Sl.No	Document Title	Publica	Abstract
24	Indoor Visible Light Positioning for a Single Partially Visible LED	2024	With the IEEE 802.11bb standard being adopted to incorporate light communication, research interest in visible light positioning (VLP) has increased. While several VLP techniques have seen success using complementary metal oxide semiconductor sensors for a single LED, in most cases, the field of view (FoV) of a front camera on a smartphone is much smaller than the rear camera, and lights are placed sparsely in offices since their primary objective is illumination. Hence, during indoor navigation, the front camera is bound to encounter far more partial images of the light than complete images. The proposed technique seeks to solve this problem by performing positioning on images where only two corners of a square light are in the FoV. While most offices have square or rectangular panel lights, we have chosen to use square lights owing to the added difficulty in positioning arising from all sides being equal in length. We detect the corners of the light from an image and order them based on inertial measurement unit (IMU) readings from smartphones to perform structure-based positioning. The proposed technique achieved 2.27 cm average 3-D positioning error on a partial light image dataset captured at two different heights.
34	Reconfigurable Optical Filter Based Receiver Structure For Visible Light Communication	2024	In this paper, a novel receiver structure is proposed to mitigate the inter-channel interference (ICI) effects that limit the data rate in multi-color visible light communication (MCVLC) systems. Reconfigurable optical filters (ROFs) are used at the receiver side of MC-VLC systems to enable the separation of color channels. ROFs are optical elements that have the ability to electrically change their transmission spectrum. Utilizing this feature of ROFs, a receiver structure is developed that, unlike traditional receiver structures, can adaptively adjust the transmit spectrum based on channel state information. This adaptive adjustment is aimed at maximizing communication performance by effectively separating color channels in MC-VLC systems. The obtained results demonstrate that the proposed receiver structure achieves higher communication performance compared to traditional receivers.
5	Data Signal Detection and Demodulation Based on Object Detection DNN for Image Sensor-Based Visible Light Communication	2023	This study focuses on a digital signage and image sensor-based visible light communication system in which the transmitter side modulates data signals on the signage image, and the receiver side detects and demodulates the data signals from the captured images. In the conventional studies, the detection and demodulation of the data signals are processed independently. This paper proposes a novel algorithm that simultaneously processes the data signal detection and demodulation by applying object detection DNN (Deep Neural Network). Using pseudo received images with blur and noise, it is shown that the proposed method achieves much higher detection and demodulation performance than a template matching-based detection and threshold-based demodulation method.
10	Design of a LiFi System for Short-Distance Communications	2023	LiFi technology introduces Visible Light communication that uses light as a source to deliver high data speed, which is much greater than that of Wi-Fi. The research paper proposes a communication system that utilizes Light-Fidelity (Li-Fi) technology for short-range wireless communication. The article begins with an introduction to Li-Fi technology and its advantages over traditional wireless communication systems. The paper also highlights the limitations of Li-Fi, including its short range. The authors then present their proposed approach, which includes a transmitter section, a receiver section, and two modes of operation (text and audio). Additionally, the system consists of two applications to demonstrate its functionality: an SOS application and a device on/off application. The paper concludes with a detailed explanation of how the proposed system works and its potential applications in various fields.
