

LI-FI TECHNOLOGY

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Abstract

Nowadays many people are taking interest as to accomplish their tasks through wired or wireless networks. As numbers of users get increased in wireless network the speed reduces proportionally. Though Wi-Fi gives us speed up to 150 Mbps as per IEEE 802.11n, it is still insufficient to accommodate desired no of users. To remedy this limitation, we are introducing the concept of Li-Fi. As per German physicist Harald Haas "data through illumination" –taking the fiber out of fiber optic by sending data through an LED light bulb that varies in intensity faster than the human eyes can follow. It's the same idea based behind the infrared remote controls but far more powerful. Haas says his invention, which he calls D-LIGHT, can produce data rates faster than 10 Mbps, which is speedier than average broadband connection. Twentieth century is an era of internet. Most of the communications happen over the internet. Wi-Fi is the currently most advanced technology that is being widely used for connecting to the internet. The speed and the number of users that can connect at a time are limited in Wi-Fi. Our project is about visible light communication. This communication happens using light as a medium. As light is going to act as a medium the speed will be tremendous for data transmissions. Not only speed but also the security in a closed environment will increase with the use of Li-Fi. Our project aims at exploring the use of Li-Fi also known as optical wireless communication.

Keywords: Wireless-Fidelity (Wi-Fi), Light Fidelity (Li-Fi), Light Emitting Diode (LED), Illumination, D-LIGHT

1. INTRODUCTION

Li-Fi or Light Fidelity is a high speed, bidirectional and fully networked subsets of visual light communications (VLC). It uses visible light communication instead of radio frequency (RF) waves which carry more information. Thus Li-Fi is an emergent technology that has the potential to deliver enormous bandwidth. As data transmission through radio waves approaches its limits, a new medium presents itself. Most of us are familiar with Wi-Fi (Wireless Fidelity) uses 2.4-5 GHz RF to deliver wireless data, information or internet access around. It can cover up a large area, but it fails to cover up all the area as its bandwidth is typically limited to 50-100 megabits per second (Mbps). This is a good match to the speed of internet services, but insufficient for moving large data files like HDTV movies, music libraries and video games. The bandwidth and speed is directly proportional medium of communication. Therefore RF-based technologies such as today's Wi-Fi are not the optimal way. In addition to that Wi-Fi fails to provide new desired capabilities such as precision indoor positioning and gesture recognition. To this a new trend has come in technology that overcomes these flaws, that is Li-Fi or Light Fidelity. This is also called as visible light communication and informally known as optical wireless technology, a vivid permutation of speed, reliability, flexibility and usability. Li-Fi is transmission of data through illumination by taking the fibre out of fibre optics by sending data through a LED light bulb that varies in intensity faster than the human eye can follow. Li-Fi is the term some used to label the fast and cheap wireless communication system which is the optical version of Wi-Fi. It is possible to encode data in the light by varying the rate at which the LEDs flicker on and off to give different strings of 0s and 1s. The LED intensity is modulated so rapidly that human eye cannot notice, so the output appears constant. More sophisticated techniques and ways could dramatically increase visible communication data rate. Li-Fi is fast two way communication that uses visible light instead of radio frequency waves for carrying data. The amount of data being carried over the visible light is far more than the radio frequency waves thus giving us more bandwidth available for using. Machine data usually refers to combinations of 0's and 1's. Thus transferring streams of 0's and 1's means transferring data and if its two ways it becomes communication. There must be a unique way to represent 0's and 1's which by using light is OFF and ON respectively. If we have a unique way to represent 0's and 1's we can operate on machine data.

Ieee Paper On Li Fi Technology

**Saiyed Salim Sayeed,Hemant Kumar
Sharma,Pramod Kumar Yadav,Brijesh
Mishra**

Ieee Paper On Li Fi Technology:

