University of Tikrit
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Simultaneous Lightwave Information and Power Transfer (SLIPT) Using Solar Panels in VLC Systems

A project submitted to the Council of Shirqat College of Engineering at University of Tikrit in partial fulfilment of the requirements for the bachelor's Degree in electrical engineering.

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Abstract

Technology is an evolving aspect of our life, and one of these new evolving technologies is VLC (Visible Light Communication System), it's an unlicensed alternative to WIFI Technology that uses Radio Frequency systems. Simultaneous light wave information and power transfer (SLIPT) is a new technology that is able to harness energy while also providing

Data transition using the same beam of light. This project designs a working SLIPT prototype by using Light Emitting Diodes (LED) and a Photovoltaic (PV) solar panel to show the functionality of optical wireless communication and energy harvesting.

The system design consists of a transmitter that is custom made and a receiver module. The transmitter uses a type of modulation called analog Intensity Modulation (IM), by using an IRF3205 MOSFET (Metal–Oxide–Semiconductor Field-Effect Transistor) and an adjustable DC-bias network to modulate continuous analog signals (such as audio) onto the driving current of a 3-Watt LED array. A solar panel receive the signal that is being transmitted through the light along with a DC element, and to split the combined received Electrical signal from AC And DC, a simple wiring circuit that conisit from a low-pass filter and high-pass filter helps to split the AC And DC, and is called a Bias-Tee. This helps showing the different component each heading to their Respective path, the AC path for information (audio/data), And DC path for energy use.

This prototype will help showing how we can use this dual functionality, weather it is for simple (IoT) devices, or to benefit from more battery-less in the future, or for charging everyday devices and making more smart energy efficient infrastructure.