

CONTACT INFORMATION	<b>NVIDIA Research</b> 2701 San Tomas Expressway Santa Clara, CA 95050 USA	<i>Mobile:</i> +1-678-707-3912 <i>E-mail:</i> kihwan23.kim@gmail.com <i>Homepage:</i> www.kihwan23.com
RESEARCH INTERESTS	Dynamic and static scene analysis and reconstruction (structure from motion or any sparse/semi/dense reconstruction), scattered data approximation, real-time rendering, machine learning, augmented/virtual/mixed reality and robotic navigation (tracking and SLAM), Sensor Fusion, object recognition, detection and tracking	
EDUCATION	<p><b>Georgia Institute of Technology</b> Atlanta, Georgia</p> <p>Ph.D. in Computer Science, Dec. 2011 GPA: 3.87/4.0</p> <ul style="list-style-type: none"> <li>• Thesis: <i>Spatio-temporal Data Interpolation for Dynamic Scene Analysis</i></li> <li>• Advisor: <a href="#">Professor Irfan Essa</a></li> <li>• Area of Study: Computer Vision and Graphics</li> </ul> <p>M.S. in Computer Science, Aug. 2010 GPA: 3.87/4.0</p> <ul style="list-style-type: none"> <li>• Advisor: <a href="#">Professor Irfan Essa</a></li> <li>• Area of Study: Computer Vision and Graphics</li> </ul> <p><b>Yonsei University</b> Seoul, South Korea</p> <p>B.S. in Electrical Engineering, Feb. 2001 GPA: 3.71/4.0 upper, 3.45/4.0 overall</p>	
EMPLOYMENT HISTORY	<p><b>NVIDIA Research</b> Santa Clara, California Senior Research Scientist Dec. 2014 – Present</p> <p><b>NVIDIA Research</b> Santa Clara, California Research Scientist Jan. 2012 – Dec. 2014</p> <p><b>Georgia Institute of Technology, College of Computing</b> Atlanta, Georgia Graduate Research Assistant Aug. 2005 – Dec. 2011</p> <p><b>Disney Research Pittsburgh</b> Pittsburgh, Pennsylvania Visiting Research Associate/Research Intern Jan. 2009 – Aug. 2009</p> <p><b>Samsung IT R&amp;D Center, SDS</b> Seoul, South Korea Advisory Engineer Mar. 2001 – Aug. 2005</p> <p><b>Samsung Electronics, Digital Solution Center</b> Seoul, South Korea Ubiquitous Task Force Jun. 2003 – Jan. 2004</p> <p><b>Republic of Korea Air Force</b> Suwon, South Korea Engineer/Sergeant Mar. 1996 – Sep. 1998</p>	
THESIS	<p><b>[BSTHESIS01]</b> K. Kim, <i>Simple Enhanced Block-Matching Algorithm for Intermediate View Reconstruction</i>, Department of Electrical Engineering, Yonsei University</p> <p><b>[PHDTHESIS11]</b> K. Kim, <i>Spatio-temporal Data Interpolation for Dynamic Scene Analysis</i>, College of Computing, Georgia Institute of Technology</p>	

