IJIREEICE

ISSN (Online) 2321-2004
ISSN (Print) 2321-5526

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

Vol. 9, Issue 6, June 2021

DOI 10.17148/IJIREEICE.2021.9625

Underwater Communication Using Li-Fi Technology

Anand Kumbhar[1], Sandip Hujare[2], Abhishek Kadam[3], Mukesh Salgar[4], Aslam Bagwan[5], Ganesh Munde[6]

[1]Assistant professor, department of electrical engineering, Sanjay Ghodawat Institute of Engineering, Kolhapur, India

[2 3 4 5 6]B.E. student, department of electrical engineering, Sanjay Ghodawat Institute of Engineering, Kolhapur, India

Abstract: Whether you're using wireless internet in a coffee shop, stealing it from the guy next door, or competing for bandwidth at a conference, you've probably gotten frustrated at the slow speeds you face when more than one device is tapped into the network. As more and more people and their many devices access wireless internet, clogged airwaves are going to make it increasingly difficult to latch onto a reliable signal. But radio waves are just one part of the spectrum that can carry our data. What if we could use other waves to surf the internet? One German physicist,DR. Harald Haas, has come up with a solution he calls "Data Through Illumination"—taking the fiber out of fiber optics by sending data through an LED light bulb that varies in intensity faster than the human eye can follow. It's the same idea behind infrared remote controls, but far more powerful. Haas says his invention, which he calls D-Light, can produce data rates faster than 10 megabits per second, which is speedier than your average broadband connection. He envisions a future where data for laptops, smartphones, and tablets is transmitted through the light in a room. And security would be a snap—if you can't see the light, you can't access the data. Li-Fi is a VLC, visible light communication, technology developed by a team of scientists including Dr Gordon Povey, Prof. Harald Haas and Dr Mostafa Afgani at the University of Edinburgh. The term Li-Fi was coined by Prof. Haas when he amazed people by streaming high definition video from a standard LED lamp, at TED Global in July 2011. Li-Fi is now part of the Visible Light Communications (VLC) PAN IEEE 802.15.7 standard. "Li-Fi is typically implemented using white LED light bulbs. These devices are normally used for illumination by applying a constant current through the LED. However, by fast and subtle variations of the current, the optical output can be made to vary at extremely high speeds. Unseen by the human eye, this variation is used to carry high-speed data," says Dr Povey, , Product Manager of the University of Edinburgh's Li-Fi Program 'D-Light Project'.

Keywords: LASER, LED, Li-Fi, Visible light communication, Underwater communication

I. INTRODUCTION

In simple terms, Li-Fi can be thought of as a light-based Wi-Fi. That is, it uses light instead of radio waves to transmit information. And instead of Wi-Fi modems, Li-Fi would use transceiver fitted LED lamps that can light a room as well as transmit and receive information. Since simple light bulbs are used, there can technically be any number of access points. This technology uses a part of the electromagnetic spectrum that is still not greatly utilized-The Visible Spectrum. Light is in fact very much part of our lives for millions and millions of years and does not have any major ill effect. Moreover there is 10,000 times more space available in this spectrum and just counting on the bulbs in use, it also multiplies to 10,000 times more availability as an infrastructure, globally. 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 1s and 0s. The LED intensity is modulated so rapidly that human eyes cannot notice, so the output appears constant. More sophisticated techniques could dramatically increase VLC data rates. Teams at the University of Oxford and the University of Edinburgh are focusing on parallel data transmission using arrays of LEDs, where each LED transmits a different data stream. Other groups are using mixtures of red, green and blue LEDs to alter the light's frequency, with each frequency encoding a different data channel. Li-Fi, as it has been dubbed, has already achieved blisteringly high speeds in the lab. Researchers at the Heinrich Hertz Institute in Berlin, Germany, have reached data rates of over 500 megabytes per second using a standard white-light LED. Haas has set up a spin-off firm to sell a consumer VLC transmitter that is due for launch next year. It is capable of transmitting data at 100 MB/s - faster than most UK broadband connections.

