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AUDIO SIGNAL TRANSMISSION USING LASER COMMUNICATION SYSTEM

Mrs. P.ARUNA KUMARI[1], G V ROHITH KUMAR REDDY[2], C LIKITHA[3], BANDLA MADHU[4], C YATHISH[5], DASARI SASI PREETHAM[6]

[1]Assistant Professor, Dept. of ECE, S V College of Engineering, Tirupati,A.P, India.

[23456]B.Tech Students, Dept. of ECE, S V College of Engineering, Tirupati, A.P, India.

ABSTRACT

Laser communications Laser Communication is the most evolving arenas in the field of wireless communication. Presently, laser commutation is espoused in the satellite communication for the purpose of space research related activities because of its benefits such as less power consumption, low cost, flexibility and resistance to the radio interference. This work is an application of laser communication for transmitting data between two ends.Laser Communication needs the transmitter and receiver to be aligned in line-of-sight. The carrier which transmits the signal is produced by a laser diode.The complete system for this work consists of a transmitter and a receiver capable of transmitting and receiving the analog signal respectively. The results shows that input signal frequencies are preserved at the output with less distortion. However there is decrease in the amplitude of the received signal which can be increased at the output end and the original signal can be recovered. Signal to Noise Ratio is used as a performance metric.

Keywords: Demodulation, laser communication, modulation, receiver, transmitterr

INTRODUCTION

Laser as a medium of communication has some exceptional properties compared to other communication mediums. Line-of-sight laser is advantageous where wires are not physically connected between transmitter and receiver over a long distance. Unlike wires, a laser beam does not necessitate shielding for long distance transmission. Even though, RF transmitteroffers long distances than line-of-sight lasers, they are subjected to other signal interference. The recent trends of the space-based and fiber-based laser communication systems have better data rates and the sensitivities. The free space underwater optical communication which is laser based will collect oceanographic data

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for a duration of specified time interval and will transmit the data to the external world on a periodic basis for the purpose of processing.

LITERATURE REVIEW

1. Data Transmission Using Laser Light Microcontroller based communication system using laser light to transmit data. In this paper the data transmission using laser light is superior in many respects to the conventional communication system. Laser light has higher intensity, efficiency, as well as beller visibility and performance quality.
2. Wireless Transmission of Audio Signal using Coherent Optical Signal "To demonstrate wireless transfer of an audio signal via a coherent optical signal in free space between two independent systems. The principle behind said communication is conversion of audio signal to light signal via the application of modulation and amplification into a high intensity laser source that is detected by a phototransistor or a photodiode and is then demodulated and amplified back to the audio signal.
3. Lunar Laser Communication Demonstration NASA's First Space Laser Communication System Demonstration: LLCD was the NASA first laser communication demonstration. LLCD has the capability to transfer data at a rate of up to 622 megabits per second (Mbps). It will demonstrate two way, high-rate laser communications from lunar orbit aboard the Lunar Atmosphere Dust Environment Explorer (LADEE)

EXISTING METHOD

Wired communications places vital role optical fiber a wire is used to transfer signal from one place to another place.

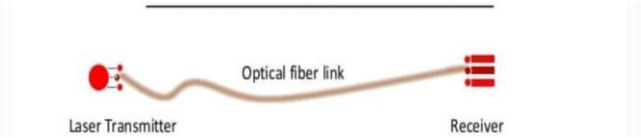

Fig 1: Existing method

DISADVANTAGES

Optical fibers wires not always possible to lay fiber lines so we prefer wireless technology i.e., LASER. Low power-high power emitters are available to improve power supply, it would add extra cost. Fragility-Optical fiber is rather fragile and more vulnerable to damage. You'd better not to twist or bend fiber optic cables too tightly. Distance-The distance between the

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transmitter and receiver should keep short or repeaters are needed to boost the signal.

PROPOSED METHOD

Laser communications systems are wireless connections through atmosphere use laser beams to transmit information between to locations.Signal can transmits long distance in applications of satellite communication.

