Dynamic Target Ranging With Multi-Tone Continuous Wave Lidar Using Phase Algorithm

Tech ID: 32470 / UC Case 2021-722-0

BRIEF DESCRIPTION

Researchers at the University of California, Irvine have developed a novel algorithm that is designed to be integrated with current multi-tone continuous wave (MTCW) lidar technology in order to enhance the capability of lidar to acquire range(distance) of fast-moving targets as well as simultaneous velocimetry measurements.

SUGGESTED USES

·Remote sensing and geographical mapping

·Small satellite LiDARs

·Autonomous driving vehicles

FEATURES/BENEFITS

» Simultaneous acquisition of speed and range(distance) of fast-moving targets.

» The phase algorithm invention can overcome the limitations of current continuous wave (CW) lasers, further improving the functionality of MTCW lidar.

TECHNOLOGY DESCRIPTION

Multi-tone continuous wave (MTCW) lidar is a novel, more advanced alternative to the traditional continuous wave lidar systems. MTCW offers advantages such as simultaneous ranging and velocimetry and is widely used in a number of industries such as forestry & oceanography, autonomous vehicles, small satellite systems, among others. However, even the more advanced MTCW lidars rely on coherent detection, a characteristic that negatively affects performance with increasing target speeds. As a result, the ranging capabilities of the CW lidar are diminished through a phenomenon called the Doppler effect (shift), which is a change in the frequency of a wave in relation to the target.

In order to further enhance this technology, the researchers at the University of California, Irvine have developed a novel algorithm that can be integrated into the MTCW lidars, and via its range extraction methodology, enhance the lidar's performance by eliminating the adverse impacts of the doppler shift. To do so, the algorithm focuses on the phase of the cross-beatings of the reference and shifted tones and using the interference of the incident and backscattered light, relate the phase information to the range of the target. As a result, MTCW lidar is able to perform both ranging and velocimetry on faster moving targets with high precision.

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OTHER INFORMATION

CATEGORIZED AS

» **Optics and Photonics**

» All Optics and Photonics

» **Computer**

» Software

» **Imaging**

» Remote Sensing

» **Sensors & Instrumentation**

» Position sensors

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20230131584	04/27/2023	2021-722
United States Of America	Published Application	20210382164	12/09/2021	2021-722

RELATED CASES

2021-722-0

STATE OF DEVELOPMENT

The researchers have performed numerical analysis and software simulations on the invention as well as initial experiments to determine the limits of the current MTCW lidars via performance testing on slow speed targets.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Silicon On Sapphire Based Plasmonic And Metasuraface Design For Optical Light Manipulation

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