REFEREED  
CONFERENCE  
PUBLICATIONS

- [ICCV17a]** K. Kim, J. Gu, S. Tyree, P. Molchanov, M. Nießner, Daniel Cremers, J. Kautz, *A Lightweight Approach for On-the-Fly Reflectance Estimation*, In *Proceeding of 2017 IEEE International Conference on Computer Vision, ICCV 2017*
- [ICCV17b]** R. Maier, K. Kim, M. Nießner, D. Cremers, J. Kautz, *Intrinsic3D: High-Quality 3D Reconstruction by Joint Appearance and Geometry Optimization with Spatially-Varying Lighting*, In *Proceeding of 2017 IEEE International Conference on Computer Vision, ICCV 2017*
- [CVPR16a]** B. Eckart, K. Kim, A. Troccoli, A. Kelly, J. Kautz, *Accelerated Generative Models for 3D Point Cloud Data*, In *Proceeding of 2016 IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2016*
- [CVPR16b]** P. Molchanov, X. Yang, S. Gupta, K. Kim, S. Tyree, J. Kautz, *Online Detection and Classification of Dynamic Hand Gestures with Recurrent 3D Convolutional Neural Networks*, In *Proceeding of 2016 IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2016*
- [IV16]** S. Gupta, P. Molchanov, X. Yang, K. Kim, S. Tyree, J. Kautz, *Towards Selecting Robust Hand Gestures for Automotive Interfaces*, In *Proceeding of 2016 IEEE Intelligent Vehicles Symposium, IV 2016*
- [3DV15]** B. Eckart, K. Kim, A. Troccoli, A. Kelly, J. Kautz, *MLMD: Maximum Likelihood Mixture Decoupling for Fast and Accurate Point Cloud Registration*, In *IEEE 3D Vision, 3DV2015*
- [EGSR15]** S. U. Mehta, K. Kim, D. Pajak, K. Pulli, J. Kautz, R. Ramamoorthi, *Filtering Environment Illumination for Interactive Physically-Based Rendering in Mixed Reality*, In *Eurographics Symposium on Rendering, EGSR 2015*
- [CVPRW15]** P. Molchanov, S. Gupta, K. Kim, J. Kautz, *Hand Gesture Recognition with 3D Convolutional Neural Networks*, In *IEEE CVPR 2015 Workshop on Hand Gesture Recognition*
- [FG15]** P. Molchanov, S. Gupta, K. Kim, K. Pulli, *Multi-sensor System for Drivers Hand-Gesture Recognition*, In *IEEE Automatic Face and Gesture recognition, FG2015*
- [RADAR15]** P. Molchanov, S. Gupta, K. Kim, K. Pulli, *Short-Range FMCW Monopulse Radar for Hand-Gesture Sensing*, In *IEEE International Radar Conference 2015*
- [3DV14]** D. Herrera, K. Kim, J. Kannala, K. Pulli, and J. Heikkila, *DT-SLAM: Deferred Triangulation for Robust SLAM*, In *IEEE 3D Vision, 3DV2015*
- [SIGGRAPH13]** J. Baek, D. Pajak, K. Kim, K. Pulli, and M. Levoy, *WYSIWYG Computational Photography via Viewfinder Editing*, In *ACM Transactions on Graphics, SIGGRAPH Asia 2013*
- [CVPR12]** K. Kim, D. Lee, and I. Essa, *Detecting Regions of Interest in Dynamic Scenes with Camera Motions*, In *Proceeding of 2012 IEEE Conference on Computer Vision and Pattern Recognition*
- [ICCV11]** K. Kim, D. Lee, and I. Essa, *Gaussian Process Regression Flow for Analysis of Motion Trajectories*, In *Proceeding of 2011 IEEE International Conference on Computer Vision*
- [CVPR10a]** K. Kim, M. Grundmann, A. Shamir, I. Matthews, J. Hodgins, and I. Essa, *Motion Fields to Predict Play Evolution in Dynamic Sports Scenes*, In *Proceeding of 2010 IEEE Conference on Computer Vision and Pattern Recognition*

