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Under Water Communication through Li Fi for Data Transmission

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Abstract

There is now a lot of active research being done on underwater sensor networks and communications. In order to try high-speed communication, the bandwidth and network speed will need to increase. Divers use white boards to communicate because it is exceedingly challenging to do so underwater. However, today's incredible Li-Fi technology, which employs light to enable underwater communication, makes this conceivable. Visible light communication (VLC) systems using light emitting diodes or laser as a medium to high-speed communication are referred to as Li-Fi or Light Fidelity. The photo sensors that serve as the receiver and the transmitter in the LI-FI system are lasers. By altering the rate at which the LASER flickers on and off very quickly to produce different strings, it is feasible to encrypt data in the light as 1s and 0s.

The astonishing Li-Fi concept, put forth by German physicist Harald Hass, uses light to enable underwater communication. Bidirectional, fast, fully networked wireless optical communiction is known a Light Fedelity (Li-Fi). By enlarging the angle, light will be reflected even when it is blocked by floating objects, increasing its capacity to reach the receiver and making it sufficient even when the light moves the current. There are countless applications for Li-Fi. The Navy improves submarine communication systems by using Li-Fi. Future Li-Fi applications might by used for much more than merely in chemical plants, aeroplanes and the ocean.

Keywords: *Light Fidelity, Visible Light Communication, LASER.*

1. Introduction

The Li-fi concept is currently generating a lot of interest, not least because it provides an authentic and highly effective alternative to RF. The wireless transmissions are becoming more and more crowded, and each device's access to free data transfer capabilities is becoming more and more limited as more people and their new devices use the remote web, making it harder and harder to get a strong, quick signal. It's exciting to have the option to use a completely unique electromagnetic component. Li-Fi has advantages over Wi-Fi that Wi-Fi does not have, such as being safe to use in nuclear power plants and thermal energy stations. Only obvious light spectrum can be safeguarded in such locations because RF waves in such stations can be harmful and affect accidents. In addition to inhospitable locations, Li-fi can be used anywhere Wi-Fi is allowed. Li-fi is accessible anywhere there is access to light, eliminating the need to have issue areas only in specific locations. Li-Fi and Wi-Fi operation is based on four factors: limit, productivity, accessibility, and security. Both Li-fi and Wi-Fi employ electromagnetic spectrum to transmit information, but while Wi-Fi uses radio waves, LiFi uses clear light connectivity at speeds up to 100Mb/s. The currently published document controls VLC, which provides a broad and speedy information rate of 500Mb/s. The correlation between WiFi and LiFi developments is made in this research. Additionally, the functioning, application, and advancements of Li-fi technology are

examined in this research. The Li-Fi technology may be used for a variety of things because it allows for information to be transmitted through Lights, therefore any screen that emits light can be used as a platform for information exchange.

2. Block Diagram

The block diagram of the proposed system is system is shown in Figure 1.

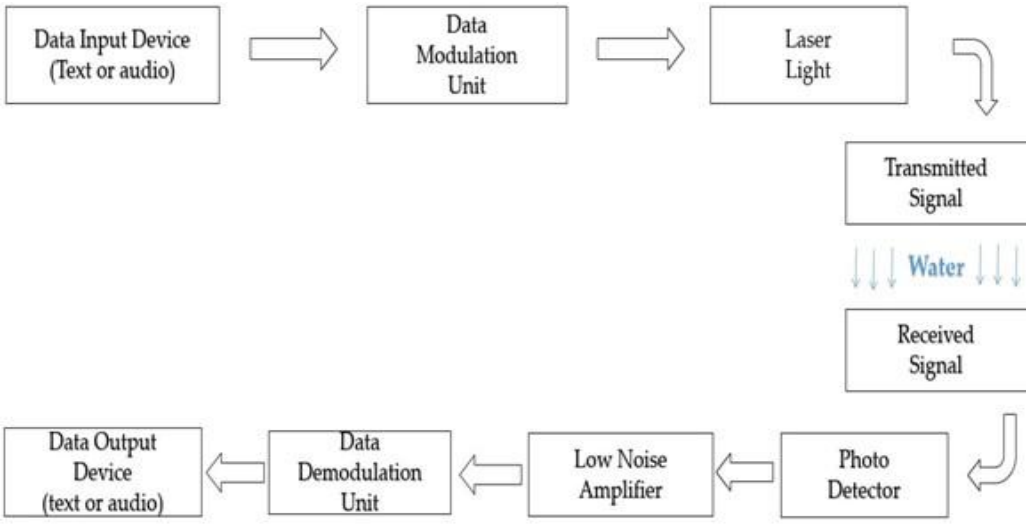

Figure 1: Block Diagram of the Proposed System

The text data for transmission is taken through the keypad and audio data to be transmitted is taken through the mice or Bluetooth module which is given to microcontroller. Microcontroller modulates it and maps it into binary ones and zeros. These binary Ones and Zeros where One represents ON state and zero represents OFF state which is then given to laser light in the form of pulses which acts as the medium for transmission through the channel. Transmitted data through the channel is received by the receiver where LDR is used as the receiver. This received data is given to the microcontroller for demodulation, if the demodulated data is text it is given to the LCD display and if the demodulated data is audio it is given to the audio amplifier which is connected to the speaker using this the audio signal that is transmitted from transmitter through the channel can be listened.