18	An Approach to Enhancing Industrial Safety via M2M Communication Utilizing Effulgence	2023	frequencies. VLC boasts minimal latency and high bandwidth, in contrast to radio, which operates within a more restricted spectrum and is more susceptible to issues like cross talk and interference when compared to VLC. The requirement for a direct line of sight can also be viewed as a security feature, except in cases where a hacker has a clear line of sight to a network device on a private network, leaving it vulnerable to external air gap attacks. Li-Fi, an implementation of wireless networking, utilizes VLC technology. While Visible Light Communication (VLC) technologies were historically less prevalent, the allure of light-based communication is on the rise due to the increasing proliferation of wireless devices and the escalating congestion of the radio spectrum. The growing interest in VLC technologies stems from their distinctive capability to function without causing interference, even in scenarios where multiple networks employing different radio frequencies coexist. VLC technology is being leveraged as a cost-effective means of connecting millions of consumer electronics and machine-to-machine (M2M) devices. This paper aims to clarify the utilization of the visible light spectrum for data communication, with particular emphasis on how Li-Fi enhances Visible Light Communication (VLC) by utilizing light-emitting diodes (LEDs)
31	Performance Analysis of Integration of Wireless Sensor Network with Li-Fi Wireless Communication Technology	2023	Ensuring data security in WSNs (Wireless sensor networks) has been a persistent issue. The absence of a reliable mechanism to secure data poses a serious threat to the integrity of information. Also, the quality of services provided by WSNs is poor. Hence, there exists a need for a new technological paradigm that can address these shortcomings of WSNs. In this regard, Li-Fi technology emerges as a highly relevant wireless communication technology. This research paper focuses on the integration of Li-Fi with WSNs and analyses its performance using the software: Opti System, used for analyzing the communication system. In this paper, three models: the LOS model, the single LED non-LOS model, and the double LED non-LOS models have been considered and the LOS model has been found best with an eye height of 1.050 due to which it leads to minimum distortion and noise as compared to the other two, which are non- LOS models.
7	Complete Data Transmission using Li-Fi Technology with Visible Light Communication	2022	Everyday numbers of people use the internet. Demand for net access increased as a result. Wi-Fi (wireless fidelity) is more expensive and exhibits sluggish data speeds when more than two routers are connected. Li-Fi (light-fidelity) is a good solution to solve these problems. It is a wireless technology that uses LED or infrared light to transfer data. This method uses a light source to transmit data while using VLC. This paper proposed a device that transfers all data using VLC (visible light communication). While a photodiode is placed in the receiver component to receive light arrays, the transmitter device uses high-power LED arrays to transmit audio, video, text, and images. The transmitter and receiver system to verify the performance and compile the audio, video, text, image transmission using Li-Fi under varying limitations such as light intensity, output quality and distance. Li-Fi uses LED for up to 500 Mbit/s of communication over short distances or regular lamps for transmissions at 10 Kbit/s. By conducting experiments, the system described in this paper can deliver data over a variety of distances. We are also putting into practice the application of how this previously mentioned concept might be indicated for indoor location-based services.
8	Performance Evaluation of a Visible Light Communication System for Indoor Navigation	2022	Visible Light Communication using modulated LED lighting infrastructure as transmitters and optical cameras as receivers has a lot of new and useful applications as an alternativfe way of transmitting data for road traffic signaling, navigation inside large buildings, etc. This paper provides extensive and exhaustive simulations to test the functionality and performances of an indoor navigation system based on Optical Camera Communication developed by the authors, by considering the avoidance of light flickering at the emitter and the real-world capture conditions of smartphone cameras used as receivers. The experimental results show that the proposed system can achieve good decoding results in real-word scenarios, even in the presence of camera frame rate errors and independent on the moment the capturing device starts the decoding process.
20	A 130 nm CMOS Receiver for Visible Light Communication	2022	Visible light communication (VLC) is an emerging technology that has been gaining attention over the last few years. Transmission of data at higher rates in a VLC system is mainly limited by the modulation bandwidth of the employed LED. To alleviate this limitation, equalization is frequently employed. This is usually achieved by either using discrete circuit elements or in digital form. In this paper, we present a power-efficient VLC receiver as a system-on-chip, implemented in 130 nm CMOS technology. The proposed receiver supports LEDs with different bandwidths thanks to the switchable equalizer. We tested the proposed receiver using phosphorescent white LEDs with different bandwidths on an experimental VLC link. For each tested LED, around 20 fold improvement in data rate was achieved compared to the original bandwidth of the LED. For the LED with a modulation bandwidth of 1.6 MHz, data rates of 32 Mbps and 50 Mbps at a BER of 10^{-2} were obtained at a distance of 2 meters without and with a blue filter, respectively.
