



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Special Issue 1, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Using Li-Fi Communication for Real-Time Health Monitoring of Divers in Underwater Environments

Mr.P.Manivannan¹, R.Murali², P.Muthukumar³, S.Nithish Kumar⁴,G.Raghul⁵

Associate Professor, Department of Electronics and Communication Engineering, Adhiyamaan College of Engineering, Krishnagiri, Tamil Nadu, India¹

U.G Student, Department of Electronics and Communication Engineering, Adhiyamaan College of Engineering, Krishnagiri, Tamil Nadu, India^{2,3,4,5}

ABSTRACT: Diving has come a common way of performing exploration in the submarine-living world. One of the major problems with diving is the health issues faced by the divers during diving and there comes the need for covering the diver's health. This paper substantially utilizes Li-Fi (Light Fidelity) data transfer, this system provides divers with health monitoring systems, fear buttons body temperature, and body position. The covered health specifications are recorded as a database in a memory chip for further analysis. To reduce power consumption, the system transfers the data to the near divers and boats only during an abnormal health issue.

KEYWORDS: health monitoring, Li-Fi, diving, vital signs, fear button, memory chip, data transfer, abnormal health issue, power consumption, security.

I. INTRODUCTION

Ad Image inpainting is a powerful technique used for repairing damaged or incomplete images. This process involves reconstructing missing or corrupted parts of an image to create a natural-looking output. In many real-world situations, people require a system that can restore damaged photographs, designs, drawings, artworks, and other types of images. Damage to images can occur for various reasons, including scratches, overlaid text or graphics, or other types of damage. Image inpainting can be used to reconstruct image damage due to dirt, scratches, overlaid text, and more. Image inpainting works by modifying and filling in missing areas of an image in a way that is undetectable to an observer not familiar with the original image. This technique can be used to restore images damaged by scratches, dirt, overlaid text, and other types of damage. Additionally, some images may contain mixed text-picture-graphic regions in which text characters are printed in an image. Detecting and recognizing these characters can be crucial, and removing them is essential for removing indirect advertisements and for aesthetic reasons. Image inpainting has many applications ranging from the restoration of photographs and films to the removal of occlusions such as text, subtitles, logos, stamps, scratches, and red-eye removal. This paper presents an algorithm for automatic text detection using morphological operations, connected component analysis, and a set of selection or rejection criteria. The algorithm consists of several steps, and the flow diagram illustrates the process. After detecting the text, the algorithm fills in the text region using an inpainting technique described in Section III. Section IV presents experimental results showing the performance of the algorithm on various test images. Finally, Section V presents the conclusion. In conclusion, image inpainting is a valuable technique for restoring damaged or incomplete images. The algorithm presented in this paper provides an efficient and effective way to detect and remove text from images using an inpainting technique. This technique has many practical applications and can be used to restore images that have been damaged by scratches, dirt, overlaid text, and other types of damage. The experimental results demonstrate the effectiveness of the algorithm in detecting and removing text from images, making it a useful tool for image restoration and manipulation.

II. RELATED WORK

[1]. A Survey of Underwater Wireless Optical Communication UWOC is a highly promising technology that utilizes optical waves for data transmission in unguided water environments. It offers higher bandwidth and data rates than traditional RF and acoustic waves, making it well-suited for applications including military operations and environmental monitoring. Despite facing challenges like absorption and scattering in the underwater channel, UWOC has led to new system design approaches. [2]. Underwater Visible Light Communications in Cascaded Gamma-Gamma Turbulence This paper investigates the performance of vertical underwater visible light communication links under moderate and strong turbulence conditions, using a Gamma-Gamma probability density function. A statistical turbulence channel model is developed based on depth-dependent refractive index variations. A closed-form expression for bit error rate performance is formulated and confirmed through simulations. Multiple layers are used to model the vertical link with varying turbulence strength based on depth-dependent temperature and salinity profiles. The underlying fading coefficients are modelled as i.n.i.d GG random variables. [3]. Wendelstein 7-X Program— Demonstration of a Stellarator Option for Fusion Energy The superconducting stellarator Wendelstein 7-X aims to demonstrate the intrinsic advantages of the stellarator over the tokamak, such as steady-state operation without the need for current drive or stability control. An optimization process was used to achieve high-temperature plasma with minimal neoclassical transport losses, while maintaining equilibrium and stability properties at high β and incorporating a viable divertor concept. Plasma operation follows a staged approach, with the objective of demonstrating steady-state plasma at fusion-relevant parameters. Wendelstein 7-X will also address issues related to fast-ion confinement and alpha heating in a power plant. Commissioning began in 2015, and first plasmas are expected to be produced later that year.

