



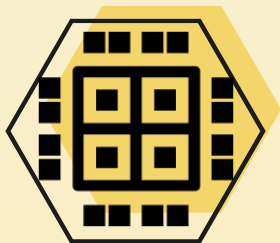
## Macroscale Visible Light Interconnects

The rapid growth of large language models and cloud services is driving demand for high-throughput, low-latency data-center interconnects. Visible-light communication (VLC) offers a promising alternative to conventional telecom links, but its adoption requires cost-effective, high-speed devices capable of both transmitting and detecting optical signals. GaN micron-scale LEDs are strong candidates due to their high modulation speeds, compact size, and improved safety compared with lasers.

This project aims to design and implement a fiber-coupled optical system to evaluate LED performance for VLC applications.

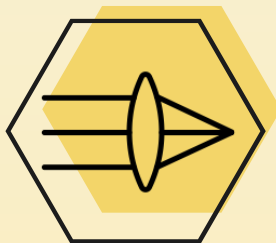
Student teams will fabricate their own devices, build a fiber-coupled optical system, and characterize the devices as transceivers in a realistic VLC scenario (e.g., sending GIFs).

This hands-on project integrates device fabrication, optical system design, and communication system testing—providing students with experience at the intersection of materials science, optoelectronics, and data communication



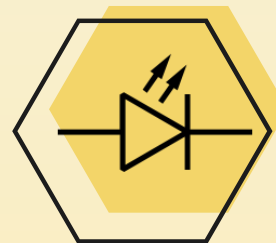
### FPGA Control

An FPGA is planned to be used to address each LED and process transferred, encoded data in real-time.



### Fiber System

An optical system is needed, wherein an LED and a corresponding detector are coupled via fiber for higher signal-to-noise ratio.



### Device Fabrication

MicroLEDs are to be fabbed on previously grown epitaxies to enable flexibility and control over, e.g., design and layout.

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