IJIREEICE

ISSN (Online) 2321-2004
ISSN (Print) 2321-5526

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

Vol. 9, Issue 6, June 2021

DOI 10.17148/IJIREEICE.2021.9625

II. MAIN COMPONENTS USED

2.1 Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version will be the reference versions of Arduno, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards. The Atmega328 has 32 KB of flash memory for storing code (of which 0,5 KB is used for the bootloader); It has also 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

2.2 LED

A **light-emitting diode** (**LED**) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device. Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared (IR) light. Infrared LEDs are used in remote-control circuits, such as those used with a wide variety of consumer electronics. The first visible-light LEDs were of low intensity and limited to red. Modern LEDs are available in visible, ultraviolet (UV), and infrared wavelengths, with high light output. Early LEDs were often used as indicator lamps, replacing small incandescent bulbs, and in seven-segment displays. Recent developments have produced high-output white light LEDs suitable for room and outdoor area lighting. LEDs have led to new displays and sensors, while their high switching rates are useful in advanced communications technology.

LEDs have many advantages over incandescent light sources, including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. LEDs are used in applications as diverse as aviation lighting, fairy lights, automotive headlamps, advertising, general lighting, traffic signals, camera flashes, lighted wallpaper, horticultural grow lights, and medical devices. Unlike a laser, the light emitted from an LED is neither spectrally coherent nor even highly monochromatic. However, its spectrum is sufficiently narrow that it appears to the human eye as a pure (saturated) color. Also unlike most lasers, its radiation is not spatially coherent, so it cannot approach the very high brightness's characteristic of lasers.

2.3 LESSER

This is SYD1230 12mm 5mw Red CROSS LINES laser module. Easy to install, Durable and portable. laser emission head For Ciclop Scanner 3D printer Components Points Spot Size Adjustable. It is suitable for 3V-5V 5mW standard, with 6mm outside diameter. It can be used to connect diode tubes for multiple uses. This Laser diode module is very efficient and useful for your electronic projects. For example, with this product, you can make a laser radiation sensor and with the use of an Arduino development board, you can create your own laser harp. Simply connect power to the red and black wires and you will be lasing in no time**2.4 SIM 808L MODULE.** SIM808 is integrated with a high performance GSM/GPRS engine, a GPS engine and a BT engine. The GSM/GPRS engine is a quad-band GSM/GPRS module that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM808 features GPRS multi-slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. The GPS solution offers best-in-class acquisition and tracing sensitivity, Time-To-First-Fix (TTFF) and accuracy. With a tiny configuration of 24*24*2.6mm, SIM808 can meet almost all the space requirements in user applications, such as M2M, smart phone, PDA, tracker and other mobile devices.

