

Nathan Jacobs

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Areas of Expertise

Computer Vision, Deep Learning, Big Data, Geospatial Data, Social Media, Medical Imaging

Education

2005–2010	Ph.D. in Computer Science Adviser: Robert Pless 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

Appointments and Affiliations

Associate Professor of Computer Science 2016–present		University of Kentucky <i>Lexington, KY</i>
Visiting Research Scientist 2017–present		Orbital Insight <i>Mountain View, CA</i>
Member 2017–present	Institute for Biomedical Informatics, University of Kentucky	<i>Lexington, KY</i>
Affiliated Faculty 2013–present	Unmanned Systems Research Consortium, University of Kentucky	<i>Lexington, KY</i>
Affiliated Faculty 2010–present	Center for Visualization and Virtual Environments, University of Kentucky	<i>Lexington, KY</i>
Assistant Professor of Computer Science 2010–2016		University of Kentucky <i>Lexington, KY</i>
Graduate Research Assistant 2005–2010		Washington University <i>St. Louis, MO</i>

Awards

- 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 in the Washington University Department of Computer Science (Fall 2006).

Publications

Refereed Journal Publications

- [1] Xiaofei Zhang, Yi Zhang, Erik Han, Nathan Jacobs, Qiong Han, Xiaoqin Wang, and Jinze Liu. Classification of whole mammogram and tomosynthesis images using deep convolutional neural networks. *IEEE Transactions on NanoBioscience*, 2018.
- [2] Hasan Sajid, Sen-ching S. Cheung, and Nathan Jacobs. Appearance based background subtraction for PTZ cameras. *Signal Processing: Image Communication*, 2016. Impact factor: 1.602.
- [3] Nathan Jacobs, Scott Workman, and Richard Souvenir. Cloudmaps from static ground-view video. *Image and Vision Computing (IVC)*, 52:154–166, August 2016. Impact factor: 1.766.
- [4] Mohammad T. Islam, Connor Greenwell, Richard Souvenir, and Nathan Jacobs. Large-Scale Geo-Facial Image Analysis. *EURASIP Journal on Image and Video Processing (JIVP)*, 2015(1):1–14, June 2015. Impact factor: 1.060.
- [5] Scott Workman, Richard Souvenir, and Nathan Jacobs. Scene Shape Estimation from Multiple Partly Cloudy Days. *Computer Vision and Image Understanding (CVIU)*, pages 116–129, April 2015. Impact factor: 1.54.
- [6] Nathan Jacobs, Austin Abrams, and Robert Pless. Two Cloud-Based Cues for Estimating Scene Structure and Camera Calibration. *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 35(10):2526–2538, 2013. Impact factor: 4.795.
- [7] Nathan Jacobs and Robert Pless. Time Scales in Video Surveillance. *IEEE Transactions on Circuits and Systems for Video Technology (CSVT)*, 18(8):1106–1113, 2008. Impact factor: 2.615.

Book Chapters

- [8] Radu Paul Mihail, Nathan Jacobs, Judy Goldsmith, and Kristine Lohr. Using visual analytics to inform rheumatoid arthritis patient choices. In Christian Sebastian Loh, Yanyan Sheng, and Dirk Ifenthaler, editors, *Serious Games Analytics*, Advances in Game-Based Learning, pages 211–231. Springer International Publishing, 2015.

Preprints

- [9] Hamid Hamraz, Nathan B Jacobs, Marco A Contreras, and Chase H Clark. Deep learning for conifer/deciduous classification of airborne lidar 3d point clouds representing individual trees. *arXiv preprint arXiv:1802.08872*, 2018.

Refereed Conference Publications

- [10] Samuel Schuster, Menghua Zhai, Nathan Jacobs, and Manmohan Chandraker. Learning to look around objects for top-view representations of outdoor scenes. In *European Conference on Computer Vision (ECCV)*, 2018.
- [11] Menghua Zhai, Tawfiq Salem, Connor Greenwell, Scott Workman, Robert Pless, and Nathan Jacobs. Learning geo-temporal image features. In *British Machine Vision Conference (BMVC)*, 2018.

