

Prototype Design of Visible Light Communication System for the Road Safety Application

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Abstract-Visible Light Communication (VLC) is a new emergent communication system. This system is envisioned to be used in a wide range of applications using different topologies. VLC system uses Light Emitting Diodes (LEDs) which are considered to be the next generation of lighting systems. The VLC systems exploit the inherent characteristics of high rate switching for data communication without interruption to the primary use of LEDs for lighting. This thesis entitled “Prototype Design of Visible Light Communication System for the Road Safety Application” addresses the usage of VLC in an outdoor application for the road safety. This kind of application, termed as advanced driver assistance systems (ADAS) are generally very challenging. The system performance depends on several factors such as ambient, road street light, direct sun light to mention a few. The Direct Sequence Spread Spectrum (DSSS) modulation is being examined as a suitable method to combat the effects of these noise sources. An initial comparative study for various modulation schemes such as On-Off Keying (OOK), L-level of Pulse Position Modulation (L-PPM), Sub-Carrier Binary Phase Shift Keying (SC-BPSK) show that DSSS modulation technique may have an edge over these schemes. However, further investigation continues to solidify our approach. Previously, the characterization of LEDs emitter and a thorough analysis of LEDs based full system traffic light set up have been carried out. Various design parameters have been optimized using our developed model. These design parameters are expected to enhance the performance of the receiver. A series of measurements in different environments are likely to be undertaken using our assembled front end receiver. This experimental task will help us to devise an equivalent noise model. It is expected that the prototype VLC system would be ready towards the end of coming year.