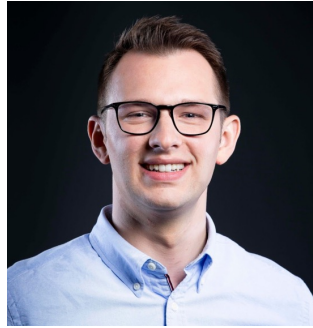


# Physics-Based Visual Computing for Efficient 3D Vision and Sensing



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University of Toronto

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## Abstract

In applications from robotics and computer vision to autonomous driving and remote sensing, there is an increasing need for optical sensors and visual computing algorithms that efficiently sense and understand the surrounding environment. Yet, conventional imaging systems fail to exploit or, worse, discard captured physical properties of light that are rich with information. For example, time of flight, polarization, wavelength, coherence, angular information, and other physical properties are encoded in photons as they interact with an environment. By understanding and carefully modeling the physics of light transport, we can reveal scene information that would otherwise remain invisible, enabling powerful and efficient methods for vision and sensing. In this talk, I describe physics-based techniques for applications in 3D imaging and computer vision. I discuss efficient methods for imaging around corners and through scattering media and make a connection to efficient methods for neural rendering and novel view synthesis through different approximations of the radiative transfer equation.

## Bio

David Lindell is an Assistant Professor in the Department of Computer Science at the University of Toronto. His research combines optics, emerging sensor platforms, machine learning, and physics-based algorithms to enable new capabilities in visual computing. Prof. Lindell's research has a wide array of applications including autonomous navigation, virtual and augmented reality, and remote sensing. Prior to joining the University of Toronto, he received his Ph.D. from Stanford University. He is the recipient of the 2021 ACM SIGGRAPH Outstanding Dissertation Honorable Mention Award.

## Host

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