- [12] Weilian Song, Scott Workman, Armin Hadzic, Reginald Souleyrette, Eric Green, Mei Chen, Xu Zhang, and Nathan Jacobs. Farsa: Fully automated roadway safety assessment. In *IEEE Winter Conference on Applications of Computer Vision*, 2018.
- [13] Connor Greenwell, Scott Workman, and Nathan Jacobs. What goes where: Predicting object distributions from above. In *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2018.
- [14] Tawfiq Salem, Menghua Zhai, Scott Workman, and Nathan Jacobs. A multimodal approach to mapping soundscapes. In *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2018.
- [15] Derek Jones, Jeevith Bopaiah, Fatemah Alghamedy, Nathan Jacobs, Heidi Weiss, Wibe A De Jong, and Sally Ellingson. Polypharmacology within the full kinome: a machine learning approach. In *AMIA Informatics Summit*, 2018.
- [16] Derek Jones, Nathan Jacobs, and Sally Ellingson. Learning deep feature representations for kinase polypharmacology. In *ACM Richard Tapia Celebration of Diversity in Computing Conference*, 2018.
- [17] Xiaofei Zhang, Yi Zhang, Erik Han, Nathan Jacobs, Qiong Han, Xiaoqin Wang, and Jinze Liu. Whole mammogram image classification with convolutional neural networks. In *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, 2017. Acceptance rate: 19%.
- [18] Scott Workman, Menghua Zhai, David Crandall, and Nathan Jacobs. A unified model for near/remote sensing. In *IEEE International Conference on Computer Vision (ICCV)*, 2017.
- [19] Scott Workman, Richard Souvenir, and Nathan Jacobs. Understanding and mapping natural beauty. In *IEEE International Conference on Computer Vision (ICCV)*, 2017.
- [20] Nam Vo, Nathan Jacobs, and James Hays. Revisiting im2gps in the deep learning era. In *IEEE International Conference on Computer Vision (ICCV)*, 2017.
- [21] Menghua Zhai, Zach Bessinger, Scott Workman, and Nathan Jacobs. Predicting ground-level scene layout from aerial imagery. In *IEEE Computer Vision and Pattern Recognition (CVPR)*, 2017.
- [22] Zachary Bessinger, Chris Stauffer, and Nathan Jacobs. Who goes there? approaches to mapping facial appearance diversity. In *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL)*, 2016.
- [23] Scott Workman, Menghua Zhai, and Nathan Jacobs. Horizon lines in the wild. In *British Machine Vision Conference (BMVC)*, 2016.
- [24] Menghua Zhai, Scott Workman, and Nathan Jacobs. Camera geo-calibration using an mcmc approach. In *IEEE International Conference on Image Processing (ICIP)*, 2016.
- [25] Zachary Bessinger and Nathan Jacobs. Quantifying curb appeal. In *IEEE International Conference on Image Processing (ICIP)*, 2016.
- [26] Menghua Zhai, Scott Workman, and Nathan Jacobs. Detecting vanishing points using global image context in a non-manhattan world. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2016.
- [27] Tawfiq Salem, Scott Workman, Menghua Zhai, and Nathan Jacobs. Analyzing human appearance as a cue for dating images. In *IEEE Winter Conference on Applications of Computer Vision (WACV)*, pages 1–8, 2016.
- [28] Ryan Baltenberger, Menghua Zhai, Connor Greenwell, Scott Workman, and Nathan Jacobs. A fast method for estimating transient scene properties. In *IEEE Winter Conference on Applications of Computer Vision (WACV)*, pages 1–8, 2016.

