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Laser Communication

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ABSTRACT

Laser communications offer a viable alternative to RF communications for inter satellite links and other applications where high-performance links are necessary. High data rate, small antenna size, narrow beam divergence, and a narrow field of view are characteristics of laser communication that offer a number of potential advantages for system design. The high data rate and large information throughput available with laser communications are many times greater than in radio frequency (RF) systems. The small antenna size requires only a small increase in the weight and volume of host vehicle. In addition, this feature substantially reduces blockage of fields of view of the most desirable areas on satellites. The smaller antennas, with diameters typically less than 30cm, create less momentum disturbance to any sensitive satellite sensors. The narrow beam divergence of affords interference-free and secure operation. Laser communications offer a viable alternative to RF communications for inter satellite links and other applications where high-performance links are necessary.

I. Introduction

Laser Communication is one of the emerging areas of wireless communication system. Due to its low noise ratio makes its one of the well suited communication medium for exchange of information. Currently laser commutation is adopted in satellite communication for space research activities and due to its efficiency on low noise ratio, inexpensive, low power and its flexibility and its resistance to the radio interferences makes laser communication as one of research area in wireless communication. In this process, comprises the one such application of laser communication for information exchange between any two devices. In Laser Communication the transmitter and receiver must require a line-of-sight conditions and Laser communications systems have the benefit of eliminating the need for broadcast rights and buried cables.

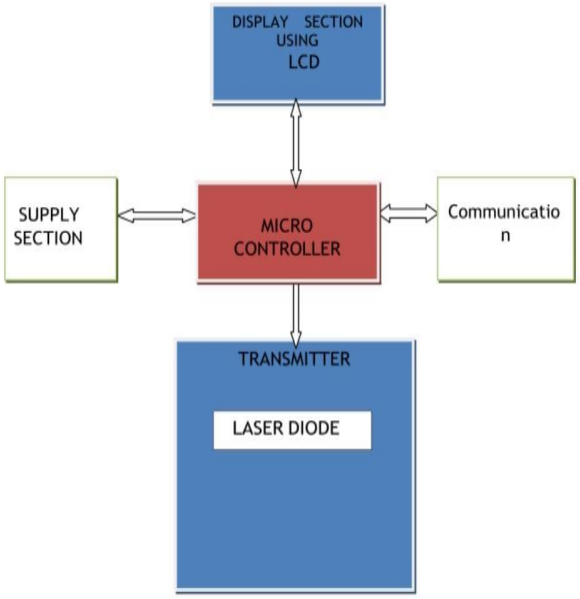
The carrier used for the transmission signal is typically generated by a laser diode. Two parallel beams are needed, one for transmission and one for reception. Laser communications systems are wireless connection through the atmosphere. Which is focused on decreasing the noise ratio in optical communication system Laser communications systems work similarly to fiber optic links, except the beam is transmitted through free space. Laser Communications systems can be easily deployed since they are inexpensive, small, low power and do not require any radio interference studies. The carrier used for the transmission signal is typically generated by a laser diode. Two parallel beams are needed, one for transmission and one for reception.

Laser communications plays a key role, as solutions for satisfy ever increasing high demand of bandwidth. In Laser communications systems bandwidth could be distributed in neighborhoods by putting systems on top of homes and pointing them towards a common transceiver with a fast link to the Internet. It supports possible transmit speeds of up to a gigabit per second, Other applications of Laser communications systems technology include temporary connectivity needs (e.g. sporting events, disaster scenes, or conventions), or space based communications.

II. Working Principle

There are two microcontroller one at sending end and the other at receiving end .Laser transmitter is connected to the pin of the microcontroller at the sending end and the LASER receiver is connected to microcontroller at receive end. whenever a person is wishing to send the data the microcontroller make the laser transmitter to send the frequency corresponding to that data and at receiver end that frequency can change to the original data form which will display on the lcd connected to the pin of the microcontroller.in this way the function of transmitting the data through laser receiver and transmitter have been completed.

Figure 1: QD-Laser communication block .



A block diagram of typical terminal is illustrated in Fig 1, Information, typically in the form of digital data, is input to data electronics that modulates the transmitting laser source. Direct or indirect modulation techniques may be employed depending on the type of laser employed. The source output passes through an optical system into the channel. The optical system typically includes transfer, beam shaping, and telescope optics. The receiver beam comes in through the optical system and is passed along to detectors and signal processing electronics. There are also terminal control electronics that must control the gimbals and other steering mechanisms, and servos, to keep the cquisition and tracking system operating in the designed modes of operation.

