

Gunhee Kim, Ph.D.

Assistant professor
Department of Computer Science and Engineering,
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Research Interests

Computer Vision, Machine Learning, Optimization, Data Mining, and Robotics

Education

- Ph.D. in Computer Science, **Carnegie Mellon University** Sept 2009 – Sept 2013
Thesis: Reconstruction and Applications of Collective Storylines from Web Photo Collections
Advisor: Prof. Eric P. Xing
Committee: Prof. Takeo Kanade, Prof. Christos Faloutsos, Prof. Antonio Torralba (MIT)
- M.S. in Robotics, **Carnegie Mellon University** Aug 2006 – May 2008
Thesis: Link Analysis Techniques for Object Modeling and Recognition
Advisor: Prof. Martial Hebert *Committee:* Prof. Christos Faloutsos
- B.S. and M.S. in Mechanical Engineering, **KAIST** (Korea Advanced Institute of Science and Technology)

Research Appointments

- Assistant Professor** Feb 2015 – Current
Seoul National University, Department of Computer Science and Engineering, Seoul, Korea
- Postdoctoral Researcher** Sept 2013 – Jan 2015
Disney Research Pittsburgh, PA, USA
- Graduate Research Assistant** Aug 2009 – Sept 2013
Computer Science Department, Carnegie Mellon University, Pittsburgh, PA, USA
- Visiting Student** Jan 2011 – Apr 2011
Computer Science Department, Stanford University, Stanford, CA, USA (with Prof. Fei-Fei Li).
- Visiting Student** Feb 2009 – June 2009
Computer Science and Artificial Intelligence Laboratory, MIT, Cambridge, MA, USA
(with Prof. Antonio Torralba)
- Research Intern** Sept 2008 – Jan 2009
Honda Research Institute, Cambridge, MA, USA (with Dr. Bernd Heisele)
- Intel/CMU Summer Fellow** May 2008 – Aug 2008
Intel Research, Pittsburgh, PA, USA (with Dr. Rahul Sukthankar and Dr. Shimin Chen)
- Part-time Programmer** June 2008 – August 2008
BimagicLab, Department of Biomedical Engineering, Carnegie Mellon University, Pittsburgh, PA, USA
(with Prof. Jelena Kovacevic)
- Graduate Research Assistant** Aug 2006 – May 2008
The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, USA (with Prof. Martial Hebert)

Visiting Researcher	Apr 2005 – July 2006
The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, USA (with Prof. Martial Hebert)	
Research Scientist	Aug 2001 – July 2006
Intelligent Robotics Research Center, Korea Institute of Science and Technology (KIST) , Seoul, Korea	
Graduate Research Assistant	Mar 1999 – July 2001
Robotics and Simulation Lab, KAIST, Taejon, Korea	

Awards and Fellowships

Winners of two tracks of LSMDC 2016 Challenge (*Annotation and Retrieval*, and *Fill-in-the-Blank*), Oct 16, 2016.

2015 Naver New faculty award, Dec 23, 2015.

2014 SIGKDD Doctoral Dissertation Award, Aug 26, 2014.

Best paper award at IEEE Workshop on Large Scale Visual Commerce (LSVisCom) in conjunction with ICCV 2013, Dec 7, 2013.

Travel awards from KDD 2012 (Jun 25, 2012) and WSDM 2013 (Feb 4, 2013).

Outstanding paper award at International Conference on Control, Automation and System (ICCAS2003) (4 out of 540), Oct 24, 2003.

Graduate fellowship (full financial support) for M.S. and Ph.D. study from CMU.

Graduate fellowship (full financial support) for B.S. and M.S. study from KAIST.

Citation from Taejon Welfare Center for the Disabled, Dec 1996.

