

## **Advanced Li-Fi System with Green Wavelength Directly Modulated Laser for High-Speed, Scalable and Resilient Communication in 6G Hospitals**

**Dr Ajay Sharma**

*Department of Computer Information Systems, Faculty of Information and Communication Technology*

In this research, an innovative Li-Fi system is developed for high-speed communication in hospital environments that operates at a green wavelength of 500 nm with Directly Modulated Laser (DML). The proposed system shows excellent performance and achieves a Q factor of 18.84, a bit error rate (BER) of  $1.6e-79$ , and a signal-to noise ratio (SNR) of 74.94 dB, which is significantly better than the previous research. It also has a range of up to 25 meters line-of-sight (LOS) and can transfer data at speeds in excess of 1 Gbps, making it significantly faster than previous work conducted with much lower LOS ranges while being robust against interference. New applications of DML combined with optical splitters contribute to providing signal stability and system scalability, overcoming problems such as low range. This design ensures safe, reliable, and non-intrusive communication, ideal for applications that require high data reliability, such as real-time imaging and telemedicine in hospitals. This new Li-Fi system is found to be compatible with modern hospital power requirements, and it also provides a solid foundation for future 6G communication networks.