IJIREEICE

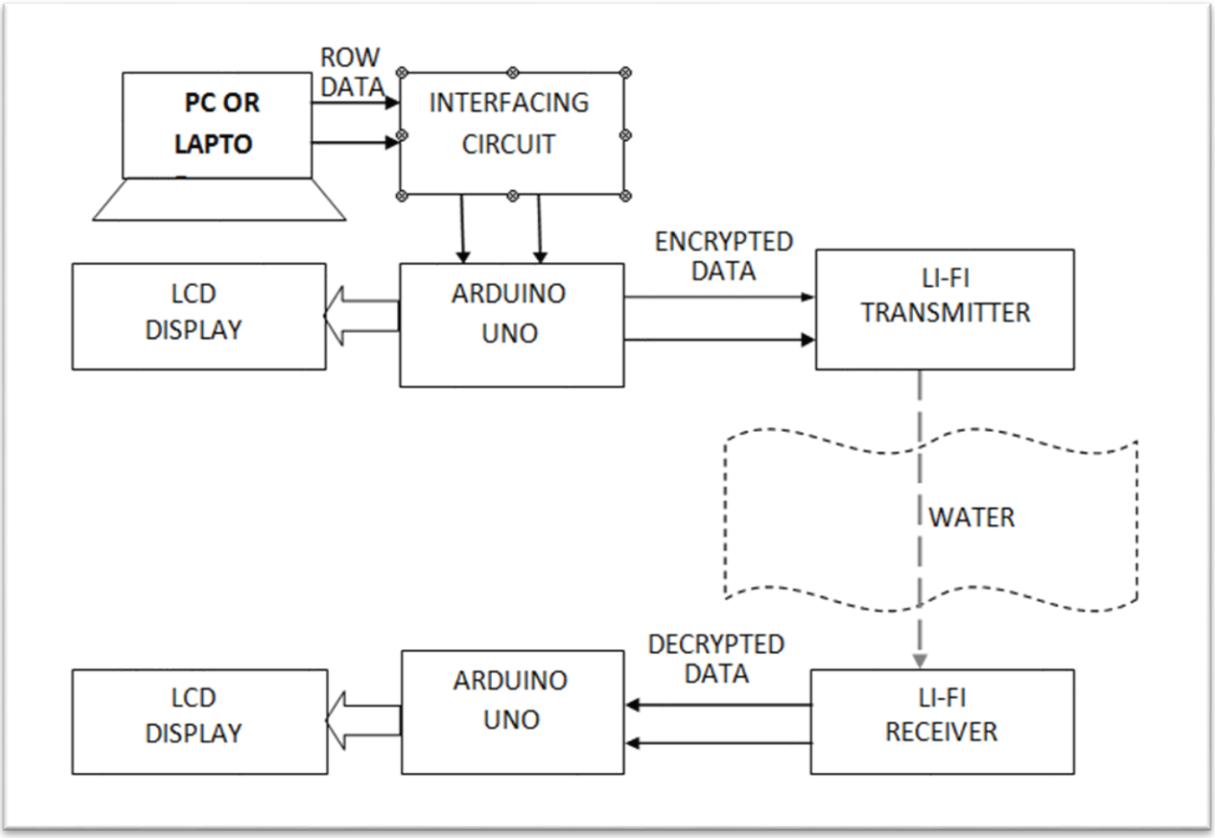
ISSN (Online) 2321-2004
ISSN (Print) 2321-5526

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

Vol. 9, Issue 6, June 2021

DOI 10.17148/IJIREEICE.2021.9625

2.5 BLOCK DIAGRAM & WORKING



Information is transmitted from one point to another via modulation. Modulation forming the basis of communication is the process of transmission of low frequency data signal with high frequency carrier signal. As it could be understood from the description above, we need two signals for modulation process. These are data signal (voice, music, map, and video) to transmit and high frequency carrier signal. For three reasons modulation is a necessity. First, low frequency data signal has not that much energy to travel far distances. Second, if low frequency data signal were not imposed on carrier signal, in other words if not modulated, the dimension of the antenna would be inefficiently long. It is because the dimension of the antenna inversely proportional to frequency. Third, data signal bandwidth is 20 Hz-20 KHz and assuming the frequency range of amplitude modulation is 5-10 KHz, there could be a few stations established. For these causes modulation as basis of communication is a demanding tool needed to be used The above diagram shows the actual working process of the underwater communication using the lifi technology.

In it first we use the laptop or Keyboard as input to this system. In this we write a message which will be transferred to the transmitter circuit to the receiver circuit to display at the receiver end. Next one is the interfacing circuit this circuit is used for the interfacing the Arduino Uno. Here we use the Arduino Uno as a microcontroller. Mainly in this Arduino Uno the all date will be given to the transmitter circuit before that the data send from the of is displayed on the LED1.Then the data will be converted into the signal from by using the Arduino .We program the Arduino like that when we send the data to the Arduino circuit We program the Arduino like that when we send the data to the Arduino circuit the Arduino will encrypted the program into the different form. Then this data will send to the LIFI transmitter circuit. In this lifi transmitter circuit by using the light sensor we will transmit the data towards the receiver side. In between the transmitter and receiver circuit we will use the water as a Media. The data will be received at the receiver end and then the data will be description program will be given to the Receiver Arduino circuit .The Arduino will descript the data and then it will be displayed on the pc/ screen/ LED on the receiver side end.