Publication

Peer-Reviewed Conferences (Selected)

1. Juyong Kim, Yookoon Park, **Gunhee Kim**, and Sung Ju Hwang. *SplitNet: Learning to Semantically Split Deep Networks for Parameter Reduction and Model Parallelization*. International Conference on Machine Learning (**ICML 2017**). Sydney, Australia, 2017.
2. Cesc Chunseong Park, Byeongchang Kim, and **Gunhee Kim**. *Attend to You: Personalized Image Captioning with Context Sequence Memory Networks*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR 2017**). Honolulu, Hawaii, 2017. (**Spotlight**) (Acceptance = 215/2680 ~ 8.0%)
3. Youngjae Yu, Hyungjin Ko, Jongwook Choi, and **Gunhee Kim**. *Supervising Neural Attention Models for Video Captioning by Human Gaze Data*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR 2017**). Honolulu, Hawaii, 2017. (**Spotlight**) (Acceptance = 215/2680 ~ 8.0%) **Winners of two tracks of LSMDC 2016** (Annotation and Retrieval, and Fill-in-the-Blank)
4. Yunseok Jang, Yale Song, Youngjae Yu, Youngjin Kim, and **Gunhee Kim**. *TGIF-QA: Toward Spatio-Temporal Reasoning in Visual Question Answering*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR 2017**). Honolulu, Hawaii, 2017. (**Spotlight**) (Acceptance = 215/2680 ~ 8.0%)
5. Youngjae Yu, Jongwook Choi, and **Gunhee Kim**. *Supervising Neural Attention Models for Video Captioning by Human Gaze Data*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR 2017**). Honolulu, Hawaii, 2017. (Acceptance = 783/2680 ~ 29.2%)
6. Chulmoo Kang, **Gunhee Kim**, and Suk I. Yoo. *Detection and Recognition of Text Embedded in Online Images via Neural Context Models*. AAAI Conference on Artificial Intelligence (**AAAI 2017**). San Francisco, California, 2017. (**Oral**) (Acceptance = 638/2590 ~ 24.6%)