BLOCK DIAGRAM

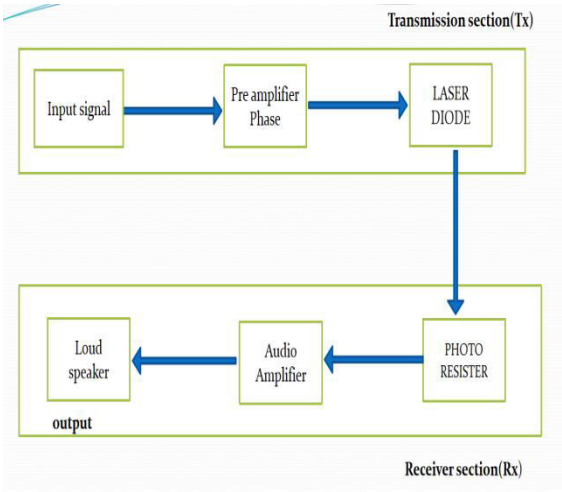

Fig 2: Block diagram

TRANSMITTER

Because I'm sending a continuous analog signal, I will need my laser bias such that the laser is on at all times. If you are sending a digital signal.I am going to bias my laser at 4.5VDC and modulate it from 4V to 5V. First measure the current draw of the laser at 5V, for my laser it was drawing 29mA. This is more than what many op-amps can provide so I will power my laser with a transistor set up as a voltage follower. To drive the voltage follower, I will use a op-amp to mix my input signal with 4.5V and attenuate the signal from 2Vpp to 1Vpp

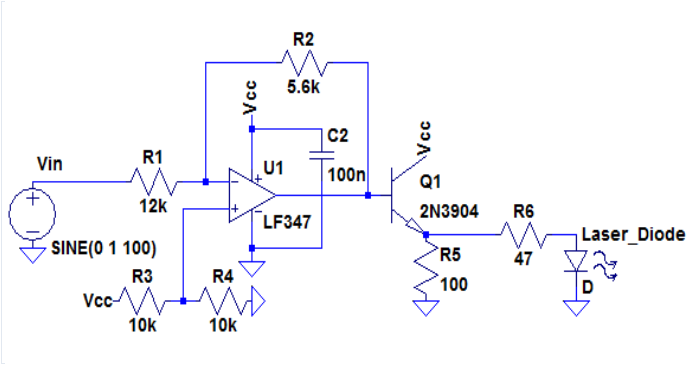

Fig 3: Transmitter circuit

RECIEVER SECTION

To design the receiver, we going to make a voltage divider using the photoresistor.we will then connect that to the input of an inverting amplifier. The inverting amplifier output is then passed into a highpass RC filter with a cut off of 10 Hz, this will remove the DC component without any major effects on the audio quality of the system. To select the second resistor for my voltage divider, I looked at my measurements of the photoresistor and choose the value that was closest to the 4.5v measurement. That gave me a values for R7 of 680 ohms. That gave me a voltage that would voltage ranging from 3.84V to 4.37V, a swing of 0.82V. For the gain stage, I

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would need a gain of 2.4 to regain my original 2V input.

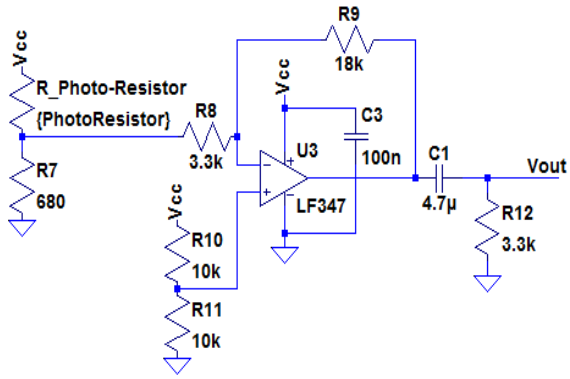

Fig 4: Receiver circuit

RESULT

TRANSMITTER

An Analog signal from the mobile phone is given as the input to the transmitter section and through laser diode signal is transmitted to receiver

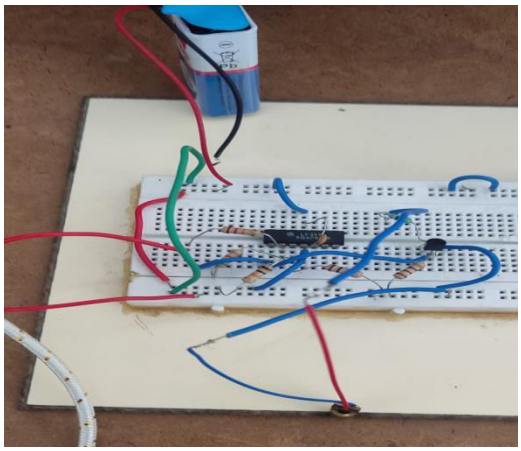

Fig 5: Transmitter section

RECEIVER

The output from the transmitter is given to the photo resistor and output is heard from the headphones/ear phones.

