DepthIQ™
At-a-Glance for OEMs

AIRY3D's DepthIQ™ platform is a simple and versatile 3D imaging solution that can be deployed at a fraction of the cost, power and size of traditional 3D imaging solutions into a much wider range of applications than current 3D imaging solutions.

Simple:

• Single-sensor 3D imaging

• 2D sensor drop-in replacement

• 2D and depth in a single capture

• Innately registered 2D and depth

• Low compute resources

Versatile:

• Suitable for most image sensors

• Compelling performance in a wide variety of applications

"AIRY3D's novel technology is unrivaled by any other player in the 3D sensor space. The company has immense potential in many different markets, such as Augmented and Virtual Reality, automotive, drones, and robotics. We believe in the capabilities of this technology to disrupt various billion-dollar markets."

Jeff Yu

Investment Principal at Robert Bosch Venture Capital GmbH

A simple and versatile solution for near-field 3D sensing and imaging

would be a single sensor that: accurately measures the depth of all near-field scene elements in a single capture, simultaneously captures an innately registered, high-quality, 2D image; needs only lightweight image depth processing (IDP) and can be deployed in any application.

Traditional 3D camera solutions like structured light, time-of-flight and stereo vision enable higher performance 3D sensing than passive, single-sensor solutions, but require much greater IDP complexity/cost, are reliant on fragile calibrations and do not capture innately registered 2D and 3D images, requiring additional complexity/cost to create a 3D imaging system.

Single-sensor 3D camera solutions are relatively recent and are compelling alternatives to traditional near-field depth 3D sensing solutions. They deliver low complexity/cost and can capture innately registered 2D images and depth maps, but image quality is significantly degraded, and the technology is limited to specific image sensor types, and as a result, a narrow range of applications.

AIRY3D's DepthIQ™ platform

overcomes single-sensor deployment and image quality challenges. DepthIQ™ is specifically designed to be applicable to most image sensor types and can be deployed in numerous applications. This design flexibility also results in a better depth sensing/image quality performance envelope than other single-sensor solutions, expanding the range of applications. AIRY3D's DepthIQ™ delivers on the promise of a simple and versatile 3D sensing and imaging solution: WE DELIVER DEPTH, EVERYWHERE.

DepthIQ™ uses a Transmissive Diffraction Mask (TDM) to encode the phase and direction of light into the pixel intensity, generating a unique dataset of integrated, innately registered, 2D image and depth data. Using minimal computational resources, DepthIQ™ proprietary IDP algorithms extract the depth data and restores the raw 2D image data, ready for a customer's 2D image signal processing (ISP) pipeline. Extracted depth data is fed to the DepthIQ™ image depth processing (IDP) pipeline which outputs a depth map.

Computational processing is fast and efficient using minimal power. The image and depth information are captured simultaneously without any comparative analysis of multiple images or complex sensor fusion algorithms like traditional 3D sensing solutions.

A TDM can be added to almost any image sensor during post-fabrication processing after the microlens process. Only a few microns thick, a TDM can typically be added without changing the camera and lens assembly. This unique and globally patented solution can benefit smartphones, consumer products, IoT, robotics, industrial, automotive, and other autonomous vehicle products.

How does it work?

An incident wavefront of light is diffracted as it passes through the AIRY3D TDM structure, as shown in Figure 1(a). The overlapping phase-fronts create an interference pattern which varies depending on the incident angle of the wavefront. This pattern determines the intensity of light delivered to adjacent pixels, resulting in angular sensitivity as shown in Figure 1(b) and 1(c).
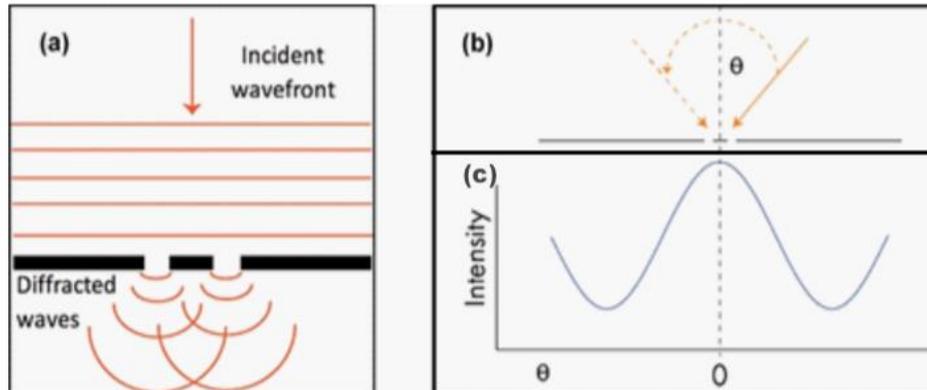

Figure 1. Diagram to illustrate how a TDM results in angular sensitivity.

What is a Transmissive Diffraction Mask (TDM)? How does it differ from a microlens?

A microlens is a passive optical structure designed to gather light from all incident angles into its pixel's photodiode. The AIRY3D TDM is a passive optical structure designed to encode the phase and direction of light in the pixel intensity. Using different structures for gathering light and encoding depth allows enormous flexibility in design and enables DepthIQ™ to deliver compelling performance in any application.
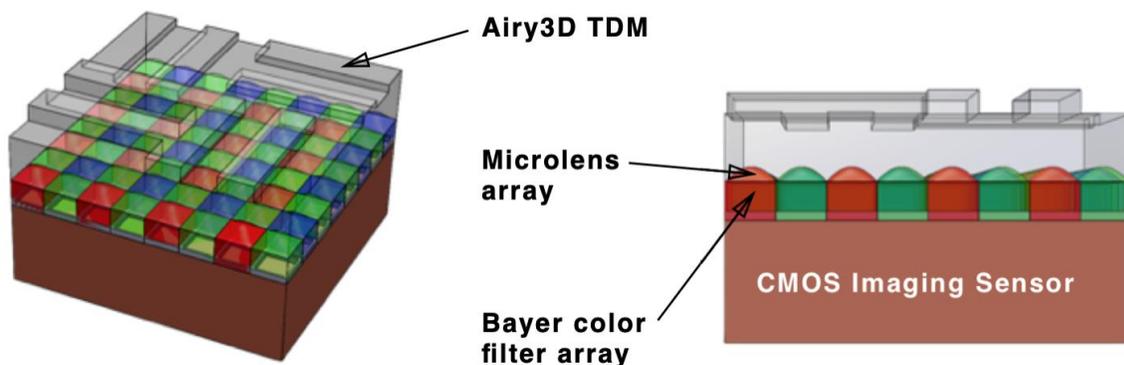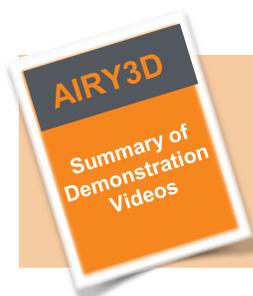

Figure 2. Cross-section of an AIRY3D Transmissive Diffraction Mask (TDM)

Find out more.

Contact us at info@airy3d.com to get a copy of a summary of demonstration videos.