- [29] Radu Paul Mihail, Scott Workman, Zach Bessinger, and Nathan Jacobs. Sky segmentation in the wild: An empirical study. In *IEEE Winter Conference on Applications of Computer Vision (WACV)*, pages 1–6, 2016.
- [30] Scott Workman, Richard Souvenir, and Nathan Jacobs. Wide-area image geolocalization with aerial reference imagery. In *IEEE International Conference on Computer Vision (ICCV)*, pages 1–9, 2015.
- [31] Calvin Murdock, Nathan Jacobs, and Robert Pless. Building dynamic cloud maps from the ground up. In *IEEE International Conference on Computer Vision (ICCV)*, pages 1–9, 2015.
- [32] Scott Workman, Connor Greenwell, Menghua Zhai, Ryan Baltenberger, and Nathan Jacobs. Deepfocal: A method for direct focal length estimation. In *IEEE International Conference on Image Processing (ICIP)*, 2015. Acceptance rate: 45% (overall).
- [33] Mohammad T. Islam, Scott Workman, and Nathan Jacobs. Face2GPS: Estimating Geographic Location from Facial Features. In *IEEE International Conference on Image Processing (ICIP)*, 2015. Acceptance rate: 45% (overall).
- [34] Scott Workman, Radu Paul Mihail, and Nathan Jacobs. A Pot of Gold: Rainbows as a Calibration Cue. In *European Conference on Computer Vision (ECCV)*, pages 820–835, 2014. Acceptance rate: 25%.
- [35] Feiyu Shi, Menghua Zhai, Drew Duncan, and Nathan Jacobs. MPCA: EM-Based PCA For Mixed-Size Image Datasets. In *IEEE International Conference on Image Processing (ICIP)*, pages 1807–1811, 2014. Acceptance rate: 40%.
- [36] Ann Whitney, John Fessler, John Parker, and Nathan Jacobs. Received Signal Strength Indication Signature for Passive UHF Tags. In *IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, pages 1183–1187, 2014.
- [37] Menghua Zhai, Feiyu Shi, Drew Duncan, and Nathan Jacobs. Covariance-Based PCA for Multi-Size Data. In *International Conference on Pattern Recognition (ICPR)*, pages 1603–1608, 2014. Acceptance rate: 56.2%.
- [38] Mohammad T. Islam, Scott Workman, Hui Wu, Richard Souvenir, and Nathan Jacobs. Exploring the Geo-Dependence of Human Face Appearance. In *IEEE Winter Conference on Applications of Computer Vision (WACV)*, pages 1042–1049, 2014. Acceptance rate: 40%.
- [39] Nathan Jacobs, Joshua King, Daniel Bowers, and Richard Souvenir. Estimating Cloud Maps from Outdoor Image Sequences. In *IEEE Winter Conference on Applications of Computer Vision (WACV)*, pages 961–968, 2014. Acceptance rate: 40%.
- [40] Radu Paul Mihail, Gustav Blomquist, and Nathan Jacobs. A CRF Approach to Fitting a Generalized Hand Skeleton Model. In *IEEE Winter Conference on Applications of Computer Vision (WACV)*, pages 409–416, 2014. Acceptance rate: 40%.
- [41] Nathan Jacobs, Scott Workman, and Richard Souvenir. Scene Geometry from Several Partly Cloudy Days. In *ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC)*, pages 1–6, 2013.
- [42] Radu Paul Mihail, Judy Goldsmith, Nathan Jacobs, and Jerzy Jaromczyk. Teaching Graphics for Games using Microsoft XNA. In *International Conference on Computer Games (CGAMES)*, pages 36–40, 2013. Best Student Paper Award (runner-up).
- [43] Nathan Jacobs, Mohammad T. Islam, and Scott Workman. Cloud Motion as a Calibration Cue. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 1344–1351, 2013. Acceptance rate: 26.2%.
- [44] Michael Dixon, Austin Abrams, Nathan Jacobs, and Robert Pless. On Analyzing Video with Very Small Interesting Motions. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 1–8, 2011. Acceptance rate: 26.4%.

- [45] Austin Abrams, Nick Fridrich, Nathan Jacobs, and Robert Pless. Participatory Integration of Live Webcams into GIS. In *International Conference on Computing for Geospatial Research and Applications (COM.GEO)*, pages 1–8, 2010.
- [46] Nathan Jacobs, Brian Bies, and Robert Pless. Using Cloud Shadows to Infer Scene Structure and Camera Calibration. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 1102–1109, June 2010. Acceptance rate: 4.5% (oral).
- [47] Nathan Jacobs, Stephen Schuh, and Robert Pless. Compressive Sensing and Differential Image Motion Estimation. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, pages 718–721, March 2010. Acceptance rate (oral) = 10%, (overall) = 48%.
- [48] Nathan Jacobs, Walker Burgin, Nick Fridrich, Austin Abrams, Kyla Miskell, Bobby H. Braswell, Andrew D. Richardson, and Robert Pless. The Global Network of Outdoor Webcams: Properties and Applications. In *ACM International Conference on Advances in Geographic Information Systems (ACM/SIGSPATIAL GIS)*, pages 111–120, November 2009. Acceptance rate: 20.9%.
- [49] Michael Dixon, Nathan Jacobs, and Robert Pless. An Efficient System for Vehicle Tracking in Multi-Camera Networks. In *ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC)*, pages 1–8, September 2009.
- [50] Nathan Jacobs, Scott Satkin, Nathaniel Roman, Richard Speyer, and Robert Pless. Geolocating Static Cameras. In *IEEE International Conference on Computer Vision (ICCV)*, pages 1–6, October 2007. Acceptance rate: 23%.
- [51] Nathan Jacobs, Nathaniel Roman, and Robert Pless. Consistent Temporal Variations in Many Outdoor Scenes. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 1–6, June 2007. Acceptance rate: 23.4%.
- [52] Terry Anderson, Ali Hussam, Bill Plummer, and Nathan Jacobs. Pie charts for visualizing query term frequency in search results. In *International Conference on Asian Digital Libraries (ICADL)*, 2002.
- [53] Ali Hussam, Terry Anderson, Nathan Jacobs, Damon Eckhoff, Ali Merayyan, and Yunhai Yang. Semantic Highlighting: Enhancing Search Engine Display and Web Document Interactivity. In *IFIP Conference on Human-Computer Interaction (INTERACT)*, September 1999.