Intelligent Manufacturing Systems in Industry 4.0 B. B. V. L. Deepak, M. V. A. Raju Bahubalendruni, D. R. K. Parhi, B. B. Biswal, 2023-06-30 This book presents the select proceedings of the 4th International Conference on Innovative Product Design and Intelligent Manufacturing System IPDIMS 2022 It covers the latest trends in the areas of design and manufacturing The main topics covered include Industry 4.0 smart manufacturing advanced robotics and CAD CAM CIM The contents of this book are useful for researchers and professionals working in the disciplines of mechatronics mechanical manufacturing production and industrial engineering *Enhanced Data Transmission using Li-Fi in Visible Light Communication (VLC) Technology* Dr. M. Vijayalakshmi, Dr. M. Sri Raghavendra, **Industrial Internet of Things and Cyber-Physical Systems: Transforming the Conventional to Digital** Kumar, Pardeep, Ponnusamy, Vasaki, Jain, Vishal, 2020-05-22 With the help of artificial intelligence machine learning and big data analytics the internet of things IoT is creating partnerships within industry where machines processes and humans communicate with one another As this radically changes traditional industrial operations this results in the rapid design cheap manufacture and effective customization of products Answering the growing demand of customers and their preferences has become a challenge for such partnerships Industrial Internet of Things and Cyber Physical Systems Transforming the Conventional to Digital is a collection of innovative research that discusses development implementation and business impacts of IoT technologies on sustainable societal development and improved life quality Highlighting a wide range of topics such as green technologies wireless networks and IoT policy this book is ideally designed for technology developers entrepreneurs industrialists programmers engineers technicians researchers academicians and students Advances in Electronics, Computer, Physical and Chemical Sciences Saiyed Salim Sayeed, Hemant Kumar Sharma, Pramod Kumar Yadav, Brijesh Mishra, 2025-04-29 The conference aimed to provide a platform for researchers scientists technocrats academicians and engineers to exchange their innovative ideas and new challenges being faced in the field of emerging technologies It provided an opportunity to exchange ideas among global leaders and experts from academia and industry in developing domains such as machine learning intelligence systems smart infrastructure advanced power technology and so forth It covered all broad disciplines of electronics computer physical and chemical science engineering *Real-World Applications and Implementations of IoT* Aritra Acharyya, Prasenjit Dey, Sujit Biswas, 2025-02-11 This book explores state of the art internet of things IoT solutions for energy conservation security agricultural advancements mining security healthcare and environmental protection This book delves deep into the technology offering a comprehensive analysis detailed descriptions and in depth discussions of recently developed IoT applications With a strong focus on the cutting edge research at a global scale the book combines IoT with artificial intelligence AI shedding light on emerging possibilities and advancements Designed to cater to a broad audience from those with a foundational understanding of science to seasoned engineering and technology experts this book can serve as an

essential resource for engineering students and science master s programs Researchers seeking to stay at the forefront of IoT and AI will also find it invaluable

National Conference on Recent Trends in Engineering Science and Technology((NCRTEST-25)) Dr. Aprameyan S,Dr. Chowda Reddy,2025-08-12

Computing Science, Communication and Security Nirbhay Chaubey,Satyen Parikh,Kiran Amin,2020-07-18 This book constitutes revised selected papers of the First International Conference on Computing Science Communication and Security COMS2 2020 held in March 2020 Due to the COVID 19 pandemic the conference was held virtually The 26 full papers and 1 short paper were thoroughly reviewed and selected from 79 submissions Papers are organised according to the topical sections on artificial intelligence and machine learning network communication and security computing science

Mobile Radio Communications and 5G Networks Nikhil Marriwala,C. C. Tripathi,Dinesh Kumar,Shruti Jain,2020-09-28 The book features original papers by active researchers presented at the International Conference on Mobile Radio Communications and 5G Networks It includes recent advances and upcoming technologies in the field of cellular systems 2G 2 5G 3G 4G 5G and beyond LTE WiMAX WMAN and other emerging broadband wireless networks WLAN WPAN and various home personal networking technologies pervasive and wearable computing and networking small cells and femtocell networks wireless mesh networks vehicular wireless networks cognitive radio networks and their applications wireless multimedia networks green wireless networks standardization of emerging wireless technologies power management and energy conservation techniques

An Introduction to Optical Wireless Mobile Communication Harald Haas,Mohamed Sufyan Islim,Cheng Chen,Hanaa Abumarshoud,2021-09-30 The use of the optical spectrum for wireless communications has gained significant interest in recent years Applications range from low rate simplex transmission links using existing embedded CMOS cameras in smartphones referred to as optical camera communications OCC mobile light fidelity LiFi networking in homes offices urban and sub sea environments to free space gigabit interconnects in data centers and point to point long range wireless backhaul links outdoors and in space This exciting book focuses on the use of optical wireless communications OWC for mobile use cases The book discusses existing conventional radio frequency RF based wireless access technology and presents the challenges that can impact the requirements of the future wave of new wireless services in the context of artificial intelligence AI driven autonomous systems and machine type communications The relationship between visible light communications VLC and light fidelity LiFi is explored and the major advantages of VLC and LiFi such as security and data density and discuss existing research challenges are also introduced Channel modeling techniques are provided for mobile multiuser scenarios and will introduce key building blocks to achieve LiFi cellular networks achieving orders of magnitude improvements of area spectral efficiency compared to state of the art Challenges that arise from moving from a static point to point visible light link to a LiFi network that is capable of serving hundreds of mobile and fixed nodes are discussed An overview of recent standardization activities and the commercialization challenges of this disruptive technology is also