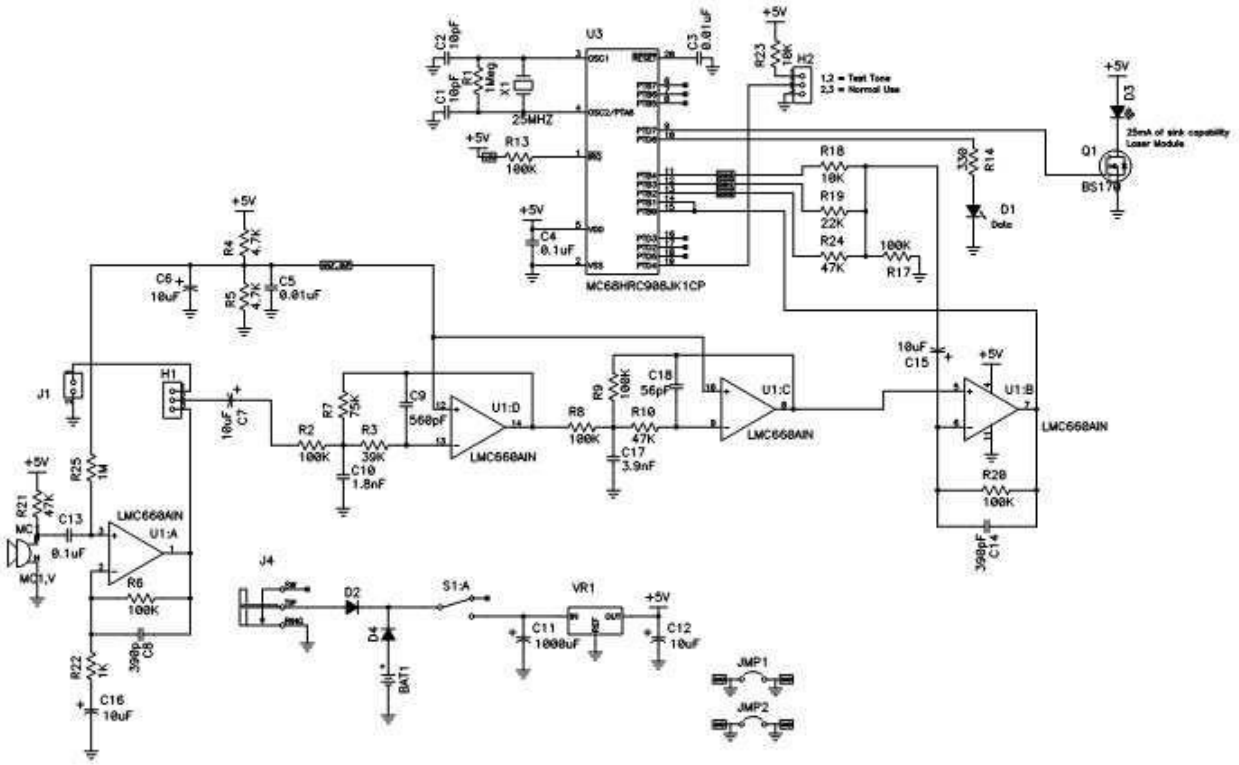


Fig 2 shows the microphone used in the transmitter circuit is a carbon microphone. A carbon microphone, also known as a carbon button microphone (or sometimes just a button microphone), uses a capsule or button containing carbon granules pressed between two metal plates. A voltage is applied across the metal plates, causing a small current to flow through the carbon. One of the plates, the diaphragm, vibrates in sympathy with incident sound waves, applying a varying pressure to the carbon. The changing pressure deforms the granules, causing the contact area between each pair of adjacent granules to change, and this causes the electrical resistance of the mass of granules to change. The changes in resistance cause a corresponding change in the

current flowing through the microphone, producing the electrical signal. This electrical signal is fed into the LMC660 CMOS Quad operational amplifier. This CMOS Quad operational amplifier consists of four opamps connected together and is ideal foroperation from a single supply.It operates from +5V to +15Vand features rail-to-rail output swing in addition to an inputcommon-mode range that includes ground.

Advantages:

1. The advantages of laser communication is that it allows very fast communication service between two or more devices than other modes of communications
2. It can provide speed more than 1GBps.So it overtakes the LAN or wireless LAN comprehensively.
3. Laser communications systems have the benefit of eliminating the need for broadcast rights and buried cables.
4. Laser communications systems can be easily deployed since they are inexpensive, small, low power and do not require any radio interference studies. The carrier used for the transmission signal is typically generated by a laser diode. Two parallel beams are needed, one for transmission and one for reception.
5. The transmitting and receiving station are smaller and lighter for given range. Less overall power is required for the given distance and data rate. Higher data rate may be achieved for given distance and power output.

III. Conclusion

This is new wireless technology to transmit the data or sound signal from one section to other section through the laser beam of the system. This system is safety and without radiation. so it is not harm to living beings. The system can likely transmit data and sound much faster than the other system (like 1GB/s), because of this laser communication system became more popular system than the other system. The paper firstly analyzed the components of maritime laser communication system.

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