Hanbyul Joo

Ph.D. student
Robotics Institute, School of Computer Science
Carnegie Mellon University
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RESEARCH INTEREST

My research interests are in computer vision, computer graphics, and machine perception of social behavior. My work mainly focuses on analyzing and understanding dynamic scenes using more than 500 synchronized cameras at the Panoptic Studio.

Main research area: 3D dynamic scene reconstruction, 3D motion tracking, markerless motion capture, structure from motion, nonverbal cue reconstruction in social interaction

EDUCATION

Ph.D. student *2012 – Present*
Robotics Institute, Carnegie Mellon University
Advisor: Prof. Yaser Sheikh

M.S. *2009*
Electrical Engineering, KAIST
Thesis: Graph-based Boundary Matching for Deformable Objects
Advisor: Prof. In So Kweon

B.S. *2007*
Computer Science, KAIST
Magna Cum Laude

PUBLICATIONS

"Panoptic Studio: A Massively Multiview System for Social Interaction Capture"
Hanbyul Joo, Tomas Simon, Xulong Li, Hao Liu, Lei Tan, Lin Gui, Sean Banerjee, Timothy Godisart, Bart Nabbe, Iain Matthews, Takeo Kanade, Shohei Nobuhara, Yaser Sheikh
Under review, arXiv:1612.03153.

"Panoptic Studio: A Massively Multiview System for Social Motion Capture"
Hanbyul Joo, Hao Liu, Lei Tan, Lin Gui, Bart Nabbe, Iain Matthews, Takeo Kanade, Shohei Nobuhara and Yaser Sheikh
International Conference on Computer Vision **(ICCV)**, 2015 (**Oral**).

"MAP Visibility Estimation for Large-Scale Dynamic 3D Reconstruction"
Hanbyul Joo, Hyun Soo Park, and Yaser Sheikh
IEEE Conference on Computer Vision and Pattern Recognition **(CVPR)**, 2014 (**Oral**).

"Graph-based Shape Matching for Deformable Objects"
Hanbyul Joo, Yekeun Jeong, Olivier Duchenne, and InSo Kweon
IEEE International Conference on Image Processing **(ICIP)**, 2011.

"Graph-Based Robust Shape Matching for Robotic Application"
Hanbyul Joo, Yekeun Jeong, Olivier Duchenne, Seong-Young Ko, and InSo Kweon
IEEE International Conference on Robotics and Automation **(ICRA)**, 2009.

"Statistical Background Subtraction Based on the Exact Per-pixel Distributions"
Youngbae Hwang, **Hanbyul Joo**, Junsik Kim, and InSo Kweon
International Association of Pattern Recognition workshop on Machine Vision Applications **(MVA)**, 2007.

WORK EXPERIENCES

Disney Research Zurich, Switzerland
Research Intern *June. 2015 – Oct. 2015*
Mentor: Thabo Beeler and Derek Bradley
Worked on a *3D Face Capture* project

Electronics and Telecommunications Research Institute (ETRI), South Korea
Research Scientist *Feb. 2009 – Jun.2012*
Worked on *full 3D reconstruction technology for broadcasting communication fusion* project
Developed a real-time markerless motion capture system using 20 broadcast cameras
Developed a system for automatic rigging and animation of 3D virtual avatar

AWARDS & SCHOLARSHIPS

Samsung Scholarship *2012 - 2017*
Tuition and stipend for Ph.D. study ($50K/year, for 5 years)

Governmental Scholarship for KAIST Graduate Students *2007 - 2009*

Governmental Scholarship for KAIST Undergraduate Students *2002 - 2006*

SELECTED PRESS COVERAGE

The Verge, Cracking The Elaborate Code, *Dec. 2016*

Reuters, Motion capture on a whole new level, *Apr. 2015*

Discovery Channel Canada, Daily Planet Show, Future Tech: Panoptic Studio, *Jan. 2015*

IEEE Spectrum, Camera-Filled Dome Recreates Full 3-D Motion Scenes, *Jul. 2014*

Discovery News, Amazing 3-D Flicks from Dome of 500 Cameras?, *Jul. 2014*

NBC NEWS, Camera-Studded Dome Tracks Your Every Move With Precision, *Jul. 2014*

CNet, Tomorrow Daily: New video capture tech, *Jul. 2014*

Engadget, Watch a dome full of cameras capture 3D motion in extreme detail, *Jul. 2014*

GIZMODO, A Dome Packed With 480 Cameras Captures Detailed 3D Images In Motion, *Jul. 2014*

THE Verge, Scientists build a real Panopticon that captures your every move in 3D, *Jul.2014*

Science Daily, Hundreds of videos used to reconstruct 3-D motion without markers, *Jul. 2014*

PHYS.ORG, Researchers combine hundreds of videos to reconstruct 3D motion without markers, *Jul. 2014*

Slate, Freezing Memories in Time, *Jul. 2014*

PetaPixel, Researchers Use a 480-Camera Dome to More Accurately Capture 3D Motion, *Jul. 2014*

Gizmag, Camera-studded dome used to reconstruct 3D motion, *Jul. 2014*

TheRegister, Boffins fill a dome with 480 cameras for 3D motion capture, *Jul. 2014*

theENGINEER, 3D motion captured without markers, *Jul. 2014*

Popular Photography, Carnegie Mellon Packs 480 Cameras In A Dome To Perfectly Track 3D Motion, *Jul. 2014*

PATENTS

Motion capture apparatus and method (Patent No.: US 8805024 B2)
Hanbyul Joo, Seong-Jae Lim, Ji-Hyung Lee, Bon-Ki Koo

Method for automatic rigging and shape surface transfer of 3D standard mesh model based on muscle and nurbs by using parametric control (Patent No.: US 7171060 B2)
Seong Jae Lim, Ho Won Kim, **Hanbyul Joo**, Bon Ki Koo

3D model shape transformation method and apparatus (Patent Application No.: US 20120162217 A1)
Seong-Jae Lim, **Hanbyul Joo**, Seung-Uk Yoon, Ji-Hyung Lee, Bon-Ki Koo.

TEACHING

Teaching Assistant, Carnegie Mellon University *Fall 2014*
16-720 Computer Vision (Instructor: Martial Hebert)