Docket #: S19-073

Dispersion engineered phased for compact LIDAR or ranging systems

Stanford researchers at the Vuckovic Lab have developed a dispersion engineered phased array which can be used as a beam steering device for compact LIDAR or ranging systems critical for self-driving cars, logistics, and the security sector.

Currently, most optical beam steering devices comprise rotating lasers or mirror systems, which are bulky, costly and/or alignment sensitive. This system is an on-chip integrated optical array steering device that is lower cost, compact and thinner than current systems. This dispersion engineered phased array can scan a larger angle with a smaller wavelength range compared to phased arrays based on strip waveguides. The larger angle range is an improvement compared to existing optical phased arrays. Moreover, the smaller wavelength range lowers the requirements on the laser.

The phased array includes several photonic devices which are being optimized together using inverse design tools described in Stanford docket S18-012 "Inverse design software for nanophotonic structures – Spins"

"Downloadable Presentation: "Inverse Design Phased Array for LIDAR"

Stage of Research:

- **Proof-of-concept** – the proposed phased array consists of several photonic devices which are being optimized together into an integrated system

Applications

- **Beam steering systems** for signal processing, projection systems, LIDAR
- **LIDAR** is critical for self- driving cars, logistics, and the security sector
- **Compact spectrometer** - As the beam deflects light with a different wavelength under different angles it can also be used as a compact

spectrometer

Advantages

- **Lower cost**
- **Compact, thin, and can be integrated it into a single layer**
- **Improves on current state-of-the-art optical phased arrays:**
  - More sensitive to wavelength
  - Can steer a larger angle range with limited bandwidth (currently, 19O by scanning from 1543nm to 1566nm)
- **Uses inverse design tools** to complete design and optimize this device

Patents

- Published Application: 20200379315
- Issued: 11,467,468 (USA)

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