7. Wonjoon Goo, Juyong Kim, **Gunhee Kim**, and Sung Ju Hwang. *Taxonomy-Regularized Semantic Deep Convolutional Neural Networks*. European Conference on Computer Vision (**ECCV 2016**). Amsterdam, Netherlands, 2016. (Acceptance = 415/1561 \sim 26.6%)
8. Hao Zhang, Zhiting Hu, Jinliang Wei, Pengtao Xie, **Gunhee Kim**, Qirong Ho, and Eric P. Xing. *Poseidon: Distributed Learning of Convolutional Neural Networks on GPU Clusters for Large-Scale Visual Recognition*. **ATC 2016** (poster), **ICML 2016 ML Systems** workshop, 2016.
9. Hanseul Jun and **Gunhee Kim**. *A Calibration Method for Optical See-through Head Mounted Displays with a Depth Camera*. IEEE Virtual Reality (**VR 2016**). Greenville, South Carolina, 2016. (Acceptance = 25.9%)
10. Hao Zhang, Zhiting Hu, Jinliang Wei, Pengtao Xie, **Gunhee Kim**, Qirong Ho, and Eric P. Xing. *Poseidon: Distributed Learning of Convolutional Neural Networks on GPU Clusters for Large-Scale Visual Recognition*. arXiv:1512.06216, 2015.
11. Cesc Chunseong Park and **Gunhee Kim**. *Expressing an Image Stream with a Sequence of Natural Sentences*. Annual Conference on Neural Information Processing Systems (**NIPS 2015**). Montreal, Canada, 2015. (Acceptance = 403/1838 \sim 21.9%)
12. Bo Xiong, **Gunhee Kim**, and Leonid Sigal. *Storyline Representation of Egocentric Videos and Its Applications to Story-based Search*. International Conference on Computer Vision (**ICCV 2015**). Santiago, Chile, 2015. (Acceptance = 525/1698 \sim 30.9%)
13. Hao Zhang, **Gunhee Kim** and Eric P. Xing. *Dynamic Topic Modeling for Monitoring Market Competition from Online Text and Image Data*. 21th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD 2015**). Sydney, Australia, 2015. (Research) (Acceptance = 159/819 \sim 19.4%)
14. **Gunhee Kim** and Leonid Sigal. *Discovering Collective Narratives of Theme Parks from Large Collections of Visitors Photo Streams*. 21th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD 2015**). Sydney, Australia, 2015. (Practice) (Acceptance = 64/187 \sim 34.2%)
15. Eunhyeok Park, Dongyoung Kim, Soobeom Kim, Sungroh Yoon, **Gunhee Kim**, and Sungjoo Yoo. *Big/Little Deep Neural Network for Ultra Low-Power Inference*. International Conference on Hardware/Software Codesign and System Synthesis (**CODES 2015**). Amsterdam, Netherlands, 2015.
16. **Gunhee Kim**, Seungwhan Moon, and Leonid Sigal. *Ranking and Retrieval of Image Sequences from Multiple Paragraph Queries*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR 2015**). Boston, Massachusetts, 2015. (Acceptance = 602/2123 \sim 28.4%)
17. **Gunhee Kim**, Seungwhan Moon, and Leonid Sigal. *Joint Photo Stream and Blog Post Summarization and Exploration*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR 2015**). Boston, Massachusetts, 2015. (Acceptance = 602/2123 \sim 28.4%)
18. **Gunhee Kim** and Eric P. Xing. *Reconstructing Storyline Graphs for Image Recommendation from Web Community Photos*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR 2014**). Columbus, Ohio, 2014. (**Oral**) (Acceptance = 104/1807 \sim 5.75%).
19. **Gunhee Kim**, Leonid Sigal and Eric P. Xing. *Joint Summarization of Large-scale Collections of Web Images and Videos for Storyline Reconstruction*. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR 2014**). Columbus, Ohio, 2014. (Acceptance = 540/1807 \sim 29.88%)
20. **Gunhee Kim** and Eric P. Xing. *Visualizing Brand Associations from Web Community Photos*. ACM International Conference on Web Search and Data Mining (**WSDM 2014**). New York City, USA, 2014. (Acceptance = 64/356 \sim 18.0%)
21. **Gunhee Kim** and Eric P. Xing. *Discovering Pictorial Brand Associations from Large-Scale Online Image Data*. Workshop on Large Scale Visual Commerce (**LSVisCom**) in conjunction with (**ICCV 2013**). Sydney, Australia, 2013 (**Best Paper Award**).
22. **Gunhee Kim** and Eric P. Xing. *Jointly Aligning and Segmenting Multiple Web Photo Streams for the Inference of Collective Photo Storylines*. Conference on Computer Vision and Pattern Recognition (**CVPR 2013**). Portland, Oregon, 2013. (**Oral**) (Acceptance = 60/1870 \sim 3.2%)
23. **Gunhee Kim** and Eric P. Xing. *Time-Sensitive Web Image Ranking and Retrieval via Dynamic*