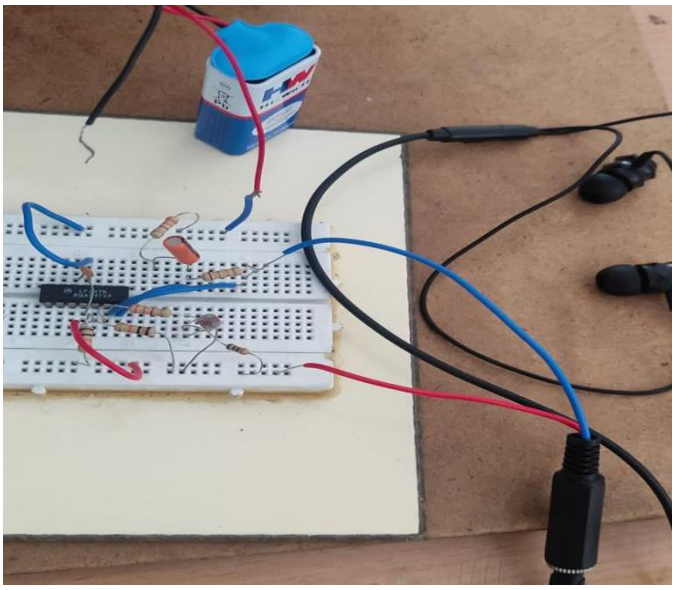

Fig 6: Receiver section

ADVANTAGES

1. Inexpensive
2. Higher intensity
3. Small Transmission loss
4. High communication quality
5. Large communication capacity

APPLICATIONS

1. Defense and sensitive areas.
2. Military Field
3. Research and Development sector

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4. At airports for communication across the runways.
5. Mass communication

CONCLUSION

Circuit for sound transmission using laser was designed and developed.The transmitter and receiver circuit were designed separately to perform the required function. An optical source, Laser was used on which the audio signal was successfully modulated and transmitted. Finally the optical signal was received by the photo resister. The complete hardware circuit was successful in performing the desired function i.e. transfers of sound from the transmitter circuit to the receiver's circuit loudspeaker via unguided media. The final module nearly met the initial expectations. It was expected that audio quality obtained would not be as good as the given input audio quality. Comparatively designing the circuits were simple, but the unpredictable alignment was not estimated.

FUTURE SCOPE

In future the work could be extended for video transmissions also. Already research is being done by LASTEC (Laser science and technology) laboratory, DRDO, to carry out under water communication using lasers. Laser communication systems can be extended to data services. Bandwidth can be distributed among neighborhoods by positioning laser communication systems in the desired locations and directing these systems to a common transceiver section with a fast link to the internet. The only major drawback of the developed model is that both the transmitter and receiver must be in Line-of-Sight.

REFERENCES

1. Toyoshima, M., &Takayama, Y. (2012). Space-based laser communication systems and future trends. In 2012 conference on lasers and electro-optics (CLEO), San Jose, CA, 2012 (pp. 1–2). doi: https://doi.org/10.1364/CLEO_AT.2012.JW1C.2.
2. Sangeetha, R. S., Awasthi, R. L., &Santhanakrishnan, T. Design and analysis of a laser communication link between an underwater body and an air platform. In 2016 International conference on next generation intelligent systems (ICNGIS), Kottayam, 2016, pp. 1–5, doi: https://doi.org/10.1109/ICNGIS.2016.78540 12.

3. Sofka, J., Nikulin, V. V., Skormin, V. A., Hughes, D. H., &Legare, D. J. (Jan. 2009). Laser communication between mobile platforms. IEEE Transactions on Aerospace and Electronic Systems, 45(1), 336–346. https://doi.org/10.1109/TAES.2009.4805283.
4. Nag, S., Gomez, E., Feller, S., Gibbs, J., & Hoffman, J. (2011). Laser communication system design for the Google Lunar X-Prize. IEEE Aerospace Conference Proceedings. https://doi.org/10.1109/ AERO.2011.5747344.
5. Khanna,S.T., & Sharma, K. (2017). Laser technology improving wireless communication: A comprehensive study on laser communicator. IOSR Journal of Computer Engineering, 19(4), 26–33.
6. Srinivas, V., Agarwal, R., Shinde, S., &Kulkarni, M. N. (2017). Transmission of audio, DTMF and serial data using LASER. International Research Journal of Engineering and Technology (IRJET), 4(4): 2017 7. Malhotra, N. S., &Malhotra, H. (2014). Transmission of sound using lasers. International Journal of Advanced Research in Computer Science & Technology (IJARCST 2014), 2(3).