

January 18, 2024

# ECEN 689: Optical Interconnects

## Homework #1

Due: 1-25-2024, 11:59PM

**Homeworks will not be received after due.**

Instructor: Sam Palermo

Read the following optical interconnect overview material and recent design papers that are posted on the website.

### Optical Interconnect Overview Material

1. I. Young *et al.*, "Optical I/O Technology for Tera-Scale Computing," *IEEE J. Solid-State Circuits*, vol. 45, no. 1, Jan. 2010, pp. 235-248.
2. R. Beausoleil, "Large-Scale Integrated Photonics for High-Performance Interconnects," *ACM Journal on Emerging Technologies in Computing Systems*, vol. 7, no. 2, May 2011, article 6.

### Recent Design Papers

#### VCSEL-Based Link

3. C. Schow *et al.*, "A Single-Chip CMOS-Based Parallel Optical Transceiver Capable of 240-Gb/s Bidirectional Data Rates," *IEEE J. Lightwave Technology*, vol. 27, no. 7, Apr. 2009, pp. 915-929.

#### MZM-Based Link

4. B. Analui *et al.*, "A Fully Integrated 20-Gb/s Optoelectronic Transceiver Implemented in a Standard 0.13- $\mu\text{m}$  CMOS SOI Technology," *IEEE J. Solid-State Circuits*, vol. 41, no. 12, Dec. 2006, pp. 2945-2955.

#### EAM-Based Link

5. A. Krishnamoorthy *et al.*, "A low-power, high-speed, 9-channel germanium silicon electro-absorption modulator array integrated with digital CMOS driver and wavelength multiplexer," *Optics Express*, vol. 22, no. 10, May 2014, pp. 12289-12295.

#### RRM-Based Link

6. C. Li *et al.*, "Silicon Photonic Transceiver Circuits With Microring Resonator Bias-Based Wavelength Stabilization in 65 nm CMOS," *IEEE J. Solid-State Circuits*, vol. 49, no. 6, June 2014, pp. 1419-1436.

**Write a one-page summary report on one of the recent design papers (3-6).**