VISVESVARAYA TECHNOLOGICAL UNIVERSITY,

BELAGAVI-590018

Mini Project Report On

"Li-Fi based data transmission through light using Arduino"

A report submitted in partial fulfillment of the requirements for

MINI PROJECT

In

Computer Science and Engineering (IOT , Cyber Security including Blockchain Technology)

Submitted by

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CERTIFICATE

This is to certify that the Project entitled **"Li-Fi based data transmission through light using Arduino"** has been successfully completed by

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the bonafide students of Department of Computer Science & Engineering (IOT , Cyber Security including Blockchain Technology), Alva's Institute of Engineering and Technology in **DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (IOT , CYBER SECURITY INCLUDING BLOCKCHAIN TECHNOLOGY)** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2023–2024. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor of Engineering Degree.

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ABSTRACT

The rapid evolution of communication technologies necessitates innovative solutions for secure and efficient data transmission. This project explores the implementation of Light Fidelity (Li-Fi) for data transmission, leveraging visible light as a medium to transmit data wirelessly. Unlike traditional wireless systems that use radio waves, Li-Fi employs light-emitting diodes (LEDs) to transfer data, offering advantages such as high speed, energy efficiency, and enhanced security.

The project focuses on designing and implementing a Li-Fi-based communication system using Arduino microcontrollers. The system modulates light intensity from LEDs to encode data, which is then received and decoded by a photodetector. The transmitted data, including text, images, or sensor readings, is accurately reconstructed at the receiver end. Key components such as pulse width modulation, signal filtering, and error correction are optimized to ensure data integrity and minimize noise interference.

Comprehensive testing validates the system's performance, including data transfer speed, range, and reliability under varying ambient light conditions. The experimental results demonstrate that Li-Fi achieves superior data rates compared to conventional wireless methods in short-range communication. Additionally, the use of light as the transmission medium inherently enhances security, as data cannot penetrate opaque barriers, reducing the risk of interception.

This project addresses challenges such as synchronization and interference from ambient light sources by implementing robust signal processing techniques. It also evaluates the feasibility of scaling the system for real-time applications, such as smart lighting, secure data sharing, and Internet of Things (IoT) devices.

In conclusion, this project highlights the potential of Li-Fi as a transformative technology for data transmission. By integrating Arduino-based systems, it paves the way for future advancements in energy-efficient and secure communication, promoting its adoption in diverse domains such as healthcare, education, and smart cities.