- Multi-Task Regression*. International Conference on Web Search and Data Mining (**WSDM 2013**). Rome, Italy, 2013. (Acceptance = 73/387 ~ 18.9%)
24. **Gunhee Kim**, Li Fei-Fei, and Eric P. Xing. *Web Image Prediction Using Multivariate Point Processes*. SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD 2012**). Beijing, China, 2012. (Acceptance = 133/755 ~ 17.6%)
 25. **Gunhee Kim** and Eric P. Xing. *On Multiple Foreground Cosegmentation*. Conference on Computer Vision and Pattern Recognition (**CVPR 2012**). Providence, Rhode Island, 2012. (**Oral**) (Acceptance = 48/1933 ~ 2.48%)
 26. **Gunhee Kim**, Eric P. Xing, Li Fei-Fei, and Takeo Kanade. *Distributed Cosegmentation via Submodular Optimization on Anisotropic Diffusion*. International Conference on Computer Vision (**ICCV 2011**). Barcelona, Spain, 2011. (**Oral**) (Acceptance = 45/1285 ~ 3.50%)
 27. Robson L. F. Cordeiro, Fan Guo, Donna S. Haverkamp, James H. Horne, Ellen K. Hughes, **Gunhee Kim**, Agma J. M. Traina, Caetano Traina Jr., and Christos Faloutsos. *QMAS: Querying, Mining And Summarization of Multi-modal Databases*. International Conference on Data Mining (**ICDM 2010**). Sydney, Australia, 2010. (Acceptance = 148/786 ~ 18.83%)
 28. **Gunhee Kim**, Eric P. Xing and Antonio Torralba. *Modeling and Analysis of Dynamic Behaviors of Web Image Collections*. European Conference on Computer Vision (**ECCV 2010**). Crete, Greece, 2010. (Acceptance = 322/1174 ~ 27.4%)
 29. **Gunhee Kim** and Antonio Torralba. *Unsupervised Detection of Regions of Interest using Iterative Link Analysis*. Annual Conference on Neural Information Processing Systems (**NIPS 2009**). Vancouver, Canada, 2009. (Acceptance = 263/1105 ~ 23.8%)
 30. Bernd Heisele, **Gunhee Kim**, and Andrew Meyer. *Object Recognition with 3D Models*. British Machine Vision Conference 2009 (**BMVC 2009**). London, United Kingdom, 2009. (Acceptance = 95/325 ~ 38%)
 31. **Gunhee Kim**, Christos Faloutsos, and Martial Hebert. *Unsupervised Modeling of Object Categories Using Link Analysis Techniques*. Conference on Computer Vision and Pattern Recognition (**CVPR 2008**). Anchorage, USA, 2008. (**Oral**) (Oral Acceptance = 62/1593 ~ 3.9%)
 32. **Gunhee Kim**, Christos Faloutsos, and Martial Hebert. *Unsupervised Modeling and Recognition of Object Categories with Combination of Visual Contents and Geometric Similarity Links*. International Conference on Multimedia Information Retrieval (**ACM MIR 2008**). Vancouver, Canada, 2008. (**Oral**) (Acceptance = 20/264 ~ 7.6%)
 33. **Gunhee Kim**, Daniel Huber, and Martial Hebert. *Segmentation of Salient Regions in Outdoor Scenes using Imagery and 3-D Data*. Workshop on Application of Computer Vision (**WACV 2008**). Colorado, USA, 2008. (**Oral**)

Peer-Reviewed Journals (Selected)

1. Cesc Chunseong Park, Youngjin Kim, and **Gunhee Kim**. *Retrieval of Sentence Sequences for an Image Stream via Coherence Recurrent Convolutional Networks*. IEEE Transactions on Pattern Analysis and Machine Intelligence (SCI), 2017.
2. Kyung Don Yoo, Clara Tammy Kim, Myoung-Hee Kim, Junhyug Noh, **Gunhee Kim**, Ho Kim, Jung Nam An, Jae Yoon Park, Hyunjeong Cho, Kyoung Hoon Kim, Hyunwook Kim, Dong-Ryeol Ryu, Dong Ki Kim, Chun Soo Lim, Yon Su Kim, and Jung Pyo Lee. *Superior Outcomes of Kidney Transplantation Compared with Dialysis*. Medicine (SCI), vol.95, no.33, e4352, August 2016.
3. R.L.F. Cordeiro, F. Guo, D.S. Haverkamp, J.H. Horne, E.K. Hughesc, **Gunhee Kim**, L.A.S. Romanid, P.P. Coltri, T.T. Souza, A.J.M. Traina, C. Traina Jr., and C. Faloutsos. *QuMinS: Fast and Scalable Querying, Mining and Summarizing Multi-Modal Databases*. Information Sciences (SCI), vol.264, pp. 211–229, April 2014.
4. **Gunhee Kim** and Woojin Chung. *Navigation Behavior Selection Using Generalized Stochastic Petri Nets (GSPN) for a Service Robot*. IEEE Transactions on Systems, Man and Cybernetics Part C (SCI),

vol.37, no.4, July 2007.

5. Woojin Chung, **Gunhee Kim**, and Munsang Kim. *Development of Multi-Functional Indoor Service Robot PSR Systems*. Autonomous Robots (SCI), vol.22, no.1, pp. 1-17, January 2007.
6. **Gunhee Kim** and Woojin Chung. *Tripodal Schematic Control Architecture for Integration of Multi-Functional Indoor Service Robots*. IEEE Transactions on Industrial Electronics (SCI), vol.53, no.5, pp. 1723- 1736, October 2006.