3. Limitations

- Without a light source, you cannot access the Internet. This can restrict the areas and circumstances in which Li-Fi can be used. The range of the signal is constrained by physical obstructions because it employs visible light, and light cannot pass through walls.
- Strict Range. While the fact that light cannot pass through walls may be advantageous in terms of security, it also severely restricts the range of Li Fi.
- Compatibility issues. Li Fi is a new technology, so not many things work with it.

4. Methodology

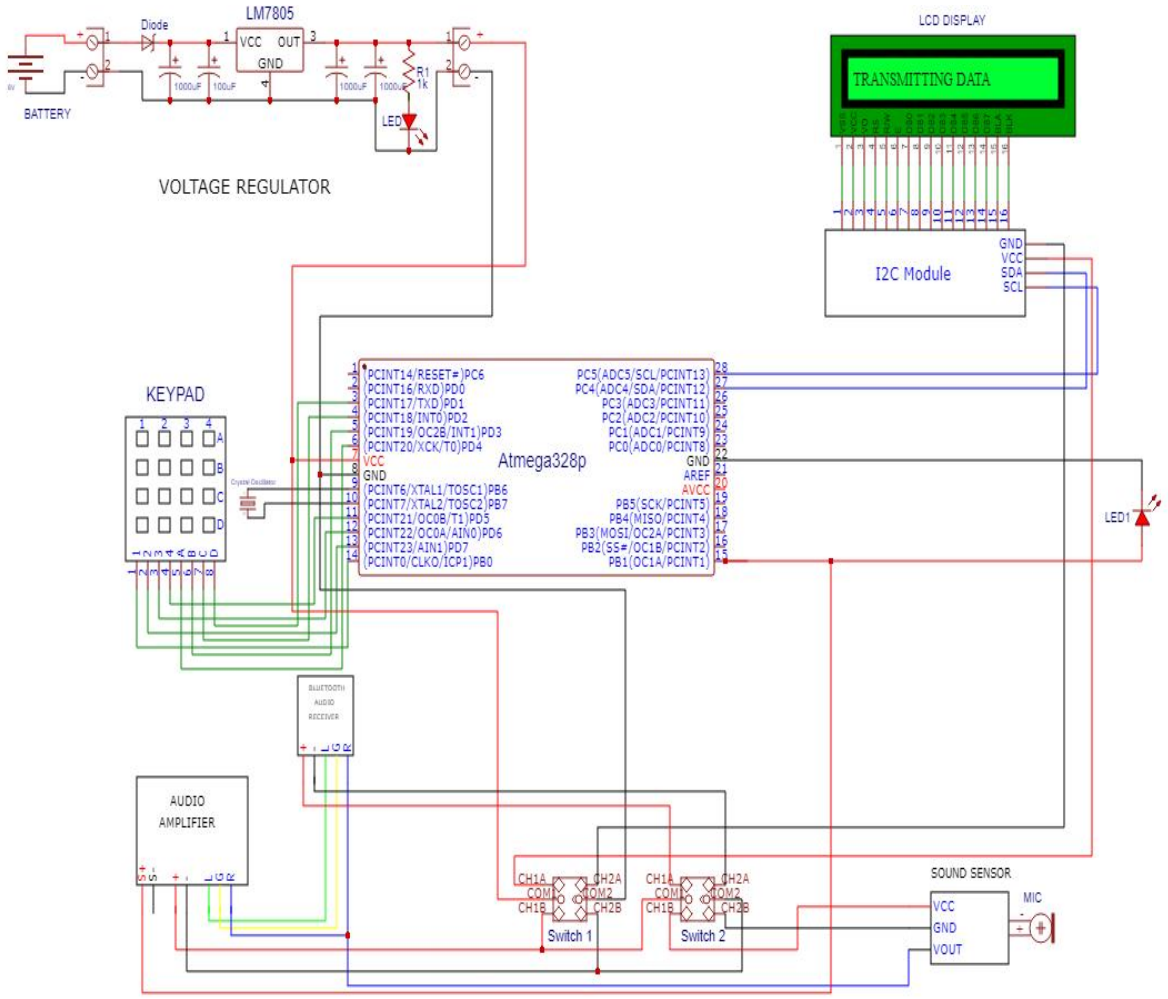

Figure 2: Transmitter Circuit

Project consists of transmitter section (Figure 2) and receiver section Figure 3). Transmitter consists of power supply to power up the circuit, a microcontroller, an LCD screen. Microphone or if required, Bluetooth module is used to take audio data as input. A text message is displayed in LCD screen that needs to transmitted and finally the major component of this project the is light source, through which the data is transmitted through the water and received by receiver. Microcontroller is used to the text message or audio into binary 0's and 1's and this is transmitted via LASER.