Refereed Workshop Publications

- [54] Scott Workman and Nathan Jacobs. On the location dependence of convolutional neural network features. In *IEEE/ISPRS Workshop: Looking from above: When Earth observation meets vision (EARTHVISION)*, pages 1–9, 2015. Acceptance rate: 30%.
- [55] Connor Greenwell, Scott Spurlock, Richard Souvenir, and Nathan Jacobs. GeoFaceExplorer: Exploring the Geo-Dependence of Facial Attributes. In *ACM SIGSPATIAL International Workshop on Crowdsourced and Volunteered Geographic Information (GEOCROWD)*, pages 32–37, 2014.
- [56] Mohammad T. Islam, Nathan Jacobs, Hui Wu, and Richard Souvenir. Images+Weather: Collection, Validation, and Refinement. In *IEEE CVPR Workshop on Ground Truth*, pages 1–7, 2013. Acceptance rate: 67%.
- [57] Calvin Murdock, Nathan Jacobs, and Robert Pless. Webcam2Satellite: Estimating Cloud Maps from Webcam Imagery. In *IEEE Workshop on Applications of Computer Vision (WACV)*, pages 214–221, 2013. Acceptance rate: 40%.
- [58] Radu Paul Mihail, Nathan Jacobs, and Judy Goldsmith. Real Time Gesture Recognition With 2 Kinect Sensors. In *International Conference on Image Processing, Computer Vision, and Pattern Recognition (IPCV)*, pages 1–7, 2012.

- [59] Austin Abrams, Jim Tucek, Nathan Jacobs, and Robert Pless. LOST: Longterm Observation of Scenes (with Tracks). In *IEEE Workshop on Applications of Computer Vision (WACV)*, pages 297–304, 2012. Acceptance rate: 44%.
- [60] Nathan Jacobs, Kyla Miskell, and Robert Pless. Webcam Geo-localization using Aggregate Light Levels. In *IEEE Workshop on Applications of Computer Vision (WACV)*, pages 132–138, 2011.
- [61] Nathan Jacobs, Richard Souvenir, and Robert Pless. Passive vision: The Global Webcam Imaging Network. In *Applied Imagery Pattern Recognition Workshop (AIPR)*, pages 1–8, 2009. Best Student Paper.
- [62] Robert Pless, Nathan Jacobs, Michael Dixon, Ralph Hartley, Patrick Baker, Derek Brock, Nick Cassimatis, and Dennis Perzanowski. Persistence and Tracking: Putting Vehicles and Trajectories in Context. In *Applied Imagery Pattern Recognition Workshop (AIPR)*, 2009.
- [63] Nathan Jacobs, Michael Dixon, Scott Satkin, and Robert Pless. Efficient Tracking of Many Objects in Structured Environments. In *IEEE ICCV Workshop on Visual Surveillance*, pages 1161–1168, October 2009.
- [64] Nathan Jacobs and Robert Pless. Calibrating and Using the Global Network of Outdoor Webcams. In *ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC)*, pages 1–2, September 2009. Winner PhD Forum Prize.
- [65] Nathan Jacobs, Walker Burgin, Richard Speyer, David Ross, and Robert Pless. Adventures in Archiving and Using Three Years of Webcam Images. In *IEEE CVPR Workshop on Internet Vision*, pages 39–46, June 2009.
- [66] Nathan Jacobs, Michael Dixon, and Robert Pless. Location-specific Transition Distributions for Tracking. In *IEEE Workshop on Motion and Video Computing (WMVC)*, January 2008. Acceptance rate: 33.3%.
- [67] Nathan Jacobs, Nathaniel Roman, and Robert Pless. Toward Fully Automatic Geo-Location and Geo-Orientation of Static Outdoor Cameras. In *IEEE Workshop on Applications of Computer Vision (WACV)*, pages 1–6, January 2008. Acceptance rate: 33.3%.
- [68] Nathan Jacobs and Robert Pless. Shape Background Modeling: The Shape of Things That Came. In *IEEE Workshop on Motion and Video Computing (WMVC)*, pages 1–6, February 2007.
- [69] Nathan Jacobs and Robert Pless. Real-time Constant Memory Visual Summaries for Surveillance. In *ACM International Workshop on Visual Surveillance and Sensor Networks (VSSN)*, October 2006.
- [70] Michael Dixon, Nathan Jacobs, and Robert Pless. Finding Minimal Parameterizations of Cylindrical Image Manifolds. In *IEEE CVPR Workshop on Perceptual Organization in Computer Vision (POCV)*, pages 1–8, June 2006.

