

Long-Range, High-Resolution Terrestrial Scanning with a Frequency-Modulated, Continuous Wave LADAR System

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Abstract: Many demanding applications, including geospatial mapping, navigation, foliage and obscuration penetration, bare earth extraction, and long range imaging, can benefit from improved 3D imagery. In this presentation, we show that coherent lidar systems, especially heterodyne detection systems using optical stretched processing of a Frequency-Modulated Continuous Wave (FMCW) chirp waveform, can offer improved performance for these demanding applications due to better range resolution, dynamic range, sensitivity, and range when compared to a direct detect lidar system. Coherent lidar systems also offer waveform flexibility to match the application needs and Doppler/vibrational sensitivity for advanced imaging capabilities. Bridger Photonics, Inc. has developed a FMCW based 3D terrestrial scanner (termed the HRS-3D Laser Scanner) for both ground and future airborne deployment. Because the FMCW system achieves better down-range resolution and an increased sensitivity as compared to direct-detect systems, the FMCW heterodyne detection system provides more precise and tactically relevant 3D imagery while increasing the overall imaging range. During this talk, we will provide an overview of the FMCW sensor, discuss recent field tests, and provide examples of using Doppler sensitivity to filter out unwanted points from the scene.