Learned Optics — Improving Computational Imaging Systems through Deep Learning and Optimization

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[Zoom](#)

ABSTRACT: Computational imaging systems are based on the joint design of optics and associated image reconstruction algorithms. Historically, many such systems have employed simple transform-based reconstruction methods. Modern optimization methods and priors can drastically improve the reconstruction quality in computational imaging systems. Furthermore, learning-based methods can be used to design the optics along with the reconstruction method, yielding truly end-to-end optimized imaging systems that outperform classical solutions.

BIOGRAPHY: Wolfgang Heidrich is a Professor of Computer Science and Electrical and Computer Engineering in the KAUST Visual Computing Center, for which he also served as director from 2014 to 2021. Prof. Heidrich joined King Abdullah University of Science and Technology (KAUST) in 2014, after 13 years as a faculty member at the University of British Columbia. He received his PhD in from the University of Erlangen in 1999, and then worked as a Research Associate in the Computer Graphics Group of the Max-Planck-Institute for Computer Science in Saarbrucken, Germany, before joining UBC in 2000. Prof. Heidrich's research interests lie at the intersection of imaging, optics, computer vision, computer graphics, and inverse problems. His more recent interest is in computational imaging, focusing on hardware-software co-design of the next generation of imaging systems, with applications such as High-Dynamic Range imaging, compact computational cameras, hyperspectral cameras, to name just a few. Prof. Heidrich's work on High Dynamic Range Displays served as the basis for the technology behind Brightside Technologies, which was acquired by Dolby in 2007. Prof. Heidrich is a Fellow of the IEEE and Eurographics, and the recipient of a Humboldt Research Award. He is the winner of the 2023 ACM SIGGRAPH Technical Achievement Award.