Abstracts

- [71] Weilian Song, Tawfiq Salem, Nathan Jacobs, and Michael 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.
- [72] Nathan Jacobs, Scott Workman, and Menghua Zhai. Crossview convolutional networks. In *IEEE Applied Imagery and Pattern Recognition (AIPR)*, 2016.
- [73] J. David Smith, Ryan Baltenberger, Scott Workman, and Nathan Jacobs. User-in-the-Loop Calibration and Mensuration. In *National Conference on Undergraduate Research (NCUR)*, 2014.
- [74] XuZi Zhou, Scott Workman, Mohammad T. Islam, Nathan Jacobs, and James Griffioen. Cyber Infrastructure for the VOEIS Project. In *Symposium in the Mathematical, Statistical and Computer Sciences*, 2013. Best Student Presentation.

- [75] Scott Workman, James Knochelmann, Nathan Jacobs, David S. White, and Richard Hauer. Registration and Visualization of Scientific Aerial Imagery at Kentucky Lake. In *Kentucky EPSCoR Conference*, 2012.
- [76] Ethan Welty, Tad Pfeffer, Shad O’Neel, and Nathan Jacobs. Calving Dynamics of the Columbia Glacier, AK (2000-2011 Update). In *Workshop on the Dynamics and Mass Budget of Arctic Glaciers*, 2012.
- [77] Peisheng Wang, Siddhartha Bhattacharyya, David White, and Nathan Jacobs. Visualization of Kentucky Lake. In *Kentucky EPSCoR Conference*, 2011.
- [78] Tom Milliman, Koen Hufkins, Isaac Lavine, Nathan Jacobs, Robert Pless, Andrew Richardson, and Steve Frolking. The PhenoCam Website: Adventures in “Crowd-Sourcing” Data Collection, Distribution and Analysis. In *American Geophysical Union Annual Meeting*, 2011.

Datasets

- [79] Scott Workman, Menghua Zhai, and Nathan Jacobs. Horizon Lines in the Wild: A large database of images with known horizon-line location. <http://hlw.csr.uky.edu>.
- [80] Mohammad T. Islam, Connor Greenwell, and Nathan Jacobs. GeoFaces: A large database of geolocated face patches. <http://geofaces.csr.uky.edu>.
- [81] Nathan Jacobs, Robert Pless, Austin Abrams, and many others (see website for details). AMOS: The Archive of Many Outdoor Scenes. <http://amos.cse.wustl.edu>.
- [82] Austin Abrams, Jim Tucek, Joshua Little, Nathan Jacobs, and Robert Pless. LOST: Longterm Observation of Scenes (with Tracks). <http://lost.cse.wustl.edu>.

Other Publications

- [83] Nathan Jacobs, Stephen Schuh, and Robert Pless. On Unusual Pixel Shapes and Image Motion. Technical Report WUCSE-2009-16, Computer Science and Engineering, Washington University in St. Louis, MO, USA, June 2009.
- [84] Austin Abrams, Chris Hawley, Kyla Miskell, Adina Stoica, Nathan Jacobs, and Robert Pless. Shadow estimation method for “The Episolar Constraint: Monocular Shape from Shadow Correspondence”. *arXiv preprint arXiv:1304.4112*, 2013.

Funding

Grants (awarded/active)

1. *CAREER: Learning and Using Models of Geo-Temporal Appearance*
 PI: Nathan Jacobs
 Sponsor: National Science Foundation (NSF)
 Amount Funded: \$499,426
 Duration: 2016–2021
2. *Crossview ConvNets for Near/Remote Sensing*
 PI: Nathan Jacobs
 Sponsor: Google
 Amount Funded: \$46,209
 Duration: 2016–2017

