

DANIEL S. JEON (전석준)

AMD Researcher

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🔗 <https://edoli.github.io/research/>

RESEARCH INTERESTS

My research interests include **machine learning**, **computational imaging** and **computer graphics**. Specifically, I have developed various camera systems and algorithms for high-resolution imaging system including hyperspectral imaging, stereo imaging and time-of-flight imaging. Also I exploited **deep neural network** to learn **hyperspectral imaging** with **compressive sensing**, image **super-resolution** for stereo system. Optical system design is another key area of my research. I investigate the use of **diffractive optics** for creating **end-to-end learned** imaging systems. This work involves developing optics-based solutions to address various imaging challenges. I also have expertise in **BRDF acquisition** with geometry and surface normals with various capturing systems such as **polarimetric imaging**, **multiview photometric stereo** and **light stage** system. Also my research developed a **polarimetric time-of-flight** imaging system for robust depth acquisition using **differentiable time-of-flight rendering** to reduce multipath interference.

EXPERIENCE

02/2023–Present **AMD**, MTS Software Development Eng.

- Work in Advanced Rendering Research Group (ARR).
- Research machine learning-based realtime rendering algorithms.

EDUCATION

09/2016–02/2023 **KAIST, PhD Student in Computer Science**

– Thesis: Physically-based Phasor Imaging for Advanced Scene Understanding

09/2014–08/2016 **KAIST, M.S in Computer Science**

– Thesis: Multisampling Compressive Video Spectroscopy

03/2010–08/2014 **KAIST, B.S in Computer Science**

PROGRAMMING SKILLS

- Programming Language: Python, CUDA, C, C++, MATLAB, Javascript, Java, Kotlin
- Library: PyTorch, Tensorflow, Mitsuba, OpenGL, OpenCV, Numpy, Cupy

PUBLICATIONS

International Journals:

- [J1] **Daniel S. Jeon**, Seung-Hwan Baek, Shinyoung Yi, Qiang Fu, Xiong Dun, Wolfgang Heidrich, Min H. Kim, “Compact Snapshot Hyperspectral Imaging with Diffracted Rotation,” ACM Transactions on Graphics (TOG), 37(6), pp. 268:1–12, 2018, presented at **SIGGRAPH 2019 (SCI-IF=7.8)**
- [J2] **Daniel S. Jeon**, Inchang Choi, Min H. Kim, “Multisampling Compressive Video Spectroscopy,” Computer Graphics Forum (CGF), 35(2), May 12, 2016, pp. 467-477, presented at **EUROGRAPHICS 2016 (SCI-IF=2.7)**
- [J3] Hyeonjoong Jang, Sanghoon Cho, **Daniel S. Jeon**, Dahyun Kang, Myeongho Song, Changhyun Park, Jaewon Kim, Min H. Kim, “Automated Visual Inspection of Defects in Transparent Display Layers using Light-Field 3D Imaging,” IEEE Transactions on Semiconductor Manufacturing 36.3: 486-493, 2023 (**SCI-IF=2.3**)

- [J4] Myeong-Su Ahn, Jaehun Jeon, Charles Soon Hong Hwang, **Daniel S. Jeon**, Min H. Kim, Ki-Hun Jeong, “Actively Tunable Spectral Filter for Compact Hyperspectral Camera using Angle-Sensitive Plasmonic Structures,” *Advanced Materials Technologies*, 8.10: 2201482., 2023 (**SCI-IF=6.4**)
- [J5] Inseung Hwang, **Daniel S. Jeon**, Adolfo Muñoz, Diego Gutierrez, Xin Tong, Min H. Kim, “Sparse Ellipsometry: Portable Acquisition of Polarimetric SVBRDF and Shape with Unstructured Flash Photography,” *ACM Transactions on Graphics (TOG)*, 41(4), Aug. 8 - Aug. 11, 2022, presented at **SIGGRAPH 2022** (**SCI-IF=7.8**)
- [J6] Shinyoung Yi, **Daniel S. Jeon**, Ana Serrano, Se-Yoon Jeong, Hui-Yong Kim, “Modelling Surround-aware Contrast Sensitivity for HDR Displays,” *Computer Graphics Forum (CGF)*, 2022 (**SCI-IF=2.7**)
- [J7] Seung-Hwan Baek, **Daniel S. Jeon**, Xin Tong, Min H. Kim. “Simultaneous acquisition of polarimetric svbrdf and normals,” *ACM Transactions on Graphics (TOG)*, 37(6), pp. 268:1–12, 2018, presented at **SIGGRAPH Asia 2018**, (**SCI-IF=7.8**)
- [J8] Joo Ho Lee, Adrian Jarabo, **Daniel S. Jeon**, Diego Gutierrez, Min H. Kim. “Practical multiple scattering for rough surfaces,” *ACM Transactions on Graphics (TOG)*, presented at **SIGGRAPH Asia 2018**, 37(6), pp. 275:1–15, 2018 (**SCI-IF=7.8**)
- [J9] Dongmin Keum, Kyung-Won Jang, **Daniel S. Jeon**, Charles S. Hwang, Elke K. Buschbeck, Min H. Kim, Ki-Hun Jeong. “Xenos peckii vision inspires an ultrathin digital camera,” *Nature Publishing Group (NPG), Light: Science and Applications*, 7:80(1), Oct. 24, 2018. (**SCI-IF=20.6**)
- [J10] Inchang Choi, **Daniel S. Jeon**, Giljoo Nam, Diego Gutierrez, Min H. Kim (2017), “High-Quality Hyperspectral Reconstruction Using a Spectral Prior,” *ACM Transactions on Graphics (TOG)*, 36(6), Nov. 27-30, 2017, pp. 218:1–13, presented at **SIGGRAPH Asia 2017** (**SCI-IF=7.8**)