22	Gesture Recognition Using Machine Learning for Light Communication Systems	2022	Gesture recognition has a wide range of human-computer interface (HCI) applications in the home, commerce or office. However, the most widely used methods for recognizing gestures are computationally expensive and costly. We propose to apply gesture recognition to an existing visible light communication (VLC) system. Different finger motions are detected using a long short-term memory (LSTM) network operating on light transitions between fingers. At the receiver side, the platform utilizes a light-emitting diode and photodiode. The device can distinguish motions from gaps in direct light transmission, making it compatible with high-speed light communication systems. The accuracy of gesture identification was evaluated for five different gestures over a distance of 48 cm and the findings show the method is capable of successfully identifying the motions with 88 percent accuracy.
32	LiCamIoT: An 8x8 LED Matrix Pattern to Camera Communication for LiFi-IoT Applications	2022	With the advent of the Internet of Things(IoT), a new frontier for developing applications under smart cities, smart transport, smart agriculture, and smart industries has garnered the attention of researchers and the consumer community. However, it also means adding more network-connected devices to the saturated Radio Frequency spectrum. Visible Light Communication based IoT systems can provide short-range indoor communication with minimal cost, thus aiding in offloading spectrum saturation. In this paper, an Optical Camera Communication-based IoT Application is proposed, implemented, and evaluated. The sensed values from the temperature and humidity sensor are mapped to an 8x8 LED matrix based on the proposed frame format. A camera-based receiver captures and decodes data from the frame using the proposed technique. The performance of the proposed system was evaluated based on SNR, distance, Packet Rate, and Packet Error Rate(PER). The PER of less than 3% was achieved for 2m distance and a Packet rate of 2 packets per second (pps).
21	LI-FI based Industrial Safety Module	2021	Safety is one of the main aspects of the industry, specifically core industry. To minimize material loss and human health damage, a protection system along with a rapid communication system is necessary inside the industry. The primary objective of this work is to design a green environment monitoring system for industries using Li-Fi technology to provide secure communication, high data rate transfer, and a pollution-free environment. The traditional system of wired communication along with the Fixed Base station has not been so effective. In this proposed protocol, as a source for data transmission, light-emitting diodes are used and are favored as they have a longer life-time. Different sensors are used to track different parameters in an industrial setting and these sensors relay sensed information in terms of LED flickering using Li-Fi technology. In this work, the main aim is to focus on the detection of abnormal gases, fire, and unusual vibrations in the industries and transmitting this information to the workers using the Li-Fi transceiver. Various adversities hindering the workers and emergency information can be efficiently communicated using this technology. If the sensor senses a value beyond the predefined threshold value, information is sent through text and alarm to the workers. The developed system surpasses most current systems as it provides communication at a rate of 1.5 Mbps with a range of 10 meters and, more importantly, is free of electromagnetic interference. Henceforth, the visible light communication (VLC) technique is exploited for industrial applications.
39	VLC Using 800-µm Diameter APD Receiver Integrated in Standard 0.35-µm BiCMOS Technology	2021	The fully integrated 800 µm. diameter avalanche photodiode optical receiver is implemented in 0.35 µm BiCMOS technology without any process modifications. The integrated receiver reaches sensitivities of -33 dBm at 1 Gbit/s and -29.3 dBm at 2 Gbit/s. The reached sensitivities are well within the state-of-the-art of integrated avalanche photodiode receivers and can even be compared to a hybrid avalanche photodiode receiver comprised of high-performing commercial components. The performance of the designed receiver was verified in visible light communication experiments. The receiver could reach up to 16.5 m at 2 Gbit/s and 27 m at 1 Gbit/s of error free transmission distance using a 675-nm point laser source as transmitter. The common indoor illuminance levels up to 500 lux could be tolerated when pointed directly towards the receiver. High sensitivity and high speed make this integrated receiver suitable for future optical wireless communication systems, where due to its integrated nature the manufacturing cost can be lowered, and at the same time the design is compact in size and easy to assemble and scale. Furthermore, no optics is used in front of the receiver due to its large area resulting in a wide field of view.