3. *GeoLookbook: Modeling Worldwide Human Visual Appearance*
 PI: Nathan Jacobs
 Sponsor: National Geospatial Intelligence Agency (NGA, New Investigator Program)
 Amount Funded: \$299,204
 Duration: 2014–2018
4. *Monomeric G-proteins and Cardioprotection from Heart Failure (R01)*
 PI: John Satin
 Co-PI(s): Douglas Andres, Ahmed Abdel-Latif, Nathan Jacobs, Peter Kekenos-Huskey
 Sponsor: National Institute of Health (NIH)
 Amount Funded: \$1,575,279
 Duration: 2016–2020
5. *Mechanism of a Novel Stable Compensatory Cardiac Hypertrophy Model*
 PI: Jonathan Satin
 Co-PI(s): Douglas Andres, Nathan Jacobs, Moriel Vandsburger
 Sponsor: American Heart Association
 Amount Funded: \$154,000
 Duration: 2016–2018

Grants (completed)

1. *WALDO: Wide Area Localization of Depicted Objects*
 PI: Nathan Jacobs
 Sponsor: Intelligence Advanced Research Projects Activity (subcontract through Object Video Inc.)
 Amount Funded: \$373,395
 Duration: 2012–2016
2. *ContextualEyes: A Context-Aware Surveillance System*
 PI: Nathan Jacobs
 Sponsor: Defense Advanced Research Projects Agency (DARPA)
 Amount Funded: \$743,131
 Duration: 2011–2015
3. *Image-Net: Discriminatory Imaging and Network Advancement for Missiles, Aviation, and Space*
 PI: Brent Seales
 Co-PI(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
 Amount Funded: \$2,092,905
 Duration: 2011–2012

Donations

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. <i>NVIDIA Titan X (Maxwell) GPU</i>
 PI: Nathan Jacobs
 Sponsor: NVIDIA Corporation
 Amount Funded: \$778
 Date: October 2016 2. <i>AWS Research Education Grant</i> | <ol style="list-style-type: none"> 3. <i>NVIDIA Tesla K40 GPU</i>
 PI: Nathan Jacobs |
|--|---|

Sponsor: NVIDIA Corporation
Amount Funded: \$3,900
Date: December 2014

PI: Nathan Jacobs
Sponsor: OMRON Corporation
Amount Funded: -
Date: May 2013

4. *OKAO Vision Software*

Talks

- “WhatGoesWhere: Predicting Object Distributions from Above”, July 2018, IGARSS, Valencia, Spain
- “Building World Models for Situated Training and Planning”, May 2018, Air Force Science and Technology 2030 Workshop, Bloomington, IN
- “Recent Advances in Image Understanding”, May 2018, DASC, Lexington, KY
- “(Tutorial) Recent Advances in Deep Learning: Fusing Overhead and Ground-Level Views for Remote Sensing”, April 2018, USGIF Annual Symposium, Tampa, FL
- “Understanding Places Using Ground-Level and Overhead Views”, Feb 2018, CVPR Area Chair Meeting, Toronto, Canada
- “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 3)”, Sep. 2017, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
- “GPU Accelerated Computer Vision, Remote Sensing, and Machine Learning”, Aug. 2017, Kentucky Geological Service, Lexington, KY
- “Fusing Overhead and Ground-Level Imagery to Improve Scene Understanding”, July 2017, Planet, San Francisco, CA
- “Learning about When and Where from Imagery”, June 2017, Orbital Insight, Mountain View, CA
- “(Tutorial) Recent Advances in Deep Learning: Fusing Overhead and Ground-Level Views for Remote Sensing”, June 2017, USGIF Annual Symposium, San Antonio, TX
- “How Computers See People (extended)”, May 2017, CCTS Biomedical Informatics Seminar Series, Lexington, KY
- “Understanding Places Using Ground-Level and Overhead Views”, May 2017, Midwest Vision Meeting, Chicago, IL
- “How Computers See People”, Feb. 2017, Suds’n’Science Speaker Series, West Sixth Brewing, Lexington, KY
- “Learning about When and Where from Imagery”, Feb. 2017, University of Missouri, Department of Computer Science
- “Localization, Mapping, and Image Understanding”, Feb. 2017, USGIF Machine Learning Symposium
- “Deep Convolutional Neural Networks: Concepts and Examples (in Computer Vision)”, Nov. 2016, University of Kentucky, Society of Industrial and Applied Mathematics
- “Crossview Convolutional Networks”, Oct. 2016, Applied Imagery and Pattern Recognition, Washington, D.C.
- “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 2)”, Sep. 2016, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
- “Deep Convolutional Neural Networks: Concepts and Examples”, Jul. 2016, University of Kentucky: Systems Biology and Omics Integration Seminar

