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Dimming control in visible light communication

Afrah Ali
University of Wollongong in Dubai, UAE

Increasing wireless data traffic is creating pressure on the conventional dwindling radio frequency spectrum. A new and reliable communication medium becomes a necessity. Visible Light Communication (VLC), a subset of optical wireless communications uses the visible light spectrum between 400 and 800 THz as a medium for communication. VLC utilizes the illumination of LED to establish a communication medium. The project focuses on achieving a successful VLC communication link at low intensities of light without affecting the speed, accuracy and efficiency of VLC. Conventional communication medium such as Radio Frequency (RF) spectrum uses complex valued Orthogonal Frequency Division Multiplexing (OFDM) signal which is not suitable for Intensity Modulation – Direct Detection (IM/DD). IM/DD is a modulation scheme where the RF signal modulates the intensity of an optical source. The LED driving signal in optical communication must be real and positive. The challenge lies in the development of a dimming control technique in VLC systems. Dimming control in VLC fixes the average intensity according to user requirements. The project will comprise of a reverse polarity optical RPO-OFDM modulator, a Forward Error Correction (FEC) encoder block, a dimming control circuit, an RPO-OFDM demodulator and a FEC decoder. Extensive research on various modulation schemes, coding and error correction techniques along with various driver circuit design for dimming control in VLC were thoroughly investigated to conclude the best reliable solution for dimming in VLC. The signal processing was validated through MATBLAB and the simulation was performed on SIMULINK.

Biography

Afrah Ali is a Bachelor of Telecommunications Engineering student at the University of Wollongong in Dubai. She has worked on the dimming control in Visible Light Communications as a part of her thesis research in her final year. She worked on the research and implementation of various other projects throughout her academic journey.

afrahali.k@hotmail.co.uk

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