

ABSTRACT

Underground mining is an activity with a high level of accident risk. The need for an underground communication system or Underground Mining Communication (UMC) to reduce the risk of accidents. Radio communication that is often used has drawbacks, the consideration of using Visible Light Communication (VLC) is a solution. VLC uses a Light Emitte Diode (LED) as the transmitting medium, very suitable for use in mining locations with minimal lighting and difficulties with radio communication and satellite signals to penetrate the mine site.

In this final project, the author has analyzed the effect of dust attenuation on the performance of the VLC system for UMC. The transmitter used is an LED which is placed at the top of the mine tunnel and the receiver used is a PIN Photodiode which is placed on the miner's helmet. The scenario used is the comparison between the LED distance and the miner's helmet, which is between 5 meters to 10 meters using OOK-NRZ modulation and Line of Sight (LoS) as the transmission channel. Performance quality is determined by the Bit Error Rate (BER) of 10^{-3} and Signal to Noise Ratio (SNR).

The results of this study are height (h) can affect the communication distance and the quality of BER and SNR performance. Height $h=5$ meters obtains the farthest distance (d) of 6.66 m based on the BER and SNR parameters of 18.73 dB. Dust concentration affects communication quality because it causes attenuation, the minimum dust concentration value ($C_1=0.9$) obtained the farthest distance of 6.37 m based on the BER and SNR parameters of 12.13 dB.

Keywords : Underground Mining Communication (UMC), Visible Light Communication (VLC), Line of Sight (LoS), Light Emitte Diode (LED).