



Information Technology and Software

## Pseudo random coding technique for 3D imaging

Offers enhanced resolution and improved system reliability

NASA Goddard Space Flight Center has developed a high resolution 3-D imaging lidar system using a resolution enhanced pseudo random code technique that improves the ranging resolution by an order of magnitude with the same transmitted optical power. Further, multiple laser diodes can be used as transmitters and transmitter power can be scaled up by modulating many diode lasers simultaneously.

### BENEFITS

- Enhanced resolution
- Transmitter power is easily scaled
- Improved system reliability

technology solution



# NASA Technology Transfer Program

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## THE TECHNOLOGY

This technology uses a pseudo random coding technique for 3D imaging. This new approach uses a spread spectrum time-resolved method, which has been widely used in the field of radar and telecommunications and the technique is also known as random-modulation continuous-wave (RM-CW). In such a spread spectrum time-resolved system, a low power continuous wave (CW) laser diode modulated with a pseudo-random bit sequence replaces the pulsed laser as the light source. The fundamental idea is that range resolution in CW operation is preserved if the emitted signal is modulated such that its cross correlation with a demodulating signal is a cyclically repeated delta-like function of time. This allows retrieval of laser returns from specific distances despite temporal overlap at the detector.

## APPLICATIONS

The technology has several potential applications:

- Surface reconstruction
- Mapping
- Obstacle recognition and navigation for vehicles

## PUBLICATIONS

Patent No: 9081096

National Aeronautics and Space Administration

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