| Title: Enhancing Plug-and-Play Image Registration via Diffusion                                 |                                    |
|                                                                                                 |                                    |
| 85. Yuxuan Yang                                                                                 | Degree: M.S., Computer Science     |
| Role: member                                                                                    | Date: Spring 2025                  |
| Title: Training Safety Filters for Safe Control with Partial Observed and Un-labeled Data       |                                    |
|                                                                                                 |                                    |
| 86. Zifan Wang                                                                                  | Degree: M.S., Computer Science     |
| Role: member                                                                                    | Date: Spring 2025                  |
| Title: GCHP Workload Balancing                                                                  |                                    |
|                                                                                                 |                                    |
| 87. Haris Naveed                                                                                | Degree: M.S., Computer Science     |
| Role: chair                                                                                     | Date: Spring 2025                  |
| Title: Deep Learning for Tree Canopy Height Estimation                                          |                                    |

## Oral Qualifying Exam Committees

Student	Date	Advisor
Junlin Wu	Fall 2022	Eugene Vorobeychik
Ye Htet	Spring 2023	Jeremy Buhler
Han Liu	Spring 2023	Ning Zhang
Yiwen Ju	Spring 2023	Tao Ju
Jiarui Feng	Summer 2023	Yixin Chen
Lydia Reader	Spring 2023	Ross Hammond
Tri Pham	Fall 2023	Caitlin Kelleher
Jingxuan Zhu	Summer 2024	
Aaron Adkins	Summer 2024	Chou Zhou
Ben Warner	Spring 2025	Chenyang Lu
Chengsong Huang	Spring 2025	Jiaxin Huang