- [**CVPR10b**] R. Hamid, R. Kumar, M. Grundmann, K. Kim, I. Essa and J. Hodgins, *Player Localization Using Multiple Static Cameras for Sports Visualization*, In *Proceeding of 2010 IEEE Conference on Computer Vision and Pattern Recognition*
- [**ISMAR09**] K. Kim, S. Oh, J. Lee and I. Essa, *Augmenting Aerial Earth Maps with Dynamic Information*, In *Proceeding of 2009 IEEE/ACM International Symposium on Mixed and Augmented Reality*
- [**ISWC08**] K. Kim, J. Summet, T. Starner, D. Ashbrook, M. Kapade and I. Essa, *Localization and 3D Reconstruction of Urban Scenes Using GPS*, In *Proceeding of 2008 IEEE International Conference on Wearable Computers*
- [**ACMMM06**] K. Kim, I. Essa and G. D. Abowd, *Interactive Mosaic Generation for Video Navigation*, In *Proceeding of 2006 ACM International Conference on Multimedia*
- REFEREED  
JOURNAL  
PUBLICATIONS
- [**TOG13**] J. Baek, D. Pajak, K. Kim, K. Pulli, and M. Levoy, *WYSIWYG Computational Photography via Viewfinder Editing*, In *ACM Transactions on Graphics, Volume 32*.
- [**VR11**] K. Kim, S. Oh, J. Lee and I. Essa, *Augmenting Aerial Earthmaps with Dynamic Information from Videos*, In *Virtual Reality Journal* [Special issue on Augmented Reality], Springer London, 2011 (VR)
- [**JGT08**] B. Kim, K. Kim and G. Turk, *A Shadow Volume Algorithm for Opaque and Transparent Non-Manifold Casters*, In *Journal of Graphics Tools*, A.K. Peters, 2008
- OTHER  
PUBLICATIONS  
POSTERS,  
TECH' REPORTS
- [**STS11**][**ISMICS 2011**] E. Sarin, K. Kim, I. Essa, and W. Cooper, *3-Dimensional Visualization of the Operating Room Using Advanced Motion Capture: A Novel Paradigm to Expand Simulation-Based Surgical Education*
- [**4GS09**] K. Kim, M. Grundmann, I. Essa, *Collaborative Crowd-casting using Mobile devices*, In *4G Symposium*, Las Vegas 2009
- [**TECH07**] B. Kim, K. Kim, G. Turk, *Real-time Shadow of Transparent Casters Using Shadow Volume*, In *Georgia Institute of Technology Technical Report GT-IC-07-04*
- [**TECH06**] K.Kim, J.Summet, T.Starner, D.Ashbrook, M.Kapade and I.Essa, *Localization and 3D Reconstruction of Urban Scenes Using GPS*, 2008 In *Georgia Institute of Technology Technical Report GT-IC-08-06*
- [**GT-CMU06A**] K.Kim, I.Essa and F. Dellaert *Augmenting Earth Maps with Dynamic Information Using Vanishing Point Clustering*, In 2006 GT-CMU Retreat for Graphics
- [**GT-CMU06B**] B. Kim and K. Kim, *Transparent Shadow Casters and Softened Self-Shadow Using Shadow Volume*, In 2006 GT-CMU Retreat for Graphics
- [**GT-CMU05**] K. Kim and I. Essa, *Multi-scale Photomosaic*, In 2005 GT-CMU Retreat for Graphics
- INVITED  
TALK
- [**SNU11**] K. Kim, *Spatio-temporal Analysis of Videos for Visualization*, Department of Computer Science and Engineering, Seoul National University January.2011
- [**Google13**] K. Kim, *Sparse-to-dense approaches for video analysis*, **Google Tech-talk**, Google Research. 2013.
- PATENTS  
ISF
- [**P16a**] B. Eckart, K. Kim, A. Troccoli, J. Kautz *Modeling Point Cloud Data - Hierarchies of Gaussian Mixture Models* US Patent.
- [**P16b**] P. Molchanov, S. Gupta, K. Kim, *Multi-Sensor Based User Interface* US Patent.
- [**P16c**] P. Molchanov, S. Gupta, K. Kim, *In-Vehcle Short-range RADAR system for Intelligent UIs* US Patent App.

**[P14]** K. Kim, D. Pajak, K. Pulli,. *System, Method, and computer program product for performing one-dimensional searches in two-dimensional images* , US Patent.

**[P13]** K. Kim, A. Shamir, IA Matthews, M. Grundmann, JK. Hodgins, and Irfan Essa. *System and Method for Utilizing Motion Fields to Predict Evolution in Dynamic Scenes*, US Patent App. 13/075,947

REVIEWER  
TC,EDITOR

Reviewer in CVPR, ICCV, Eurographics, SIGGRAPH, SIGGRAPH ASIA, tPAMI, tIP, HPG, EVC (TC), EVW(TC), IWMV(TC), IEICE (Assc.Editor).

MEDIA  
COVERAGE

**[CNN09]** H. Collins, J. Levs, *New technology tracks movement on ground*, CNN News-room, aired on October 2009

**[NS09]** V. Venkatraman, *Live video makes Google Earth cities bustle* , NewScientist, September 2009, Magazine Issue 2728

**[PS09]** S.F. Locke, *Augmented Google Earth Gets Real-Time People, Cars, Clouds* , PopularScience, September 2009

RESEARCH AND  
PROFESSIONAL  
PROJECTS  
INVOLVED

### **NVIDIA Research**

Santa Clara, CA USA

#### *Machine Learning and Visual Computing Research Group*

- Leading **Sensor-based localization project (autonomous driving)**: mapping and registration **[3DV15][arXiv17b]**.
- Leading **VirtualEye (DARPA)** project: 3D mapping and free view-point video.
- Leading **NVIDIA SLAM(NVSLAM)**: for next generation augmented and virtual reality **[3DV14][3DV15][EGSR15][CVPR16a][ICCV17a][ICCV17b]**.
- Collaboration with Google/ATAP for **Tango** project.
- Conducting a project for **Driver's gesture recognition system** for Advanced Driver Assistant System (ADAS) using multi-modal sensors and Deep Neural Network (CNN) **[FG15][RADAR15][P15-a,b][IV16][CVPRW15][CVPR16b]**
- Conducting tracking and scene reconstruction research for ADAS and autonomous driving project (Sensor fusion: depth-camera, vision, IMU, etc.)
- Conducted an Real-time viewfinder editing project: **[SIGGRAPH13]**.
- Co-author of a tutorial on OpenCV for native Android: SIGGRAPH13 (mobile)
- Fast Image registration and tracking for mobile vision **[P14]**
- Stochastic Motion field analysis using Gaussian Process **[CVPR12]**

