PURDUE INNOVATES | Office of Technology Commercialization

Isolated Self-Powered Gate Drive with laser and PV cell

Laser-powered, EMI-immune gate drive sends power/control optically for fast, low-deadtime MV/HV switching.

Researchers at Purdue University have developed a laser-powered gate drive system in which gate control is achieved by modulating laser power levels rather than the traditional way of turning the laser ON/OFF. This technology address common mode transient immunity (CMTI) and conducted electromagnetic interference (EMI) associated with electrical switching systems. Additionally, it provides fast switching and very low deadtime using a single laser, making this technology highly applicable in the electric vehicle and MV and HV power electronics industries.

Technology Validation:

Simulation completed. Experimental validation through prototype is ongoing

Advantages:

-Continuous laser operation

-Efficient power transfer

-Reduced energy loss

-Switching noise immunity

-Integrated power and gate signal transfer

Applications:

-Electric vehicle industry

-High power motor drives

-Electric aviation

-Power grid with power electronics

Technology ID

2025-LEE-71059

Category

Energy & Power Systems/Grid Modernization & Smart Grids
Semiconductors/Devices & Components
Automotive & Mobility Tech/Micromobility & Smart Urban Infrastructure

Authors

Junghoon Kim
Woongkul Lee

Further information

Parag Vasekar
psvasekar@prf.org

View online

-MV and HV power electronics

TRL: 3

Intellectual Property:

Provisional-Patent, 2025-07-18, United States

Keywords: Electrical Engineering, Green Technology, Laser power modulation, Non-contact gate control, Optical gate drive, Optical power transfer