

## **Image sensing technologies, challenges and vision**

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Image sensors have become an integral part of modern technology, embedded in a vast array of devices and applications. Over the past few decades, continuous advancements have significantly refined image sensor technology, allowing state-of-the-art imagers to approach the theoretical limits of classical photography. These innovations have not only enhanced the quality and performance of traditional imaging but have also paved the way for new possibilities in the field. The evolution of information processing has played a crucial role in expanding the capabilities of image sensors. What was once limited to capturing images in visible light has now broadened to encompass a variety of wavelengths, including near-infrared (NIR) and short-wave infrared (SWIR). These developments have opened up new avenues for information gathering in fields such as scientific research, medical diagnostics, security, and industrial applications, where the ability to capture images beyond the visible spectrum offers significant advantages.

This presentation provides a comprehensive overview of the current trends in image sensor development, beginning with a fundamental explanation of their operating principles. We will delve into the key factors that have driven these advancements, such as improvements in sensor materials, design innovations, and the integration of advanced processing techniques. Additionally, we will explore some of the most recent breakthroughs in NIR and SWIR image sensors, highlighting their potential impact on various industries and the future direction of image sensor technology.