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An adaptive FIR filter for a high speed VLC system

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Light-emitting diode (LED) devices are being used in a wide range of applications for both illumination and as a communication system. The use of LEDs as emitters for communications is evolving and it is likely that visible light communications (VLC) will provide extra data transmission capacity in the future wireless systems. At present devices used for illumination suffers from inter symbol interference (ISI). To reduce the inter symbol interference an adaptive FIR filter (an adaptive equalizer filter) is placed in the transmitter side and a raised cosine filter (RCC) is introduced in the receiver circuit. To find the optimal coefficients for the FIR filter, previous channel information and off-line adaptive algorithm is used. The proposed adaptive FIR was verified using Simulink and MATLAB. The FIR filter structure is designed with 4-tap for the simulation purpose. For compatibility and flexibility, the channel impulse response is randomly selected. The bit error rate (BER) performance of the VLC system together with other measures such as data rate and distance were compared with the results obtained without the use of equalizer circuits. It clearly shows an advantage of using the pre- equalizer FIR filter in improving the system performance.

Biography

Nour El Sayed is in the final year of his Bachelor's Degree in Telecommunication Engineering at the University of Wollongong. His professional memberships include the following but not limited to; Institute of Electrical and Electronics Engineers (IEEE), and Engineers Australia.

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