### **Georgia Institute of Technology**

Atlanta, Georgia

#### *Dynamic Scene Analysis*

- Recognizing traffic patterns and detecting anomalous events using Gaussian Process Regression Flow, and 4th-order moment. Persistent Stare Exploitation and Analysis System (*PerSEAs*) with *Kitware/DARPA*. Published in **[ICCV11]**
- Analysis and prediction of multi-agent motions in dynamic sports scene. (*Microcasting at Disney Research*) Spatio-temporal radial basis network for dense flow generation. Tracking ground positions using geometric constraint optimization. Published in **[CVPR10A]** and **[CVPR10B]**
- Video retargeting for automated sports broadcasting. Auto-directed crop region, and its paths are calculated from motion saliency. Submitted to **[S11]**

#### *Dynamic Scene Visualization and Augmented Reality*

- City-level visualization of dynamic scenes from distributed videos using spatio-temporal interpolation and analysis. Published in **[ISMAR09]**, **[VR11]**, **[4GS09]** and **[GT-CMU06A]** Media coverage and articles in **[CNN09]**, **[NS09]** and **[PS09]**

- 3D Reconstruction and localization of nearby buildings from the analysis of GPS signals having low signal-to-noise ratio. Published in [ISWC08] and [TECH06]

#### *Video-based Rendering*

- Video-based spatio-temporal view interpolation for Simulating Cardiac Surgery (Emory/Inova Heart Vascular Institute) Presented in [STS11] and [ISMICS11]
- Generation of painterly and water-colored videos using fore-ground segmentation and gradient field (Samsung STAR/SAIT) Fed into mobile NPR project.

#### *Interactive Video and Multimedia System*

- Automatic generation of the annotated collection of mosaics for interactive video navigation. (AwareHome/Tunner Studio) [ACMMM06] and [GT-CMU05]

#### *Real-time Rendering Algorithm*

- Generalized Shadow Volume algorithm for the real-time rendering of non-manifold transparent casters. Published in [JGT08], [TECH07] and [GT-CMU06B]

### **Disney Research, Pittsburgh**

Pittsburgh, PA USA

#### *Scene Analysis and Micro-casting*

- Conducted a project for detecting important location in the game. Designed and implemented proto-type system for micro-casting. [CVPR10A]
- Implemented player tracking algorithm using particle filter and mean-shift , and team classification algorithm for sports visualization. [CVPR10B]

### **Samsung IT R&D Center, SDS, and Samsung Electronics**

Seoul, South Korea

#### *Face Recognition, Real-time Collaboration System*

- Responsible for face detection part. Fisher-face, and statistical skin segmentation were used for ViaFace™. Appeared in COMDEX 2001 Las Vegas.
- Designed and developed Real-time Collaboration System: Syncbiz™ (2002 Samsung Best solution award)
- Developed embedded framework for IP-Set top box: LivingWise™ (fed into Korea Telecommunication's IP-STB services)
- Ubiquitous Home network framework: NEX (framework fed into U-City projects at Samsung SDS): Remote Management system in the home server for U-City.

#### SOFTWARE AND HARDWARE SKILLS

##### Languages, Scripts, and Wrappers:

- C, C++, Embedded C, Android Native C/C++, Java, JavaScript, MFC, ATL, COM, SQL, MySQL, MATLAB, under various IDE environments
- Libraries for Vision/Graphics/Math : OpenCV, OpenGL, GLSL, DirectX, Lapack, Intel Math Kernel Library

##### Digital Logic Circuit:

- FPGA and Computer-Aided Design Tools: VHDL, MAX+PLUS, SPICE

##### Video and Image Editing tools, and Renderer:

- 3D Studio Max, Autodesk Maya, Adobe Photoshop, Premiere, and others
- POV-Ray, Indigo, Blender

#### LANGUAGES

Fluent in Korean, English and Japanese

REFERENCES

Available in:

<http://www.kihwan23.com/jobsearch/docs/reference-list.pdf>

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