

Comparison and consultation on low-noise solar communication systems



Article Overview

Low-noise solar communication systems combine solar-powered transmission with noise mitigation strategies to optimize signal quality in high solar radiation environments.

Overview of Solar Communication Systems

Solar communication systems can be broadly categorized into optical wireless communication (OWC) and solar-powered radio frequency (RF) systems. Optical systems, including Li-Fi and free-space optical (FSO) links, use light as the carrier signal and are highly sensitive to solar background noise, which can degrade the signal-to-noise ratio (SNR) and bit error rate (BER) during daytime operation. Solar-powered RF systems, such as solar radio receivers, face similar challenges from solar radio bursts but can mitigate noise using low-noise amplifiers (LNAs) and reduced frequency resolution bandwidth (RBW).

Noise Mitigation Strategies

- Orientation and Field of View (FOV) Control: Experimental studies show that the orientation of the receiver significantly affects solar noise interference. Narrowing the FOV and optimizing receiver angles can reduce multipath dispersion and ambient noise in both underwater and free-space optical systems.
- Spectral and Spatial Filtering: For FSO and Li-Fi systems, applying spectral filters to isolate the communication wavelength and spatial filters to limit the acceptance angle improves SNR, enabling high-speed data transmission even under strong sunl...

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The experimental outcomes depict the signal's noise content, spectral leakage, and roll-off rate variation at multiple Rx orientations.

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Experimental Investigations of Orientation-Based Solar Noise in ...

We carry out a detailed comparative performance analysis of the UOWC Rx system considering various optical

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The work focuses on using mini solar panels, coupled with tailored circuitry, to address practical challenges in greenhouse

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Experimental design and performance evaluation of a solar panel-based visible light communication system for

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Abstract Solar blind ultraviolet (UV) communication, with advantages such as low solar background noise, strong non

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The collected data and communication systems will enable further research on topics like optimizing the dispatch of

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Solar panel receiver system implementation for visible light ...

Visible Light Communication (VLC) is a rapidly growing technology. This technology has several advantages: (1)

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The proposed work investigates the effects of natural and artificial ambient light noise using solar panel as receiver in VLC system.

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Here, the serial communication based on solar-blind UV communication system consists of four modules: baud rate generator

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Abstract: The performance of the underwater optical wireless communication (UOWC) system is highly affected by seawater's

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Ambient Noise effects of the Underwater Channel on the

We investigate the effect of environmental noise, caused by solar radiations under water, on the performance of

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Performance Evaluation of Solar Blind NLOS Ultraviolet Communication ...

Then we report on statistical models for noise and signal photon counts, non-line of sight (NLOS) short-range ultraviolet

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We investigate the effect of environmental noise, caused by solar radiations under water, on the performance of

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Performance Analysis and Design Considerations of the Shallow

To this end, this paper proposes a unified model for underwater channel characterization and system performance

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Investigation of Solar Noise Impact on the Performance of Underwater ...

Abstract: We investigate the effect of environmental noise, caused by solar radiations under water, on the performance of

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Experimental design and performance evaluation of a solar ...

These findings offer insights into the design of photovoltaic-based VLC systems, highlighting opportunities to enhance

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Impact of orientation-based solar light noise on the performance of ...

This work discusses the impact of solar light on the UOWC system with its Rx facing different orientations. It is found

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An in-depth investigation of solar noise in vertical undersea visible ...

Abstract and Figures In Undersea visible light communication (UVLC) system, we investigate the effect of ambient

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The Importance of Low-Noise Amplifiers (LNAs) in Satellite ...

In satellite communication systems, low-noise amplifiers (LNAs) are essential components that enhance weak signals

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Performance evaluation of non-line-of-sight optical communication ...

Solar blind ultraviolet communication systems can provide short to medium range non line-of-sight and line-of-sight

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Receiver Intend to Reduce Ambient Light Noise in Visible

However, ambient light noise due to indirect sunlight and fluorescent light is a major concern that affects the

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Power Efficient Communication for Low Signal to Noise Ratio Optical

Abstract: Receiver sensitivity is a particularly important metric in optical communication links operating at low signal to noise ratios

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