

# 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

<b>Associate Professor of Computer Science</b> 2016–present		University of Kentucky <i>Lexington, KY</i>
<b>Visiting Research Scientist</b> 2017–present		Orbital Insight <i>Mountain View, CA</i>
<b>Member</b> 2017–present	Institute for Biomedical Informatics, University of Kentucky	<i>Lexington, KY</i>
<b>Affiliated Faculty</b> 2013–present	Unmanned Systems Research Consortium, University of Kentucky	<i>Lexington, KY</i>
<b>Affiliated Faculty</b> 2010–present	Center for Visualization and Virtual Environments, University of Kentucky	<i>Lexington, KY</i>
<b>Assistant Professor of Computer Science</b> 2010–2016		University of Kentucky <i>Lexington, KY</i>
<b>Graduate Research Assistant</b> 2005–2010		Washington University <i>St. Louis, MO</i>
<b>Research Intern</b> Summer 2008		Object Video <i>Reston, VA</i>
<b>Software Developer</b> 1998–2005		University of Missouri <i>Columbia, MO</i>

## Awards

- 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] 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.
- [2] 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.
- [3] 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.
- [4] 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.
- [5] 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.
- [6] 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

- [7] 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

- [8] Nam Vo, Nathan Jacobs, and James Hays. Revisiting im2gps in the deep learning era. In *IEEE International Conference on Computer Vision (ICCV)*, 2017.

### Refereed Conference Publications

- [9] 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.
- [10] Scott Workman, Richard Souvenir, and Nathan Jacobs. Understanding and mapping natural beauty. In *IEEE International Conference on Computer Vision (ICCV)*, 2017.
- [11] Nam Vo, Nathan Jacobs, and James Hays. Revisiting im2gps in the deep learning era. In *IEEE International Conference on Computer Vision (ICCV)*, 2017.
- [12] 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.

- [13] 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.
- [14] Scott Workman, Menghua Zhai, and Nathan Jacobs. Horizon lines in the wild. In *British Machine Vision Conference (BMVC)*, 2016.
- [15] Menghua Zhai, Scott Workman, and Nathan Jacobs. Camera geo-calibration using an mcmc approach. In *IEEE International Conference on Image Processing (ICIP)*, 2016.
- [16] Zachary Bessinger and Nathan Jacobs. Quantifying curb appeal. In *IEEE International Conference on Image Processing (ICIP)*, 2016.
- [17] 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.
- [18] 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.
- [19] 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.
- [20] 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.
- [21] 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.
- [22] 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.
- [23] 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).
- [24] 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).
- [25] 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%.
- [26] 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%.
- [27] 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.
- [28] 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%.
- [29] Mohammad T. Islam, Scott Workman, Hui Wu, Richard Souvenir, and Nathan Jacobs. Exploring the Ge-Dependence of Human Face Appearance. In *IEEE Winter Conference on Applications of Computer Vision (WACV)*, pages 1042–1049, 2014. Acceptance rate: 40%.

- [30] 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%.
- [31] 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%.
- [32] 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.
- [33] 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).
- [34] 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%.
- [35] 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%.
- [36] 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.
- [37] 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).
- [38] 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%.
- [39] 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%.
- [40] 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.
- [41] 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%.
- [42] 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%.
- [43] 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.
- [44] 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

- [45] 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%.
- [46] 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.
- [47] 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%.
- [48] 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%.
- [49] 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 (ICCV)*, pages 1–7, 2012.
- [50] 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%.
- [51] 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.
- [52] 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.
- [53] 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.
- [54] 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.
- [55] 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.
- [56] 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.
- [57] 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%.
- [58] 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%.
- [59] 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.
- [60] 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.

- [61] 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

- [62] 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.
- [63] Nathan Jacobs, Scott Workman, and Menghua Zhai. Crossview convolutional networks. In *IEEE Applied Imagery and Pattern Recognition (AIPR)*, 2016.
- [64] 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.
- [65] 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.
- [66] 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.
- [67] 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.
- [68] Peisheng Wang, Siddhartha Bhattacharyya, David White, and Nathan Jacobs. Visualization of Kentucky Lake. In *Kentucky EPSCoR Conference*, 2011.
- [69] 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

- [70] 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>.
- [71] Mohammad T. Islam, Connor Greenwell, and Nathan Jacobs. GeoFaces: A large database of geolocated face patches. <http://geofaces.csr.uky.edu>.
- [72] 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>.
- [73] 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

- [74] 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.
- [75] Austin Abrams, Chris Hawley, Kyliia 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 (R56)*  
PI: John Satin  
Co-PI(s): Douglas Andres, Ahmed Abdel-Latif, Nathan Jacobs, Janet Manning, Moriel Vandsburger, Peter Kekenos-Huskey  
Sponsor: National Institute of Health (NIH)  
Amount Funded: \$524,989  
Duration: 2016–2017
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 Trzuszczynski, 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

1. *NVIDIA Titan X (Maxwell) GPU*

PI: Nathan Jacobs

Sponsor: NVIDIA Corporation

Amount Funded: \$778

Date: October 2016

3. *NVIDIA Tesla K40 GPU*

PI: Nathan Jacobs

Sponsor: NVIDIA Corporation

Amount Funded: \$3,900

Date: December 2014

2. *AWS Research Education Grant*

PI: Nathan Jacobs

Sponsor: Amazon, Inc.

Amount Funded: \$5,000

Date: July 2015

4. *OKAO Vision Software*

PI: Nathan Jacobs

Sponsor: OMRON Corporation

Amount Funded: -

Date: May 2013

## Talks

- “GeoLookbook: Modeling Worldwide Human Visual Appearance (Year 2)”, Sep. 2016, National Academy of Sciences (IC Academic Research Symposium), Washington, DC
- “Crossview Convolutional Networks”, Oct. 2016, Applied Imagery and Pattern Recognition, Washington, D.C.
- “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

- Member of the Unmanned Systems Research Consortium
- Member of the Center for Visualization and Virtual Environments
- 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

- Organizing Committee for:
  - Video Proceedings Chair for IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2015)
  - Co-chair for IEEE Workshop on Motion and Video Computing (WMVC 2011)
- Area Chair for:
  - IEEE Winter Application and Computer Vision Conference (WACV 2014)
- Session Chair for:
  - IEEE Winter Conference on Computer Vision (WACV 2016)
  - IEEE/ACM International Conference on Distributed Smart Cameras (ICDSC 2013)
- Reviewing for Journals:
  - 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–)
    - \* 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
    - \* 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)

## Affiliations

- 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