ABSTRACT

Light Fidelity (Li-Fi) is a wireless communication technology based on visible light that offers an alternative to radio wave-based communication such as Wi-Fi. With advantages such as high transmission speed, better security, and minimal electromagnetic interference, Li-Fi presents a potential solution for indoor communication. However, its performance is highly influenced by light propagation conditions, particularly in Line of Sight (LOS) and Non-Line of Sight (NLOS) scenarios. This research aims to evaluate the performance of Li-Fi communication under LOS and NLOS conditions using a system based on Arduino UNO. The testing is carried out by analyzing parameters such as data transmission speed and bit error rate (BER) across various distances and obstacle conditions. The research method includes designing a data transmission system using an LED as the transmitter and a solar panel as the receiver, as well as conducting performance tests under LOS and NLOS conditions. The results of this study are expected to provide insights into the performance differences of Li-Fi in LOS and NLOS conditions and to identify factors that affect communication efficiency. In addition, the research aims to develop optimization strategies to enhance the reliability of Li-Fi in indoor environments and support its implementation in Internet of Things (IoT) applications and high-speed wireless communication. Based on the test results, the Arduino-based Li-Fi system was successfully implemented and was able to measure real-time data transmission performance in both LOS and NLOS conditions. At short distances (5–25 cm), LOS and NLOS showed nearly identical performance with maximum throughput and no error Bit Eror Rate , while at longer distances (100 cm), NLOS experienced a significant decrease in throughput and an increase in BER of up to 55%, whereas LOS experienced decrease in avarege throughput to 150 and 6% Bit Eror Rate. These results indicate that NLOS conditions are only effective for short-range communication, while LOS is more reliable for medium to long distances.

Keywords : *Li-Fi, LOS, NLOS, Arduino UNO, wireless communication*