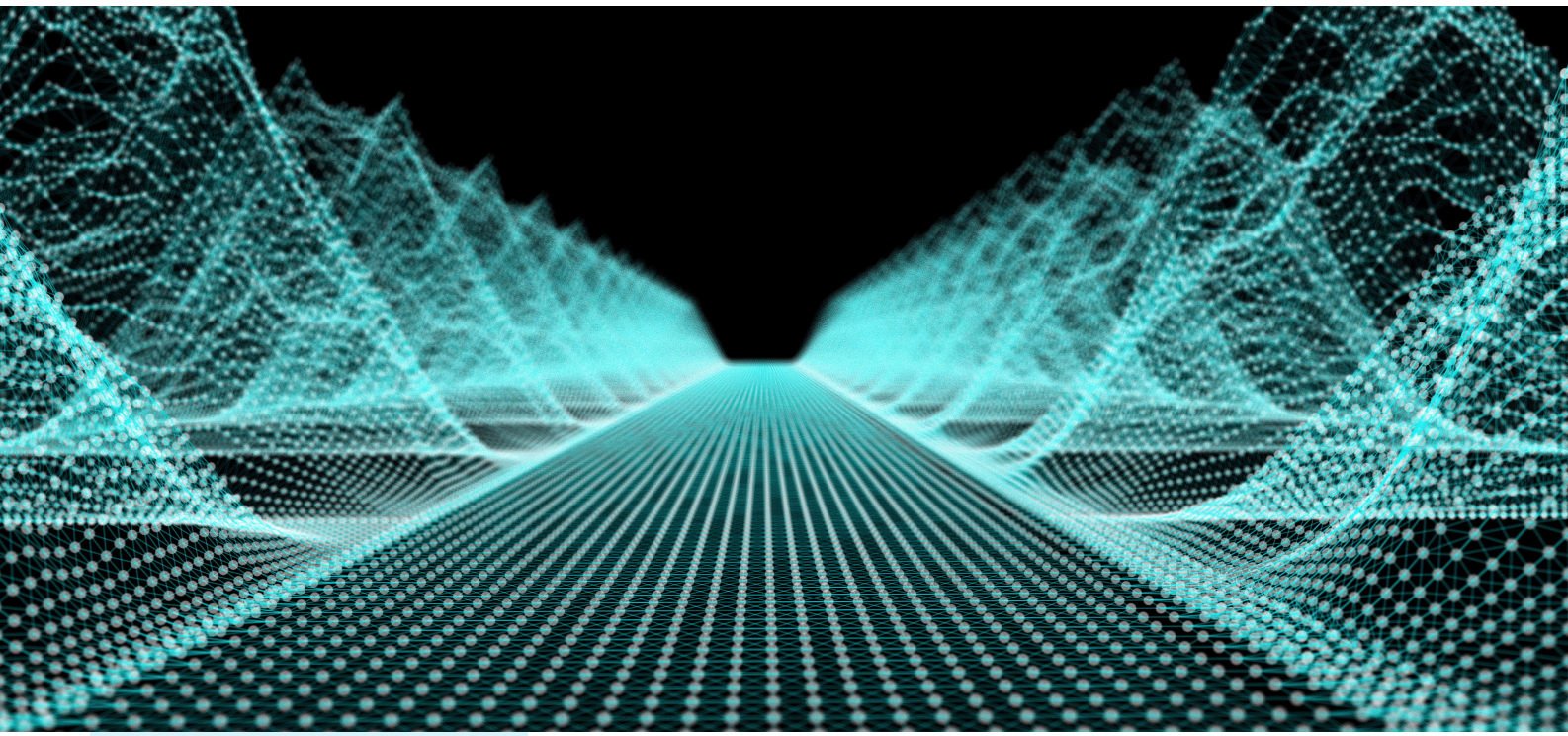
Long-range FMCW LiDAR with 2D quasi-static MEMS mirror scanning

Fraunhofer HHI



AT A GLANCE

- Direct frequency modulation at 1550 nm and coherent detection enable longer range, intrinsic amplification and glare suppression
- Reduced system complexity by monostatic design using two-dimensional MEMS Scanner
- Fiber coupling permits spatial separation of optical frontend and receiver module

Features

- Long range of about 150 m
- Simultaneous measurement of distance and speed
- Scalability by using standard communication components
- Quasi-solid-state for scanning
- Fiber-based optics and monostatic scanning design

Applications

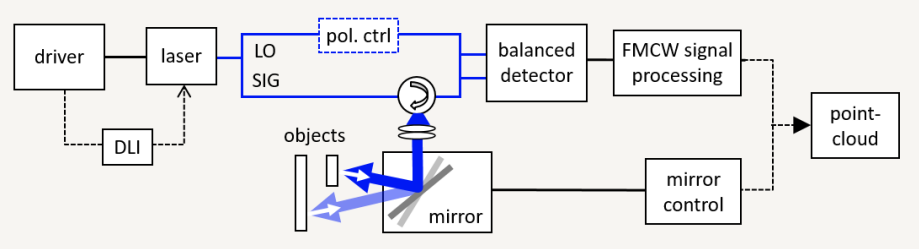
- Advanced Driver Assistance Systems (ADAS)
- 3D Imaging
- Augmented Reality (AR)
- Smart Infrastructure
- Robotics

Technical Background

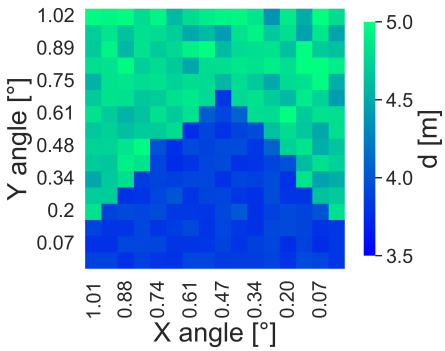
The three Fraunhofer Institutes HHI, ISIT, FHR demonstrate a LiDAR prototype based on coherent detection. This approach enables long-range operation, simple implementation of glare suppression and potentially a small form factor. It is based on the frequency modulation of an eye-safe laser at a wavelength of 1550 nm that scans the scene using small micro-electro-mechanical-system (MEMS) mirrors.

Prototype

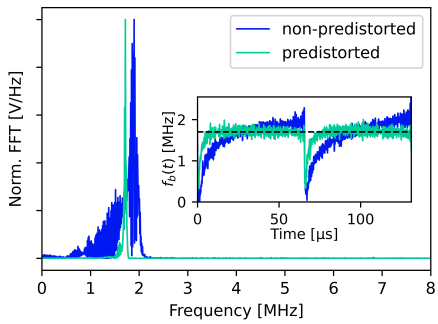
- Frequency modulated continuous wave (FMCW) method with passive predistortion
- Laser wavelength at 1550 nm and 100 kHz linewidth
- Eye-safe operation
- Utilizing a novel 2D quasi-static MEMS mirror for point-to-point scanning



Block diagram of LiDAR prototype



Point-cloud example of scanned object using our prototype



Effect of predistortion on linewidth and measurement precision

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