ABSTRACT

The establishment of reliable communication networks is recognized as quite challenging in underground mining. The radio frequency (RF) technology is one that is commonly used, however it has limitations such a high bit error rate (BER). This recommends the use of visible light communication (VLC), also known as underground mine visible light communication (UMVLC), to evaluate communication in underground mining. By using rapidly flickering LEDs that are invisible to the human eye, UMVLC utilizes the same data transmission system as VLC in indoor conditions.

Two testing scenarios are used to examine the UMVLC system's performance in this final project. In order to achieve an effectively received signal, the simulation testing aims to figure out the best tilt angle and distance. Received power, signal-to-noise ratio (SNR), and bit error rate (BER) are some of the test measures that are used.

The simulation and analytical results obtained in this final project show that the received power, SNR, and BER are all affected by the angle of tilt of the transmitter and receiver. It is clear that the BER value increases as the tilt angle of the transmitter or receiver increases, while the level of SNR drops. A 30° angle of tilt enables data to be transmitted up to a distance of 10 meters, a 45° tilt angle enables for data transmission up to a distance of 9.5 meters, and a 60° tilt angle enables for data transmission up to a distance of 8 meters.

Key Word : Underground Mine Visible Light Communication, Tilt Angle, Power Received, Signal to Noise Ratio, Bit Error Rate.