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Hierarchical Scheme for Detection of Rotating Mimo Visible Light Communication Systems Using Mobile Phone Camera

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Abstract : Multiple-input and multiple-output (MIMO) scheme can extend the transmission capacity for the light-emitting-diode (LED) visible light communication (VLC) system. The MIMO VLC system using the popular mobile-phone camera as the optical receiver (Rx) to receive MIMO signal from n x n Red-Green-Blue (RGB) LED array is desirable. The key step of decoding the received RGB LED array signals is detecting the direction of received array signals. If the LED transmitter (Tx) is rotated, the signal may not be received correctly and cause an error in the received signal. In this work, we propose and demonstrate a novel hierarchical transmission scheme which can reduce the computation complexity of rotation detection in LED array VLC system. We use the n x n RGB LED array as the MIMO Tx. A novel two dimension Hadamard coding scheme is proposed and demonstrated. The detection correction rate is above 95% in the indoor usage distance. Experimental results confirm the feasibility of the proposed scheme.

Keywords : Visible Light Communication (VLC), Multiple-input and multiple-output (MIMO), Red-Green-Blue (RGB), Hadamard coding scheme
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