

Technology Snapshot

Technology Licensing Opportunity

GigaPic-3D

A gigapixel camera that captures three-dimensional images in a single shot

Value Proposition

Creating 3D images usually requires multiple cameras or repeated measurements. GigaPic-3D can capture a gigapixel image in a single exposure. The camera uses light-field imaging, a technique that records both the amount of light and the direction it travels, allowing software to reconstruct 3D images and refocus them after they have been captured. The same camera architecture can also be configured for imaging across a broad range of wavelengths, including visible light and X-rays. This flexibility allows one platform to support scientific, industrial, security and medical applications.

Technology Readiness Level 3

IP Information: S-133984

U.S. Patent No. 12,574,655

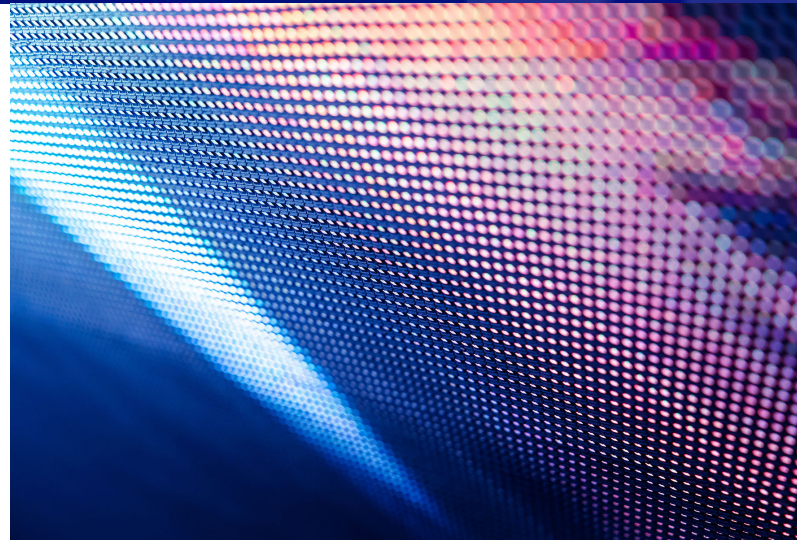
Contact Information

licensing@lanl.gov

Overview

GigaPic-3D combines many image sensors into a single camera. Together, these sensors produce images containing billions of pixels.

Most gigapixel imaging systems create a final image by collecting many separate photographs and stitching them together. GigaPic-3D captures the entire scene in a single shot, reducing image collection time and eliminating the need to align multiple images before processing.



Adobe Stock image for illustration purposes only

Unlike a conventional camera that records only the brightness of light, GigaPic-3D's light-field imaging also records the direction that light travels. Its software uses this information to create 3D images and adjust the focus after the image has been captured.

The modular design can be adapted for visible light, ultraviolet light, infrared light or X-ray imaging by selecting different optical components and radiation-conversion materials.

Advantages

- Captures gigapixel images in a single shot
- Produces 3D images from a single exposure
- Allows images to be refocused after they are captured
- Eliminates the need to stitch together multiple photographs
- Built primarily from commercially available components
- Configurable for imaging from visible light through X-rays
- Modular design supports different sensors, optics and camera configurations
- Integrated processing reconstructs images directly from the collected data

Continued on reverse

Technology Description

GigaPic-3D uses several layers that work together to capture and process an image. Light first passes through an optical layer that directs it onto an array of image sensors. For X-ray imaging, the system includes materials that convert X-rays into visible light that conventional image sensors can detect.

Instead of relying on one large image sensor, the camera combines many smaller commercial sensors into a single array. Because the sensors remain in fixed positions, they work together as one imaging system, eliminating the repeated alignment required when combining images from separate cameras.

The camera records both the brightness and direction of incoming light. Reconstruction software then creates a high-resolution image, generates 3D views and allows users to refocus the image after it has been captured.

Because the system is modular, different image sensors, optical components and detector materials can be combined to meet the needs of different applications while using the same overall camera design.

Market Applications

- **Scientific and Research Imaging** (astronomy and space imaging, fusion diagnostics)
- **Industrial and Manufacturing** (inspection, non-destructive testing, machine vision, advanced manufacturing)
- **Medical and Biomedical** (imaging, gigamacro applications)
- **Environmental and Agricultural Monitoring** (remote sensing, observation)
- **Cultural Heritage and Preservation** (high-resolution imaging, museum-grade digitization)