



Southern Illinois University System

Applications

- Integrated circuit design
- Complex threshold logic circuits
- Circuit design software

Inventor(s)

Mohammad R. Sayeh, PhD
Dr. Sayeh is a professor of electrical and computer engineering at SIU Carbondale. His research focuses on photonics and artificial neural networks.

Nima Davoudzadeh Mahboub Sedigh, PhD
Dr. Sedigh earned his PhD in electrical and computer engineering from SIU in 2014.

Mohamad Tafazoli Mehrjerdi, PhD
Dr. Mehrjerdi earned his PhD in electrical and computer engineering from SIU in 2015.

Contact

Michelle Chitambar, PhD
Senior Technology Transfer Specialist
Michelle.Chitambar@siu.edu
(618) 453-4544

All-Optical Proteretic Photonic Integrated Device

Bi-stable devices are used routinely in optical circuits to reduce signal noise. Such devices are typically hysteretic, meaning they require an optical signal to exceed a given threshold level before switching from one output level to another. This post-threshold switching requires redundant traversal of a given signal (see figure below), leading to intrinsic time delays that limit the modulation rates of conventional bi-stable devices.

Invention

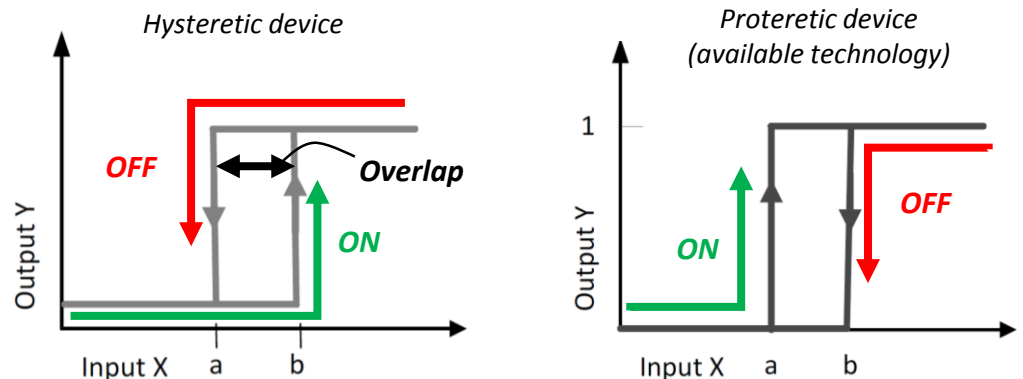
SIU researchers have developed an all-optical proteretic bi-stable device for photonic integrated circuits that utilizes proteresis—that is, reversed hysteresis—to reduce switching-induced latency. Instead of switching after a given threshold has been exceeded, the proteretic device switches prior to reaching a threshold value to reduce feedback delay. This device has been simulated via VPIphotonics™ and implemented in a proof-of-concept device.

Key Advantages

- Improves optical switching speed for particular applicability in sub-nanosecond applications
- Maintains noise immunity
- Increases oscillation rate without increasing integration speed
- Can eliminate unwanted hysteretic (memory) behavior

Status

A non-provisional patent application (No. 15/200,104) was filed for this technology in July 2016. The technology is available for license.



Other opportunities related to this technology, included but not limited to sponsored and/or collaborative research, may be available. Please reach out to the designated contact identified at left for more information.