Three-dimensional range imaging is utilized in numerous science and industrial applications. Standard devices that perform these tasks predominately use mechanical scanning such as galvanometer-controlled mirrors, oscillating or spinning mirrors, rotating optical edges, nutating mirrors, or other mechanical means for producing a linear displacement of a laser beam for scanning a remote target. Such devices often exhibit limitations that include large weight & size, low reliability, high component count, manufacturing complexity, low image quality, shorter lifespan, high power consumption. They may also experience momentum-induced perturbations and thermal-mechanical misalignment. NASAs lightweight, and reliable range-imaging system produces high-quality images without these limitations.

**BENEFITS**
- Provides an inexpensive, lightweight, and reliable range imaging system
- Produces high quality images including tens, hundreds, or even thousands of pixels
- High resolution target surface characteristics (see below)
- Reflectivity, roughness, and density (of semi-solid objects like clouds/vegetation)
- Acquires large target area images without the use of any moving mechanical parts
- Produces a controllable illumination pattern
- Wide variety of ranges, angular extents, and resolutions
THE TECHNOLOGY

NASAs invention is an apparatus and method for three-dimensional range imaging. The method involves providing a modulated light signal, forming a fixed fiber array with ends of optical fibers, switching the modulated light signal successively into multiple optical fibers to form a pixel pattern at the fixed fiber array, and projecting the pixel pattern onto a target.

APPLICATIONS

The technology has several potential applications:

- Robotic vision and guidance
- Surface characterization
- Terrestrial surveying
- Vehicle anti-collision systems

PUBLICATIONS

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