III. METHODOLOGY

The proposed method consists of two sections: the transmitting and receiving sections. The transmitting section is responsible for detecting any abnormalities that the diver might face. This data is then transmitted using a medium called light fidelity. In the receiving section, the light signal is converted into an electrical signal and the data is produced in the form of data communication. To convert the light signal into an electrical signal, a photodiode is used. The electrical signal produced by the photodiode is then passed through a double stage amplifier. The amplifier is used to amplify the detected electrical signal to make it more readable. After amplification, the electrical signal is then converted into binary information. This binary information can be easily transmitted and decoded at the receiving end. At the receiving end, the binary information is converted back into the original message. The data is produced at the output in the form of an audio signal or message. This enables the diver to receive any important messages or alerts without any hindrance. The use of light fidelity as a medium for data transfer in this method is advantageous as it is not affected by any electromagnetic interference. This ensures that the data transfer is smooth and uninterrupted. The use of a photodiode for conversion of light signal into an electrical signal is an efficient way of ensuring that the data is accurately transmitted. The use of a double stage amplifier also ensures that the data is clearly audible at the receiving end. In summary, this proposed method provides a reliable and efficient way of transmitting important data to a diver. The use of light fidelity and a photodiode makes this method suitable for use in environments where electromagnetic interference is present. The double stage amplifier ensures that the data is clearly audible at the receiving end. The proposed Li-Fi based health monitoring system for divers underwater can be implemented using various components, including Arduino Uno, thermal sensor, buzzer, motion sensor, Li-Fi transmitter (Li-Fi Tx), and Li-Fi receiver (Li-Fi Rx). The thermal sensor is used to measure the diver's body temperature, and the motion sensor is used to detect any abnormal movements or positions of the diver. These sensors are connected to the Arduino Uno, which acts as the main processing unit of the system. The Arduino Uno receives the data from the sensors and sends it to the Li-Fi transmitter for transmission. The Li-Fi transmitter converts the sensor data into visible light signals and transmits them through the water to the Li-Fi receiver. The Li-Fi receiver receives the visible light signals and converts them back into digital data, which is then processed by the Arduino Uno. If any abnormal health issue is detected, the buzzer is activated to alert nearby divers and boats. To conserve power, the system only transmits data to nearby divers and boats in case of abnormal health issues. Overall, this Li-Fi based health monitoring system can significantly improve diver safety and well-being during underwater exploration by providing real-time monitoring of health parameters and alerting nearby divers and boats in case of abnormal health issues.