IJIREEICE

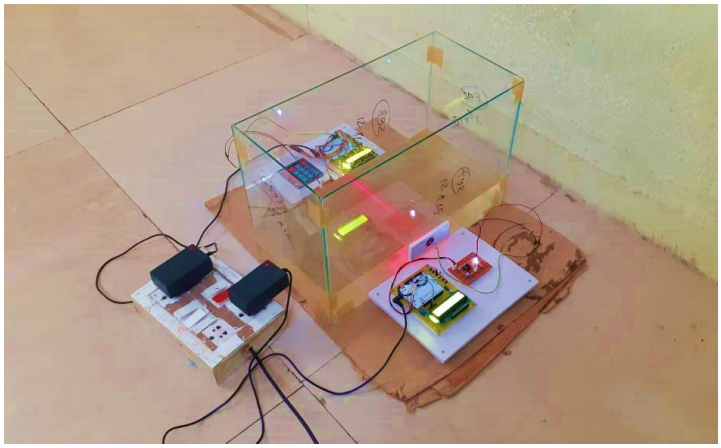
ISSN (Online) 2321-2004
ISSN (Print) 2321-5526

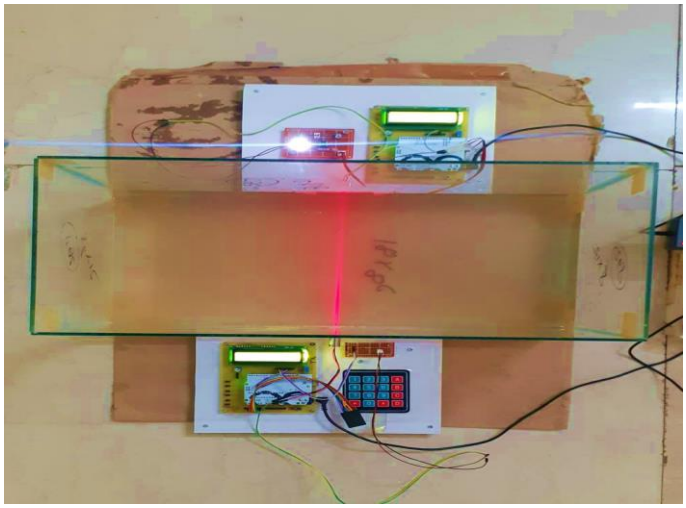
International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

Vol. 9, Issue 6, June 2021

DOI 10.17148/IJIREEICE.2021.9625

III: RESULT





IV.CONCLUSION

There are a plethora of possibilities to be gouged upon in this field of technology. If this technology becomes justifiably marketed then every bulb can be used analogous to a Wi-Hotspot to transmit data wirelessly. The possibilities are numerous and can be explored further. If this technology can be put into practical use, every bulb can be used something like a Wi-Hotspot to transmit wireless data and we will proceed toward the cleaner, greener, safer and brighter future. The concept of Li-Fi is currently attracting a great deal of interest, not least because it may offer a genuine and very efficient alternative to radio-based wireless. As growing number of people and their many devices access wireless internet, the airwaves are becoming increasingly clogged, making it more and more difficult to get a reliable, high-speed signal. This may solve issues such as the shortage of radio-frequency bandwidth and also allow internet where traditional radio based wireless isn‘t allowed such as aircraft or hospitals. One of the shortcomings however is that it only work in direct line of sight

V.REFERENCES

[1] W.-L. Jin, “SPIVC: A Smartphone- based inter-vehicle communication system,” Proceedings of Transportation Research Board Annual Meeting, 2012.
[2] A. Boukerche et al., “Vehicular Ad Hoc Networks: a new challenge for localization- based systems,” Computer Communications, Science Direct, 2008, pp. 1-12.
[3] S.Fahn, R. L. Elton, U. D. Committee et al., “Unified Parkinson’s disease rating scale,” Recent Dev. Parkinson’s Dis., vol. 2, pp. 153–163, 1987.
[4] Y. Y. Goh, B. Ho, and J. L. Ding, “A novel fluorescent protein-based biosensor for gram-negative bacteria,” Appl. Environ. Microbiol., vol. 68, no. 12, pp. 6343–6352, 2002