Peer-Reviewed Conference – Robotics (Selected)

1. **Gunhee Kim**, Woojin Chung, Sung-Kee Park, and Munsang Kim. *Experimental Research of Navigation Primitive Selection Using Generalized Stochastic Petri Nets (GSPNs) for a Tour-Guide Robot*. IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS 2005**). Alberta, Canada, 2005.
2. **Gunhee Kim**, Woojin Chung, and Munsang Kim. *A Selection Framework of Multiple Navigation Primitives Using Generalized Stochastic Petri Nets*. International Conference on Robotics and Automation (**ICRA 2005**). Barcelona, Spain, 2005.
3. **Gunhee Kim**, Woojin Chung, Sangmok Han, Kyung-Rock Kim, Munsang Kim, and Richard H. Shinn. *The Autonomous Tour-Guide Robot Janny*. IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS 2004**). Sendai, Japan, 2004.
4. **Gunhee Kim**, Woojin Chung, Munsang Kim, and Chongwon Lee. *Implementation of Multi-Functional Service Robots Using Tripodal Schematic Control Architecture*. IEEE International Conference on Robotics and Automation (**ICRA 2004**). New Orleans, USA, 2004.
5. Woojin Chung, **Gunhee Kim**, Munsang Kim, and Chongwon Lee. *Integrated Navigation System for Indoor Service Robots in Large-scale Environments*. International Conference on Robotics and Automation (**ICRA 2004**), New Orleans, USA, 2004.
6. **Gunhee Kim**, Woojin Chung, Munsang Kim, and Chongwon Lee. *Tripodal Schematic Design of the Control Architecture for the Service Robot PSR*. International Conference on Robotics and Automation (**ICRA 2003**). Taipei, Taiwan, 2003.
7. **Gunhee Kim**, Woojin Chung, Munsang Kim, and Chongwon Lee. *Design and Implementation of Tripodal Schematic Control Architecture for Multi-Functional Service Robots*. International Conference on Control, Automation, and Systems (**ICCAS 2003**). Gyeongju, Korea, 2003. (**Outstanding Paper Award**)

Patents

1. **Gunhee Kim** and Leonid Sigal. *Generating Story Graphs with Large Collections of Online Images*. US 2016/0093334 A1. 2016.
2. Bernd Heisele, **Gunhee Kim**, Andrew J Meyer. *Object recognition with 3D models*. US 8422797, WO 2011002938. 2013.

Current Grants

1. Inference and Learning Technologies for Reconfigurable Distributed Deep Neural Networks (Co-PI with Prof. Byung-Gon Chun (SNU)). *Samsung Research Funding for Future Technology*. September 1, 2016 – August 31, 2019, ₩200M/yr.
2. Video Analysis and Annotation for Storyline Representation (PI). *Samsung Electronics*. October 24, 2016 – December 24, 2017, ₩120M/yr.
3. Human-Inspired Large Scale Visual Recognition System (Co-PI with Prof. Sung Ju Hwang (UNIST)). *Samsung Research Funding for Future Technology*. December 12, 2015 – November 30, 2017, ₩100M/yr.

4. Research on Joint Understanding between Images and Natural Language Sentences (PI). *Hancom*. August 1, 2015 – July 31, 2018, ₩100M/yr.
5. Development of Automatic Storyboard-based Summarization and Exploration System for Big Visual Data (PI). *National Research Foundation of Korea*. July 1, 2015 – June 30, 2018, ₩50M/yr.
6. 3D Modeling of Indoor Environment for Augmented Reality (PI). *Samsung Electronics*. May 1, 2015 – April 30, 2018, ₩90M/yr.
7. Development of Deep Learning Approach to Video Captioning. *SKT*. February 17, 2017 – November 30, 2017, ₩80M/yr.
8. Automatic generation of captions, hashtags, and comments for online image posts. *KaKao Brain*. April 1, 2017 – March 31, 2019, ₩200M/yr.