5. Results

This project is used to transfer the data underwater using light. Here user will give the input through text message or audio, which is processed by microcontroller and then it is transmitted through light (LASER) (Figure 4). Solar panel, which is used as the receiver will accept the data transmitted and it will send the received data to microcontroller (Figure 5), where it will process the received data. If the received data is text message, it will be displayed in LCD screen or if it is audio, it can be listened through speaker. The completed model is shown in Figure 6.

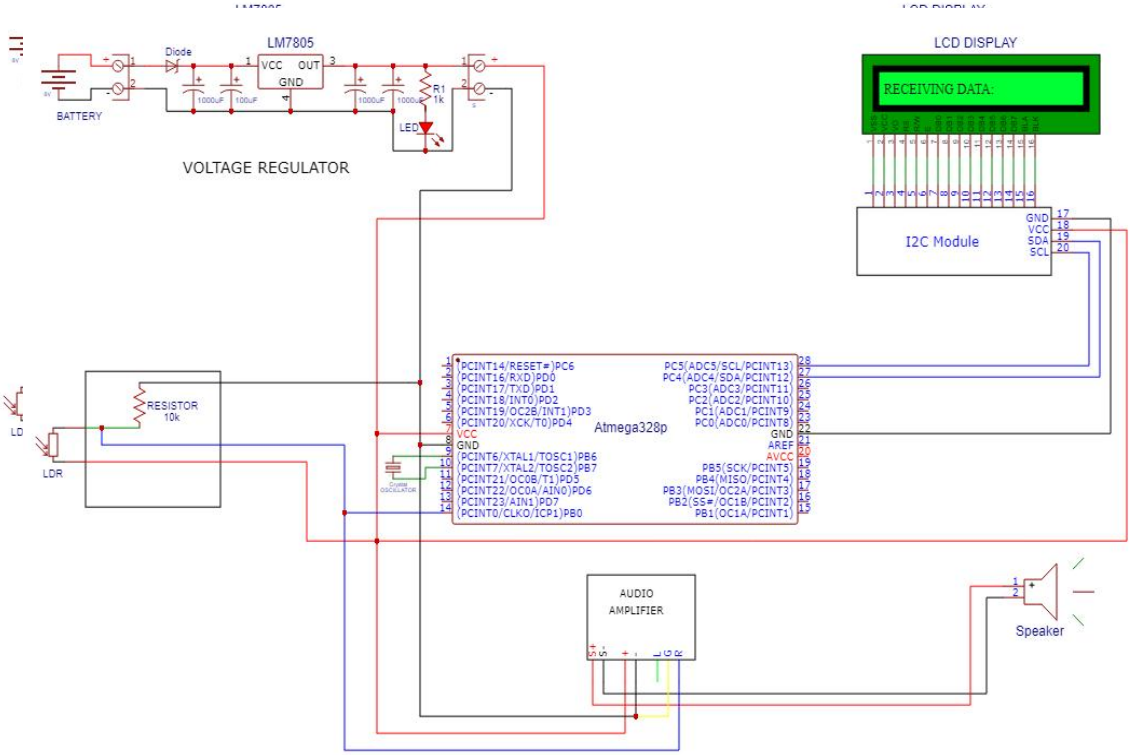

Figure 3: Receiver Circuit

Figure 4: Transferring B

Figure 5: Receiving B

Figure 6: Complete Model

6. Future Scope

To increase efficiency and communication speed, a more advanced camera and laser can be employed. To establish two-way communication, a camera and a laser can be utilized at both the receiver and the transmission end. This article is applicable to robotics control. This article can be used to several industries' heavy machinery controllers.

7. Conclusion

This paper provides a broad overview of a structure that aids with speedier, more balanced submerged correspondence. Our approach is effective in ensuring the boats' security. In the event that the Navy adopted this system, long-distance communication would benefit more from it. Therefore, implementing our approach for submerged correspondence would be effective. Li FI has a wider communication range, doesn't scatter

underwater, uses less energy, bundling is more restrained, and can transmit data at higher speeds. With all of these advantages, we conclude that Li-Fi is a superior technology that may be used for submerged correspondence when compared to acoustic methods for submerged correspondence.

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