

Digital Adaptive Optics

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The practical performance of an imaging system is fundamentally limited by the optical aberrations resulting from the imperfect lenses or dynamic imaging environments. To address this long-standing problem, we develop a new framework of digital adaptive optics for universal incoherent imaging applications based on scanning light-field imaging. With digital measurement and synthesis of the incoherent light field with ultrafine precision, we have demonstrated a series of applications which are hard for traditional methods, including long-term high-speed intravital 3D imaging in mammals, gigapixel imaging with a single lens, high-speed multi-site aberration corrections for ground-based telescopes against turbulence, and real-time megapixel depth sensing. We anticipate that digital adaptive optics may facilitate broad applications in diverse fields, including industrial inspection, mobile devices, autonomous driving, surveillance, medical diagnosis, biology, and astronomy.



Short Bio:

Jiamin Wu received his Ph.D. in Department of Automation from Tsinghua University, China. He is now an associate professor in the Department of Automation at Tsinghua University, and PI at the IDG/McGovern Institute for Brain Research, Tsinghua University. His current research interests focus on computational imaging and system biology, with a particular emphasis on developing mesoscale optical setups and AI analysis methods for the understanding of large-scale intercellular dynamics in vivo. In the recent 5 years, he has published more than 30 journal papers in Nature, Cell, Nature Photonics, Nature Biotechnology, Nature Methods, and etc. He has also served as the Associate Editor of PhotonIX, Optics Express and IEEE TCSVT.