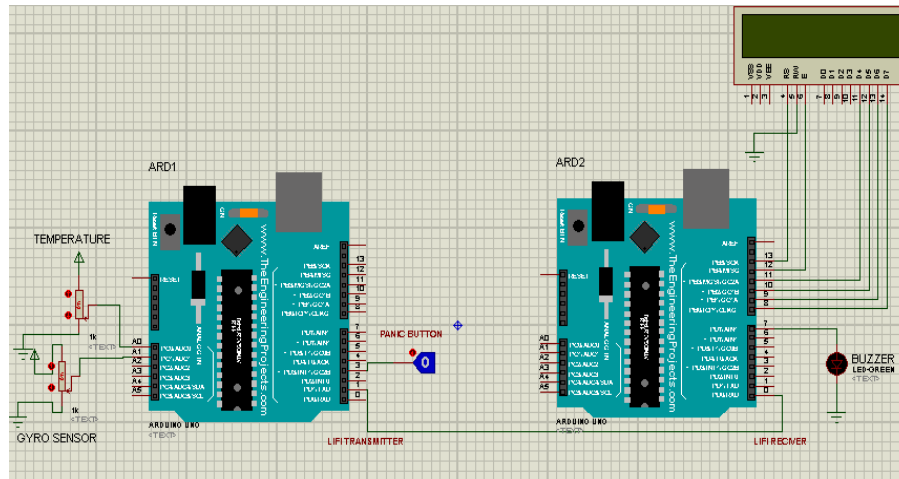


Figure 1 pin diagram

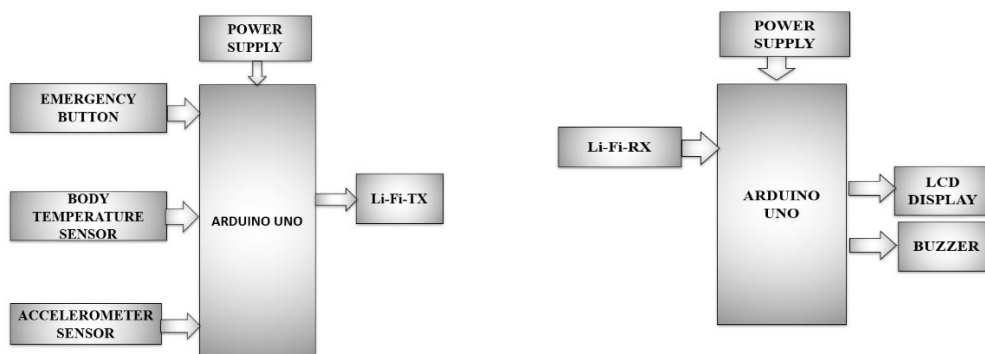


Figure 2 Block diagram of Tx and Rx

IV. EXPERIMENTAL RESULTS

Overall, the proposed system utilizes Li-Fi communication technology to monitor the health and safety of divers during underwater operations. Wearable sensors are used to measure vital signs, which are then transmitted via Li-Fi to a base station for analysis. This allows for real-time monitoring of divers' health and quick response to any health concerns that arise. One of the main benefits of Li-Fi technology is its ability to transmit data through water using visible light, which minimizes interference and allows for efficient data transfer over a distance of 10-30 meters. The system also includes a memory chip for recording and analyzing health data for further study. Additionally, the system is designed to conserve power by only transmitting data to nearby divers and the boat during abnormal health issues. Security measures are also implemented to ensure the confidentiality and privacy of the transmitted data. Overall, this system has the potential to improve diver safety and health during underwater operations, making it a valuable addition to the field of diving exploration.

V. CONCLUSION

Li-Fi, a concept that has been introduced alongside traditional techniques and trends used for vehicle-to-vehicle communications, is a system that only generates and transmits information during emergencies, using minimal power and being cost-effective. Its transmission speed is 2 Giga Bits Per Second (Gbps), which is faster than current systems.

International Journal of Innovative Research in Science, Engineering and Technology*An ISO 3297: 2007 Certified Organization**Volume 12, Special Issue 1, April 2023***10th National Conference on Frontiers in Communication and Signal Processing Systems (NCFCSPPS '23)****5th -6th April 2023****Organized by****Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India**

This concept has been used to develop a system for monitoring the health states of ocean guides, who face difficult situations due to the rapidly evolving air conditions. It can be challenging to monitor their health conditions while they are at sea, as even diving under 25 meters can cause significant changes in heart rate and pulse, potentially leading to fatalities. This system proposes a framework for monitoring the heart rate of an ocean guide during their route using an information communication system. The system can monitor the pilot's heart rate even on the ground, allowing for an understanding of their condition and avoiding potentially dangerous circumstances. It can also send prepared messages to them if the weather changes while they are exploring, helping them to understand the situation and return safely to the board. In summary, this proposed system provides a way to monitor the health conditions of ocean guides, improving their safety and avoiding potential hazards.

