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Design Considerations for High Speed Visible Light Communication Systems

Abstract: Visible light communications (VLC) has potential to play a major part in the future smart home and future generation communication networks. There had been significant improvements in VLC technology in the last decade and a multi-Gigabit data rate is possible using light emitting diodes (LEDs). The commercial success of VLC systems, however, depends on the ability to fabricate low cost transceiver components and to realize the promise of high data rates. This talk focus on a new approach to establish the device parameters for integrated VLC system design by taking account of particular characteristics of the emitter and a receiver technology and combining them with power requirement for a particular modulation scheme. Different approaches including multiple inputs multiple outputs (MIMO), spatial modulation and ganging schemes to achieve high data rates will be discussed. The talk also highlights challenges in achieving highly parallel data communication along with the possible bottlenecks in integrated approaches will also be discussed. A new approach of generating a large bandwidth (in excess of 200 MHz) white light using a blue LED and super-yellow color converter will be highlighted.

Biography: Dr Sujan Rajbhandari obtained his bachelor's degree in Electronics and Communication Engineering from Institute of Engineering, Pulchowk Campus (Tribhuvan University), Nepal in 2004. He obtained an MSc in Optoelectronic and Communication Systems with Distinction in 2006 and was awarded the P O Byrne prize for most innovative project. He then joined the Optical Communications Research Lab (OCRG) at Northumbria University as a PhD candidate and was awarded a PhD degree in 2010. His PhD thesis was on mitigating channel effect on indoor optical wireless communications using wavelet transform and neural network. He worked at Northumbria University as a senior research assistant (Dec. 2009-Aug. 2012) and research fellow (Sep. 2012- Dec. 2012). He joined the University of Oxford as a posts-doctorate Research Fellow in Dec. 2012 and is working in EPSRC's Ultra-parallel visible light communications (UP-VLC) project.

He has published more than 100 scholarly articles in the area of optical wireless communications. He is a co-author of a CRC book on "Optical Wireless Communications – Systems and Channel Modelling with Matlab (2012). He has served as a local organizing committee member for CSNDSP2010, NOC/OC&I2012, EFEA2012; publication chair for NOC/OC&I 2011; and proceeding editor for EFEA 2012 & NOC/OC&I 2011 as well as reviewer for several leading publications and international conferences. His research interests lie in the area of optical wireless communications, modulation techniques, equalization, artificial intelligence and wavelet transforms. He is a member of IEEE and an associate member of the Institute of Physics.