International Conference Proceedings:

- [C1] **Daniel S. Jeon**, Andreas Meuleman, Seung-Hwan Baek, Min H. Kim, “Polarimetric iToF: Measuring High-Fidelity Depth through Scattering Media,” *Proc. IEEE Computer Vision and Pattern Recognition (CVPR)* 2023, selected as CVPR Highlights (10% of the accepted papers)
- [C2] **Daniel S. Jeon**, Seung-Hwan Baek, Inchang Choi, Min H. Kim, “Enhancing the Spatial Resolution of Stereo Images using a Parallax Prior,” *Proc. IEEE Computer Vision and Pattern Recognition (CVPR)* 2018
- [C3] Seung-Hwan Baek, Hayato Ikoma, **Daniel S. Jeon**, Yuqi Li, Wolfgang Heidrich, Gordon Wetzstein, Min H. Kim (2020), “Single-shot Hyperspectral-Depth Imaging with Learned Diffractive Optics,” *Proc. IEEE International Conference on Computer Vision (ICCV)* 2021
- [C4] Shinyoung Yi, **Daniel S. Jeon**, Ana Serrano, Se-Yoon Jeong, Hui-Yong Kim, Diego Gutierrez, Min H. Kim, “Modeling Surround-aware Contrast Sensitivity,” *Proc. Eurographics Symposium on Rendering (EGSR)* 2021
- [C5] Andreas Meuleman, Hyeonjoong Jang, **Daniel S. Jeon**, Min H. Kim, “Real-Time Sphere Sweeping Stereo from Multiview Fisheye Images,” *Proc. IEEE Computer Vision and Pattern Recognition (CVPR 2021, Oral)*
- [C6] Hakyong Kim, Andreas Meuleman, **Daniel S. Jeon**, Min H. Kim, “High-Quality Stereo Image Restoration from Double Refraction,” *Proc. IEEE Computer Vision and Pattern Recognition (CVPR 2021)*
- [C7] Dahyun Kang, **Daniel S. Jeon**, Hakyong Kim, Hyeonjoong Jang, Min H. Kim, “View-dependent Scene Appearance Synthesis using Inverse Rendering from Light Fields,” *Proc. IEEE International Conference on Computational Photography (ICCP 2021)*

- [C8] Inseung Hwang, **Daniel S. Jeon**, Min H. Kim, “Single-shot Acquisition of Cylindrical Mesostructure Normals using Diffuse Illumination,” Proc. International Conference on Computer Vision Theory and Applications (VISAPP) 2020
- [C9] Hyeonjoong Jang, **Daniel S. Jeon**, Min H. Kim, “Fast Omnidirectional Depth Densification,” Proc. International Symposium on Visual Computing (ISVC 2019, Oral)
- [C10] Dongmin Keum, **Daniel S. Jeon**, Charles S. H. Hwang, Elke K. Buschbeck, “Ultrathin Camera Inspired by Visual System Of Xenos Peckii,” Proc. IEEE International Conference on Micro Electro Mechanical Systems (MEMS) 2016
- [C11] Dongmin Keum, **Daniel S. Jeon**, Min H. Kim, Ki-Hun Jeong, “Ultrathin Camera Inspired by Visual System Of Xenos Peckii,” Proc. IEEE International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS) 2015