provided **Internet of Things A to Z** Qusay F. Hassan, 2018-05-09 A comprehensive overview of the Internet of Things core concepts technologies and applications Internet of Things A to Z offers a holistic approach to the Internet of Things IoT model The Internet of Things refers to uniquely identifiable objects and their virtual representations in an Internet like structure Recently there has been a rapid growth in research on IoT communications and networks that confirms the scalability and broad reach of the core concepts With contributions from a panel of international experts the text offers insight into the ideas technologies and applications of this subject The authors discuss recent developments in the field and the most current and emerging trends in IoT In addition the text is filled with examples of innovative applications and real world case studies Internet of Things A to Z fills the need for an up to date volume on the topic This important book Covers in great detail the core concepts enabling technologies and implications of the Internet of Things Addresses the business social and legal aspects of the Internet of Things Explores the critical topic of security and privacy challenges for both individuals and organizations Includes a discussion of advanced topics such as the need for standards and interoperability Contains contributions from an international group of experts in academia industry and research Written for ICT researchers industry professionals and lifetime IT learners as well as academics and students Internet of Things A to Z provides a much needed and comprehensive resource to this burgeoning field **Understanding Communications Networks - for Emerging**

Cybernetics Applications Kaveh Pahlavan, 2022-09-01 Information networking has emerged as a multidisciplinary diversified area of research over the past few decades From traditional wired telephony to cellular voice telephony and from wired access to wireless access to the Internet information networks have profoundly impacted our lifestyles as they have undergone enormous growth To understand this technology students need to learn several disciplines and develop an intuitive feeling of how they interact with one another To achieve this goal the book describes important networking standards classifying their underlying technologies in a logical manner and gives detailed examples of successful applications The emergence of wireless access and dominance of the Ethernet in LAN technologies has shifted the innovations in networking towards the physical layer and characteristics of the medium This book pays attention to the physical layer while we provide fundamentals of information networking technologies which are used in wired and wireless networks designed for local and wide area operations The book provides a comprehensive treatment of the wired IEEE802.3 Ethernet and Internet as well as ITU cellular 2G 6G wireless networks IEEE 802.11 for Wi-Fi and IEEE 802.15 for Bluetooth ZigBee and ultra wideband UWB technologies The novelty of the book is that it places emphasis on physical communications issues related to formation and transmission of packets and characteristics of the medium for transmission in variety of networks Material presented in the book will be beneficial for students of Electrical and Computer Engineering Computer Science Robotics Engineering Biomedical Engineering or other disciplines who are interested in integration of navigation into their multi disciplinary projects The book provides examples with supporting MATLAB codes and hands on projects throughout to

improve the ability of the readers to understand and implement variety of algorithms **Techno-Societal 2020** Prashant M. Pawar, R. Balasubramaniam, Babruvahan P. Ronge, Santosh B. Salunkhe, Anup S. Vibhute, Bhuwaneshwari Melinamath, 2021-05-19 This book divided in two volumes originates from Techno Societal 2020 the 3rd International Conference on Advanced Technologies for Societal Applications Maharashtra India that brings together faculty members of various engineering colleges to solve Indian regional relevant problems under the guidance of eminent researchers from various reputed organizations The focus of this volume is on technologies that help develop and improve society in particular on issues such as sensor and ICT based technologies for the betterment of people Technologies for agriculture and healthcare micro and nano technological applications This conference aims to help innovators to share their best practices or products developed to solve specific local problems which in turn may help the other researchers to take inspiration to solve problems in their region On the other hand technologies proposed by expert researchers may find applications in different regions This offers a multidisciplinary platform for researchers from a broad range of disciplines of Science Engineering and Technology for reporting innovations at different levels **Compressed Sensing in Li-Fi and Wi-Fi Networks** Malek Benslama, Hatem Mokhtari, 2017-11-20 Compressed Sensing in Li Fi and Wi Fi Networks features coverage of the first applications in optical telecommunications and wireless After extensive development of basic theory many techniques are presented such as non asymptotic analysis of random matrices adaptive detection greedy algorithms and the use of graphical models The book can be used as a comprehensive manual for teaching and research in courses covering advanced signal processing efficient data processing algorithms and telecommunications After a thorough review of the basic theory of compressed sensing many mathematical techniques are presented including advanced signal modeling Nyquist sub sampling of analog signals the non asymptotic analysis of random matrices adaptive detection greedy algorithms and the use of graphical models Offers extensive development of basic theory behind telecommunications and wireless networks Contains broad coverage of treat compressed sensing including electromagnetism signals Provides insights into the two key areas of telecommunications WIFI and LIFI Includes information on advanced signal modeling Nyquist sub sampling of analog signals the non asymptotic analysis of random matrices adaptive detection greedy algorithms and more **Optical Wireless Communications** Z. Ghassemlooy, W. Popoola, S. Rajbhandari, 2019-04-30 The 2nd Edition of Optical Wireless Communications System and Channel Modelling with MATLAB with additional new materials is a self contained volume that provides a concise and comprehensive coverage of the theory and technology of optical wireless communication systems OWC The delivery method makes the book appropriate for students studying at undergraduate and graduate levels as well as researchers and professional engineers working in the field of OWC The book gives a detailed description of OWC focusing mainly on the infrared and visible bands for indoor and outdoor applications A major attraction of the book is the inclusion of Matlab codes and simulations results as well as experimental test beds for free space optics and visible light communication