Professional Activities

Workshop Organization

Workshop on Storytelling with Images and Videos (VisStory) at ECCV 2016 (2nd) and ECCV 2014 (1st), with Leonid Sigal (Disney), Kristen Grauman (UT Austin), and Tamara Berg (UNC).

Program Committee member

AAAI 2017.

Workshop on Web-scale Vision and Social Media (VSM) at ICCV 2014 (3rd), CVPR 2014 (2nd), ECCV 2012 (1st).

4th Egocentric (First-Person) Vision workshop at CVPR 2016.

4th International Workshop on Large Scale Visual Recognition and Retrieval (BigVision 2016) at CVPR 2016.

Reviewer

IEEE Transactions on Pattern Analysis and Machine Intelligence, International Journal of Computer Vision, ACM Transactions on Graphics, Annals of Applied Statistics, IEEE Transactions on Image Processing, IEEE Transactions on Multimedia, IEEE Access, IEEE Transactions on Knowledge and Data Engineering, ACM Transactions on Multimedia Computing, Communications, and Applications, IEEE Transactions on Systems, Man, and Cybernetics, Image and Vision Computing, Neurocomputing, Image Communication

CVPR 2017/2016/2015, ICCV 2017/2015/2013, ECCV 2016/2014, SIGGRAPH 2017/2016, NIPS 2015, AAAI 2017, ACM MM 2017, BMVC 2017, ACCV 2016, UbiComp 2016.

Student Supervision

Current PhD Students

Junhyug Noh (Mar 2015 –), Young Jae Yu (Mar 2015 –), Insu Jeon (Mar 2017 –), Minui Hong (Mar 2017 –), Wonhee Lee (Mar 2017 –)

Current MS Students

Byeongchang Kim (Jul 2015 –), Yunseok Jang (Sep 2015 –), Juyong Kim (Sep 2015 –), Hyouk Jang (Sep 2016 –), Yookoon Park (Mar 2017 –, URI Apr 2015 – Feb 2017), Youngjin Kim (Mar 2017 –, URI Dec 2015 – Feb 2017), Sangho Lee (Mar 2017 –, URI Sep 2016 – Feb 2017), Seil Na (Mar 2017 –, URI Jul 2016 – Feb 2017)

(URI*: Undergraduate Research Intern)

Current Undergraduate Students

Hyungjin Ko (SNU Math, 2015.08 –), Soochan Lee (SNU CSE), Jaeyun Kang (SNU ECE)

Alumni

Chunseong Park (MS student, 2015.03 – 2017.02, Researcher at Lunit Inc.)

Beomsu Kim (SNU CSE Research Intern, 2016.12 – 2017.03, Scatter Lab), JongHo Park (MS student, 2015.03 – 2016.07), Jongwook Choi (SNU CSE Research Intern, 2015.02 – 2017.01, PhD Student at UMichigan), JongHo Park (MS student, 2015.03 – 2016.07), Wonjoon Goo (SNU CSE Research Intern, 2015.03 – 2016.04, PhD Student at UT Austin CSD), Hanseul Jun (SNU ECE Research Intern, 2015.04 – 2016.05, PhD Student at Stanford Comm)

Teaching Experience

Instructor at Seoul National University

M1522.001000 *Computer Vision*, Spring 2016, Spring 2017

4190.101 *Discrete Mathematics*, Spring 2016, Spring 2017

4190.773 *Probabilistic Graphical Models*, Fall 2015, Fall 2016, Fall 2017

4190.429 *Image Processing*, Spring 2015

Graduate Teaching Assistant and Guest Lecturer at CMU

10-708 *Probabilistic Graphical Models*, Spring 2013 (Instructor: Eric P Xing)

15-385/685 *Computer Vision*, Spring 2012 (Instructor: Srinivasa Narasimhan)

15-384 *Robotic Manipulation*, Fall 2011 (Instructor: George Kantor)

Last updated: May 14, 2017