AWARDS

- **2018 Naver Ph.D. Fellowship**, Naver
- **2016 Master’s Thesis Award**, Korea Computer Graphics Society

PATENTS

US Patent:

- [1] Min Hyuk Kim, **Daniel S. Jeon**, “Image acquisition method for time of flight camera”, US20230010725A1, published in Jan. 12, 2023.
- [2] Min Hyuk Kim, **Daniel S. Jeon**, “Hyperspectral imaging spectroscopy method using kaleidoscope and system therefor”, US20180045568A1, published in Feb. 15, 2018.

Korea Patents:

- [3] Ki-Hun Jeong, Myeong-Su Ahn, Min Hyuk Kim, **Daniel S. Jeon**, “Spectral Apparatus Incorporating Tunable Spectral Filter with Multiple Resonances, and Method for Acquiring Spectral Information Thereof”, KR Patent App. : 10-2020-0035039, published in Mar. 23, 2020.
- [4] Min Hyuk Kim, **Daniel S. Jeon**, “Lensless Hyperspectral Imaging Method and Apparatus Therefor”, KR Patent App. : 10-2019-0071347, published in Jun. 17, 2019.
- [5] Min Hyuk Kim, **Daniel S. Jeon**, “Stereo Super-Resolution Imaging Method using Deep Convolutional Networks and Apparatus Therefor”, KR Patent App. : 10-2083721-0000, published in Feb. 25, 2020.
- [6] Min Hyuk Kim, **Daniel S. Jeon**, “Hyperspectral Imaging Spectroscopy Method Using Kaleidoscope and System Therefor”, KR Patent App. : 10-1915883-0000, registered in Sep. 31, 2018.

RESEARCH PROJECTS

- [1] **Mobile Time-of-Flight** (2021-2023), Samsung Mobile, Fusing two RGB cameras (floating main camera and fixed ultrawide camera) with time-of-flight depth sensor in Galaxy S20+ to generate high-quality depth map.
 - Online calibration of two RGB cameras using depth from TOF sensor.
 - RAFT-stereo with initial depth from TOF sensor.
- [2] **Polarimetric 3D Imaging** (2021-2022), Microsoft Research Asia (MSRA), A polarimetric 3D imaging.
 - Build Handheld polarimetric capture system
 - Acquisition of SVBRDF with geometry and shading normals
- [3] **Lensless Hyperspectral & Depth Imaging** (2019-2022), NRF, Development of lensless hyperspectral imaging and depth imaging system using end-to-end learning with diffractive optical elements.

- Generate diffractive optical element design by end-to-end deep learning.
 - Acquisition of hyperspectral and depth from diffractive camera system by optimizing PSF.
- [4] **Time-of-Flight Multipath Interference Correction** (2018-2023), SK Hynix, Development of high-resolution indirect time-of-flight camera system for depth measurement.
- Resolve multipath interference of time-of-flight camera by analyzing measured phasor vectors.
- [5] **Compact Hyperspectral Imaging** (2017-2018), Samsung Science & Technology Foundation, Healthcare Edion ultra-thin spectral camera for smart glass.
- [6] **Lensless Imaging** (2017-2018), SK Hynix, Development of color imaging algorithm using lensless camera with diffractive optical elements.
- Build an ultra thin diffractive optics-based camera for color imaging with aid of machine learning image reconstruction algorithm.
- [7] **Synthetic Defocus** (2016-2017), SK Hynix, Development of fast depth estimation and re-focusing algorithm for stereo camera.
- [8] **Super-resolution** (2015-2016), SK Hynix, Development of super resolution algorithm for stereo camera using deep neural network.
- Deep learning-based super-resolution of stereo images by building parallax shifts.
- [9] **High-Quality Face Scanning** (2016), EVR Studio, Created digital human for VR games. High-quality face capture with SVBRDF and geometry normals using light stage scanning system.
- [10] **Collaborative Photography**, (2015-2016), KAIST Center for Mobile Software Platform, Developing novel view synthesis algorithm for multiview photography using multiple mobile phone.
- [11] **Depth from a Dual Aperture** (2013-2015), Global Frontier Projects (CISS), Development a depth-from-defocus method for a dual aperture.
- Develop a sparse depth estimation algorithm from a dual aperture defocus system.
 - Develop a sparse to dense depthmap from a RGB image using MST algorithm.