- “Crossview Methods for Localization and Mapping”, Jun. 2016, IEEE CVPR Workshop on “Vision from Satellite to Street” (invited talk)
- “A Fast Method for Estimating Transient Scene Properties”, Mar. 2016, Winter Conference on Applications of Computer Vision, Lake Placid, NY
- “Novel Cues for Geocalibration”, Feb. 2016, Indiana University, Bloomington, IN
- “Novel Cues for Camera Geocalibration”, Jan. 2016, Uber Advanced Technology Center, Pittsburgh, PA
- “Novel Cues for Geocalibration: Cloudy Days, Rainbows, and More”, Oct. 2015, Carnegie Mellon University, Pittsburgh, PA
- “Using Geotagged Internet Imagery to Understand the World”, Sep. 2015, Université Laval, Quebec City, Canada
- “face2gps: Estimating Geographic Location from Facial Features”, Sep. 2015, International Conference on Image Processing, Quebec City, Canada
- “GeoLookbook: Modeling Worldwide Human Visual Appearance”, Sep. 2015, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
- “Exploring the Geo-Dependence of Human Face Appearance”, Mar. 2014, Winter Conference on Applications of Computer Vision, Steamboat Springs, CO
- “Estimating Cloudmaps from Outdoor Image Sequences”, Mar. 2014, Winter Conference on Applications of Computer Vision, Steamboat Springs, CO
- “Scene Geometry from Several Partly Cloudy Days”, Oct. 2013, International Conference on Distributed Smart Cameras, Palm Springs, CA
- “Unlocking the Potential of the Global Network of Outdoor Webcams”, Apr. 2013, Rochester Institute of Technology
- “Geo-temporal Computer Vision: Applications to the NGA”, Nov. 2011, National Geospatial-Intelligence Agency
- “Geo-temporal Computer Vision: Applications to the Army”, Oct. 2011, Army Research Lab
- “Localizing, Calibrating, and Using Thousands of Outdoor Webcams”, Feb. 2011, University of North Carolina–Charlotte
- “Using Clouds Shadows to Infer Scene Structure and Camera Calibration”, Jun. 2010, CVPR, San Francisco, CA
- “Passive Vision and The Power of Collective Imaging”, Apr. 2010, Object Video Inc., Reston, VA
- “Localizing, Calibrating, and Using Thousands of Outdoor Webcams”, Apr. 2010, University of Kentucky
- “Time-Lapse Vision: Localizing, Calibrating, and Using Thousands Outdoor Webcams”, Apr. 2010, Google, Mountain View, CA
- “Passive Vision and The Power of Collective Imaging”, Jan. 2010, Google, Mountain View, CA
- “Incorporating Domain Constraints in Urban Vehicle Tracking”, Nov. 2010, University of Missouri, Columbia, MO
- “Compressive Sensing and Differential Image-Motion Estimation”, Mar. 2010, ICASSP, Dallas, TX
- “The Global Network of Outdoor Webcams: Properties and Applications”, Nov. 2009, ACM GIS, Seattle, WA

- “Passive Vision: The Global Webcam Imaging Network”, Oct. 2009, AIPR, Washington, DC
- “Calibrating and Using the Global Network of Outdoor Webcams”, Aug. 2009, ICDSC, Italy
- “Adventures in Archiving and Using Three Years of Webcam Images”, Jun. 2009, CVPR Workshop on Internet Vision, Miami, FL
- “Recent Work: Webcams and Grooves”, Aug. 2009, Object Video, Reston, VA
- “Location-Specific Models for Tracking”, Jan. 2008, WMVC, Copper Mountain, CO
- “Using natural cues to geo-locate and geo-orient distributed cameras”, Jan. 2008, VISN, Copper Mountain, CO
- “Foreground Modeling: The Shape of Things That Came”, Feb. 2007, WMVC, Austin, Texas

Service

University Service

- 2018–: University Sentate
- 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
- 2013–2017: Computer Science Department: Faculty Search Committee
- 2013: Center for Visualization and Virtual Environment: Director Search Committee
- 2013: Computer Science Department: Chair Search Committee
- 2012–2013: Computer Science Department: Curriculum Development Committee
- 2012–2013, 2015: University of Kentucky Engineering Day (EDay) participant, giving an oral presentation and/or software demonstrations

Professional Service

- Doctoral Consortium Co-Chair: IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2019)
- PhD Forum Chair: IEEE Winter Conference on Applications of Computer Vision (WACV 2018)
- Doctoral Consortium Co-Chair: IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2017)
- Video Proceedings Chair: IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2015)
- Area Chair for:
 - IEEE Computer Vision and Pattern Recognition (CVPR 2018)
 - IEEE Winter Application and Computer Vision Conference (WACV 2014)
- Co-Organizer: IEEE Workshop on Motion and Video Computing (WMVC 2011)
- Session Chair for:
 - IEEE Winter Conference on Computer Vision (WACV 2016)