REFERENCES

- [1] Z. Zeng, S. Fu, H. Zhang, Y. Dong and J. Cheng, "A Survey of Underwater Optical Wireless Communications," IEEE Communications Surveys & Tutorials, vol. 19, no. 1, pp. 204-238, Firstquarter 2017.
- [2] N.Saeed, A.Celik, T. Y. Al-Naffouri, and M.Alouini, "Underwater optical wireless communications, networking, and localization: A survey," CoRR, vol. abs/1803.02442, 2018.
- [3] H. Gerçekcioglu, "Bit error rate of focused Gaussian beams in weak oceanic turbulence," JOSA A, vol. 31, no. 9, pp. 1963-1968, 2014.
- [4] T. Shafique, O. Amin, M. Abdallah, I. S. Ansari, M. S. Alouini, and K. Qaraqe, "Performance analysis of single-photon avalanche diode underwater VLC system using ARQ," IEEE Photon. J., vol. 9, no. 5, pp. 1-11, Oct. 2017.
- [5] E. Zedini, H. M. Oubei, A. Kammoun, M. Hamdi, B. S. Ooi, and M.S. Alouini, "A new simple model for underwater wireless optical channels in the presence of air bubbles," in Proc. IEEE Global Commun. Conf. (GLOBECOM), Dec. 2017, pp. 1-6.
- [6] R. Griffis and J. Howard, Oceans and marine resources in a changing climate: a technical input to the 2013 national climate assessment. Island Press, 2013.
- [7] M. Elamassie, S. M. Sait and M. Uysal, "Underwater Visible Light Communications in Cascaded Gamma-Gamma Turbulence," 2018 IEEE Globecom Workshops (GC Wkshps), Abu Dhabi, United Arab Emirates, 2018, pp. 1-6.
- [8] E. Illi, F. El Bouanani, D. B. Da Costa, F. Ayoub and U. S. Dias, "Dual-Hop Mixed RF-UOW Communication System: A PHY Security Analysis," in IEEE Access, vol. 6, pp. 55345-55360, 2018.
- [9] Z. Liao, D. Li and J. Chen, "A Network Access Mechanism for Multihop Underwater Acoustic Local Area Networks," in IEEE SensorsJournal, vol. 16, no. 10, pp. 3914-3926, May15, 2016.
- [10] X. Li, Y. Sun, Y. Guo, X. Fu and M. Pan, "Dolphins First: Dolphin-Aware Communications in Multi-Hop Underwater Cognitive Acoustic Networks," in IEEE Transactions on Wireless Communications, vol. 16, no. 4, pp. 2043-2056, April 2017.
- Muthukumar S, Dr.Krishnan .N, Pasupathi.P, Deepa. S, "Analysis of Image inpainting Techniques with Exemplar, Poisson, Successive Elimination and 8 Pixel Neighborhood Methods", International Journal of Computer Applications (0975 – 8887), Volume 9, No.11, 2010

BIOGRAPHY

Mr.P.Manivannan
Associate Professor,
Electronics and Communication
Engineering Department,
Adhiyamaan College of
Engineering,

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 12, Special Issue 1, April 2023

10th National Conference on Frontiers in Communication and Signal Processing Systems (NCFCSPPS '23)

5th -6th April 2023

Organized by

Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India



Murali R,
Electronics and Communication
Engineering Department,
Adhiyamaan College of
Engineering,



Muthukumar P,
Electronics and Communication
Engineering Department,
Adhiyamaan College of
Engineering,



Nithish Kumar S,
Electronics and Communication
Engineering Department,
Adhiyamaan College of
Engineering,



Raghul G,
Electronics and Communication
Engineering Department,
Adhiyamaan College of
Engineering,



SJIF: 8.423



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INTERNATIONAL CENTRE



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details