

The LiFi Revolution

NSF Award: [Broadband Sensors Optical Wireless Local Area Networks](#) (Pennsylvania State Univ University Park)

State: [Pennsylvania](#)

Congressional Districts: Pennsylvania District 05

Research Areas: [Engineering](#)

WiFi revolutionized how we communicate. Now, LiFi, a hybrid system that combines a wireless network with light-emitting diodes (LEDs), may bring a similar revolution to location identification. The approach offers a way to find items or people in large stores, malls, high-rise buildings, hospitals and museums.

Developed by a research team at Pennsylvania State University, the LiFi system uses radio frequency transmitters and overhead LED lights to pinpoint an exact location in indoor and environments. This provides a much needed alternative to global positioning systems (GPS) for indoor use because inside radio frequencies interfere with the GPS signal.

So how does the LiFi system work? Envision large stores or malls with overhead LED light fixtures, each with a location code. At the store or mall entrance, a computer that's accessible via keyboard or telephone contains a database of all the items available. Shortly after a query, the location of a desired item appears. The system identifies items through a photodiode and ZigBee receiver merchandise tag. Because walls block light transmission, item locations are transmitted from the LEDs via a ZigBee multihop wireless network.

Even when merchandise is moved from room to room, the location remains available because a different LED overhead light with a different location code signals the tag.

Beyond malls and stores, LED-transmitted information may also find use in settings where radio frequency signals can interfere with equipment, such as hospitals. The system could identify the floor where a person is situated. In museums, navigation systems could guide people through large buildings by reading the final destination signal from a hand-held photodiode device and initializing lights or other indicators to show the proper path.

Image

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