Long range communication using stimulated radiation of visible light

Final Year Project Report

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Bachelor of Science in Telecommunication & Networks

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Abstract:

Laser communication is new wireless technology that transmits the audio or sound signal from one Source to another source by the laser beam of the system. The system can probably transmit audio and sound much faster than the other systems. And can transmit data up to 1 GB per second. Just because of this it became more famous and well-known system than any other. Laser communication is an enormous field. But it is still need line of sight for sake of communication. This technology isn't introduced in Pakistan at that level just because of this problem. But it has been established as a very valuable technology in advanced countries. In Pakistan optical fiber and RF are being used which also have great drawback that these can be jammed. So by using laser communication at some height will end up the problem of line of sight. And it can also never be jammed.

Chapter 1
Introduction

1.1 Introduction

Laser communication is one of the most important fields of wireless communication. This is not as much different to fiber optics links but it also has a plus point that it really doesn't need any link because it can pass through free space. But the transmitter and receiver as consulted to the line of sight terms and conditions. This communication system can easily be installed since it is of low cost, small in size and consumes low power. The carrier used to transmit signal is basically generated by the laser diode. And there is a need for two parallel lines one for transmission and other for receiving.

Its low SNR makes it one of the best suitable communication medium for information exchange. Now laser communication is applied in satellite communication for space research activities. It has a high range, therefore it can be transmitted at large distances.it also consumes low power so no bigger power supply is needed.

But the only drawback is that there is a need for two parallel lines; one for transmission and other for receiving. Our project is about voice communication through laser. The signal is transmitted from the transmitter as it consumes very low power. The signal that we transmitted is in audio form, so we have to modulate that signal. In telecommunication, balance is the procedure which relies upon at least one properties of a waveform which is known as transporter motion with a tweaking signal which contains data that to be transmitted.

There are several types of modulation like phase modulation, amplitude modulation, frequency modulation and pulse width modulation. But the type we use here is pulse width modulation. Because pulse width modulation is very useful in telecommunication and very good for electric devices. Now that signal is modulated and the signal is in laser form. As we know that to reduce noise you have to undergo some processes like rectification. Before modulation, signal is rectified and now signal is transmitted in the form of laser. Now at the receiver end, we have to receive that signal and that is why we used solar panel as our receiver.

Laser light catches some specific place at solar panel and gives output as voice signal that is transmitted. As we know that the signal that we receive is in light form so we have to modulate that signal again to convert that signal into voice. We again use pulse width modulation to modulate that light signal into voice form. Again we rectify that signal by using some rectifiers. We have also used Arduino Nano at both ends. Arduino basically performs switching as we allocate some pin that performs switching. These are some major aspects that we will later discuss in laser communication.

1.2 Methodologies

We converted Voice to PWM with the assistance of modulation. It was difficult at first, but we used advanced modulation to counter the issue. The signal that we transmit is in light form so we have to convert that signal into voice by using PWM. So the signal is demodulated and in voice form. Test transmitter to receiver, secure and fast connectivity.

To accomplish this task, we are using laser, Arduino, MOSFETs etc. Our main goal is to configure voice transmission using a laser.