systems This valuable resource will aid the readers in understanding the concept carrying out extensive analysis simulations implementation and evaluation of OWC links This 2nd edition is structured into nine compact chapters that cover the main aspects of OWC systems History current state of the art and challenges Fundamental principles Optical source and detector and noise sources Modulation equalization diversity techniques Channel models and system performance analysis Visible light communications Terrestrial free space optics communications Relay based free space optics communications Matlab codes A number of Matlab based simulation codes are included in this 2nd edition to assist the readers in mastering the subject and most importantly to encourage them to write their own simulation codes and enhance their knowledge

Internet of Things - The Call of the Edge Ovidiu Vermesan,Joël Bacquet,2022-09-01 This book provides an overview of the Internet of Things IoT covering new ideas concepts research and innovation to enable the development of IoT technologies in a global context The work is intended as a standalone book in a series covering the activities of the Internet of Things European Research Cluster IERC including research technological innovation validation and deployment The book chapters build on the developments and innovative ideas put forward by the IERC the IoT European Large Scale Pilots Programme and the IoT European Security and Privacy Projects presenting new concepts ideas and future IoT trends and ways of integrating open data frameworks and IoT marketplaces into larger deployment ecosystems The IoT and Industrial Internet of Things technologies are moving towards hyperautomated solutions combining hyperconnectivity artificial intelligence AI distributed ledger technologies and virtual augmented extended reality with edge computing and deep edge processing becoming an assertive factor across industries for implementing intelligent distributed computing resources and data to keep the efficient data exchange and processing local to reduce latency exploit the sensing actuating capabilities and enable greater autonomy Expanding the adoption of consumer business industrial and tactile IoT requires further development of hyperautomated IoT concepts for collaborative solutions involving machines and humans to expand augmented creativity at the application level using AI to optimise the industrial processes and progress towards a symbiotic economy based on distributed federated cloud edge infrastructure allowing resource sharing in the form of computing memory and analytics capabilities The advances of autonomous IoT applications delivering services in real time encompasses development in servitisation robotisation automation and hyperconnectivity which are essential for the rapid evolution of industrial enterprises in the new digital era The rise of digital twins integrated into IoT platforms as fully interactive elements embedded into the simulation and optimisation environment as well as the embedment of AI techniques and methods enhances the accuracy and performance of models in the various IoT and Industrial Internet of Things applications The convergence of technologies to provide scalable interoperable IoT enabled applications pushed the requirements for high bandwidth low latency and robust and dependable connectivity to support the industry s demand for deeper integration and improved analytics to deliver sustainable competitive advantage products and services enabling digital transformation with a

focus on new business models Safety and security are interlinked for the next wave of IoT technologies and applications and combined prove a greater value for rapid adoption The new IoT technologies are essential for facilitating sustainable development reducing energy consumption and by supporting the optimisation of products and processes mitigating unnecessary carbon emissions thereby reducing the environmental impact through real time data collection analysis exchange and processing