- IEEE/ACM International Conference on Distributed Smart Cameras (ICDSC 2013)
- Guest Editor, Computer Vision and Image Understanding (CVIU), Special Issue “Computer Vision for Remote Sensing”
- Reviewing for Journals:
 - IEEE Transactions on Geoscience and Remote Sensing (2017)
 - IEEE Transactions on Computational Imaging (2016)
 - IEEE Journal on Selected Topics in Remote Sensing (2015)
 - Computer Vision and Image Understanding (2010, 2013, 2016×2)
 - Machine Vision and Applications (MVAP) (2014)
 - Elsevier Image and Vision Computing (IVC) (2013)
 - IEEE Sensors (2014)
 - IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI) (2011, 2011, 2012)
 - IEEE Transactions on Multimedia (2011,2016)
 - IEEE Transactions on Circuits and Systems for Video Technology (CSVT) (2007, 2008, 2009, 2010, 2011)
 - IEEE Computer Graphics and Applications (2010)
 - IEEE Transactions on Aerospace and Electronic Systems (2010)
 - Computers and Electronics in Agriculture (2010)
 - Cartography and Geographic Information Science (2010)
- Program Committee / Reviewer for:
 - Conferences
 - * IEEE International Conference on Robotics and Automation (ICRA) (2016)
 - * IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (2006–, Outstanding Reviewer 2017)
 - * International Conference on Machine Learning (ICML) (2012)
 - * IEEE International Conference on Computer Vision (ICCV) (2007, 2009)
 - * Asian Conference on Computer Vision (ACCV) (2010,2016)
 - * Neural Information Processing Systems (NIPS) (2010–2012)
 - * European Conference on Computer Vision (ECCV) (2010, 2014)
 - * IEEE International Conference on Advanced Video and Signal-Based Surveillance (AVSS) (2010)
 - Workshops
 - * DeepGlobe Satellite Challenge (2018, Held at CVPR)
 - * IEEE/ISPRS Workshop (Held at CVPR) EARTHVISION: Looking from above: When Earth observation meets vision (2017)
 - * The Second ACM International Workshop on Geotagging and Its Applications (2013)
 - * ICCV Workshop on Computer Vision for Converging Perspectives (CVCP) (2013)
 - * ECCV Workshop on Visual Analysis and Geo-Localization of Large-Scale Imagery (2012)
 - * IEEE Workshop on Motion and Video Computation (WMVC) (2009–2011)
 - * IEEE Workshop on Applications of Computer Vision (WACV) 2012–2013
 - * ACM Workshop on Geotagging and Its Applications in Multimedia (2012)
 - * ACM Workshop on Video Surveillance and Sensor Networks (VSSN)

- Reviewing for Funding Agencies:
 - Panelist for NSF Division of Industrial Innovation and Partnerships (2016)
 - Panelist for NSF Information and Intelligent Systems Division (2016)
 - Panelist for NSF Information and Intelligent Systems Division (2015)
 - External reviewer for NSF Information and Intelligent Systems Division (2015)
 - External reviewer for Fonds de recherche du Quebec (2014)

Memberships

- Senior Member: Institute of Electrical and Electronics Engineers (IEEE)

Teaching

Courses Taught

- *Computer Vision*, CS 636, (S2011, S2013, S2017), University of Kentucky
- *Introduction to Machine Learning*, CS 460g, (every Fall semester 2012–2016), 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
- *Independent Work in Computer Science*, CS 395/612, University of Kentucky:
 - S2016, “Applied Deep Learning: Understanding Urban Areas”
 - S2015, “Understanding Real-Estate Imagery”
 - F2014, “Recent Techniques in Machine Learning” (×4)
 - F2014, “Learning-Based Methods for Background Subtraction”
 - F2014, “A Novel Approach for Category-Level Object Detection from Partial Pose Estimation of Symmetric Objects”
 - S2013, “Extracting Geo-Temporal Image Appearance Patterns from Flickr Imagery”
 - S2013, “Automatic Camera Calibration Methods”
 - S2013, “Deep-Learning Architectures for Computer Vision”
 - F2012, “Automatic Image Geolocalization”
 - S2012, “Image Calibration using Natural Scene Variations”
 - F2011, “Practical Methods in Crowd Sourcing”
- *Intermediate Topics in Computer Science: Computational Photography*, CS 585, (F2010,F2011), University of Kentucky
- *Theory of Computation*, CECS 341, (F2002), University of Missouri