Green Computing and DX

R&D Project Title: Development of Optoelectronic Hybrid Image Recognition Processor

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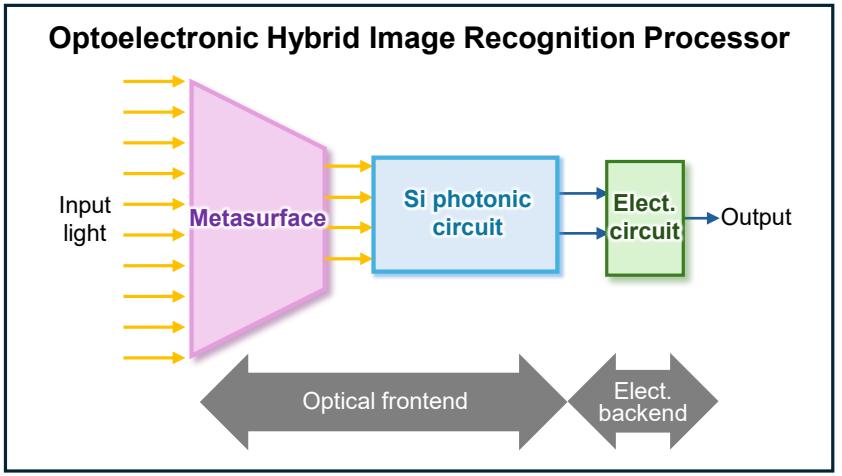
Summary:

The project aims to develop an optical frontend composed of optical metasurfaces and silicon photonic circuits, which is combined with an electrical backend to realize an optoelectronic hybrid image recognition processor that significantly reduces computation in the electrical domain.



Our research focuses on:

- **Optical frontend development**
  Designing and fabricating optical metasurfaces and silicon photonic circuits, and establishing integration technologies.
- **Neural network and learning algorithm optimization**
  Co-designing each layer, and optimizing both the network architecture and associated learning algorithms.

The project contributes to carbon neutrality by:

- **Reducing digital neural network workloads**
  Performing linear operations, such as convolution, in the optical domain to decrease computational demand and power usage in the electrical domain.
- **Minimizing opto-electric (OE) converters and analog-digital converters (ADCs)**
  Leveraging optical data compression via metasurfaces to reduce the number of OE converters and ADCs.