RFID, Microwave Circuit, and Wireless Power Transfer Enabling 5/6G Communication
Nwajana, Augustine O.,2025-02-18 The development of future 5G and 6G technologies is critical to meeting the increasing demand for faster more reliable wireless communication as global connectivity expands By addressing challenges like low data rates and high latency these advancements will enable seamless integration of smart cities autonomous vehicles and immersive virtual experiences As the number of connected devices grows exponentially next generation networks will play a pivotal role in supporting innovations across healthcare education and industry The evolution of wireless communication not only enhances efficiency but also drives economic growth and societal progress by enabling new digital ecosystems However the push for faster networks underscores the need for ongoing research and collaboration to overcome technical and infrastructural barriers RFID Microwave Circuit and Wireless Power Transfer Enabling 5 6G Communication explores how advancements in RFID microwave circuit design and wireless power transfer are shaping the development of 5G and 6G communication networks It delves into the practical applications of these technologies highlighting their transformative impact across industries like healthcare logistics and security Covering topics such as artificial intelligence AI network architecture and vehicle communication this book is an excellent resource for academicians researchers engineers policymakers students and more

Recent Advances in Information and Communication Technology 2017 Phayung Meesad,Sunantha Sodsee,Herwig Unger,2017-06-17 This book includes selected contributions related to big data and data networking presented at the 13th International Conference on Computing and Information Technology IC2IT which was held at the Arnoma Grand Hotel Bangkok Thailand July 6 7 2017 The aim of the conference was to present emerging algorithms methods and technologies with a high degree of originality novelty and innovation addressing the conference theme Mastering Data and Networking Section 1 and 2 discuss various aspects of data mining and corresponding applications Section 3 focuses on speed and overhead networking optimisation problems as well as energy problems of autonomous systems which are becoming increasingly important The key to addressing these problems is properly determining critical parameters Section 4 sheds light on natural language processing including extraction of trends and popularity and recognition of emotions as well as classic topics such as detection and classification

Handbook of Artificial Intelligence in Biomedical Engineering Saravanan Krishnan,Ramesh Kesavan,B. Surendiran,G.S. Mahalakshmi,2021-03-29 Handbook of Artificial Intelligence in Biomedical Engineering focuses on recent AI technologies and applications that provide some very promising solutions and enhanced technology in the biomedical field Recent advancements in computational techniques such

as machine learning Internet of Things IoT and big data accelerate the deployment of biomedical devices in various healthcare applications This volume explores how artificial intelligence AI can be applied to these expert systems by mimicking the human expert s knowledge in order to predict and monitor the health status in real time The accuracy of the AI systems is drastically increasing by using machine learning digitized medical data acquisition wireless medical data communication and computing infrastructure AI approaches helping to solve complex issues in the biomedical industry and playing a vital role in future healthcare applications The volume takes a multidisciplinary perspective of employing these new applications in biomedical engineering exploring the combination of engineering principles with biological knowledge that contributes to the development of revolutionary and life saving concepts

Optical and Wireless Access Networks Vivek Ashok Bohara, Swaminathan R, 2025-09-26 This textbook comprehensively covers optical and wireless access networks providing an understanding from basics to an advanced level In addition to sharing insights into the topics of optical access communications wireless multiple access communications and optical and wireless convergence towards 6G networks this book also discusses various key enabling technologies such as FSO VLC LiFi power over fiber etc The readers can benefit with sufficient in depth knowledge in designing both optical and wireless access networks for applications such as multiuser access wireless backhaul intelligent transportation systems Internet of Things IoT etc The book is ideal for undergraduate and graduate students in electronics and telecommunication engineering The book features a suite of classroom materials including homework problems an appendix for complicated derivations project ideas a solutions manual and PPT slides and tutorial videos

Design, Implementation, and Analysis of Next Generation Optical Networks: Emerging Research and Opportunities Imtiaz, Waqas Ahmed, Róka, Rastislav, 2019-07-05 By the end of the decade approximately 50 billion devices will be connected over the internet using multiple services such as online gaming ultra high definition videos and 5G mobile services The associated data traffic demand in both fixed and mobile networks is increasing dramatically causing network operators to have to migrate the existing optical networks towards next generation solutions The main challenge within this development stems from network operators having difficulties finding cost effective next generation optical network solutions that can match future high capacity demand in terms of data reach and the number of subscribers to support multiple network services on a common network infrastructure Design Implementation and Analysis of Next Generation Optical Networks Emerging Research and Opportunities is an essential reference source that discusses the next generation of high capacity passive optical access networks PON in terms of design implementation and analysis and offers a complete reference of technology solutions for next generation optical networks Featuring research on topics such as artificial intelligence electromagnetic interface and wireless communication this book is ideally designed for researchers engineers scientists and students interested in understanding designing and analyzing the next generation of optical networks

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