

Laser Bounce Listening System (LBLS)

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A Laser Bounce Listening System (LBLS) is a surveillance device that is used for listening private discussions from a far-off distance. It uses a laser beam to detect sound vibrations from a nearby reflecting surface and returns to a receiver that converts the beam to an audio signal. LBLS is designed to allow eavesdropping with a minimal chance of exposure. LBLS can be an effective gadget against terrorism and can be used by intelligence agencies as a spying tool for the places where it is difficult to reach.

Keywords – laser, eavesdropping, sound vibrations, spying tool

1. Introduction

Laser bounce listening system eavesdrops on a private or confidential conversation from a far-off distance. This seems unethical to snoop into someone’s discussion but for the sake of spying on doubtful people ethics can be put aside; even our forces don’t knock the doors of criminals and then enter, they just break-in.

Terrorism is a major problem of many countries. Image of a country gets filthy because of these extremists, our country is also facing this problem, sleeper cells are operating which are not easily traced neither their devastating planning nor actions are stopped on time. Something is needed that captures them red handed doing planning without them knowing, something that cannot let them flee or hide when raided. A technique or a technology is required that catches their voice while making evil strategies and which can be used as a proof in courts to get them sentenced and major harm can avoided.

Listening operations can generally be done by three methods i.e. by pickup devices like a microphone, video camera or other pickup devices that can be installed before the room to be targeted [7][8]. Second method is the transmission link that may be done by a radio frequency transmission or by wire

[6]. Available wires might include the active telephone line, unused telephone or electrical wire, or ungrounded electrical conduits. Third method is having a listening post where there is a secure area where the signals can be monitored, recorded, or retransmitted to another area for processing. The listening post may be as close as the next room or as far as several blocks [1].

Eavesdropping can also be done using laser light as a medium, laser being similar like an ordinary light bounces back after striking the shiny surface. The bounced angle is according to the nature of the surface and the angle at which laser was thrown. It will try to make that angle back but as there can be rough surfaces or some surfaces can disperse light too, so the bouncing angle is quite unpredictable. The advantage of using laser as medium is that it can travel a longer distance without the loss of signal or low frequency attenuation [2]. Another advantage of using laser is that it is easy to target rather than placing a microphone to the targeted room and is virtually undetectable [3].

One of main thing required for this system to work is having a reflecting surface near the conversation to be caught. The reflecting surface has two roles; it reflects the laser as well as acts as a diaphragm and modulates the laser [4]. Later the modulated laser after reflection reaches the receiving unit where the audio is processed to make it clear and understandable.

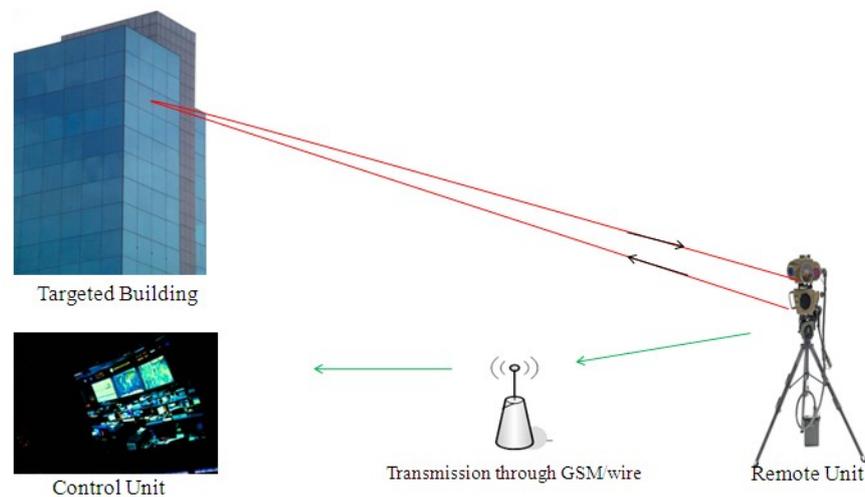


Figure 1: Pictorial Representation

The working of the system can be explained using the block diagram of our project is shown:



Figure 2: System Block Diagram

Our system consists of five parts:

Input: It contains a photodiode which receives the laser and converts light energy into electric energy.

Controller: This part contains a microcontroller IC whose function is to control the current, display of LCD and make all the parts to function together.

Filter: The low pass filter, filters out the noises to receive a good response by removing the distortions and further the audio amplifier LM386 to increase power and signal.

Switching: Relays perform its general function of switching when current flows through the coil, it turns it into an electromagnet and completing the circuit in which they are attached.

Output: This part consists of a speaker which outputs the sound reached after processing.

2. Things required for LBLS

The two obvious things required for an LBLS is a laser and a reflecting surface from where the laser can bounce. Another question arises that which laser to choose? There are many lasers available in market with different colors and frequencies. The laser we used which gave us the best results was a green colored one with a wavelength of 532nm.



Figure 3: Picture of our laser

Secondly a good reflecting surface for testing our system, we used an ordinary CD. The rests were audio amplifiers, a LCD for showing the ON and OFF status of system, relays, photodiode that will receive the laser and a microcontroller IC.

3. Is it legal to use?

Eavesdropping devices are illegal in majority of the countries so before you buy one, you should know the problems you can face because eavesdropping on someone's privacy is a crime. We propose our device to be used by the intelligence agencies only, rather than easily accessible by a common person just like not all weapons are given license to civilians [2].

So should it be legal to use by the intelligence agencies also? Do they have the right to break someone's privacy? The answer is yes, for the sake of security and easy spying on doubtful people it can be a very useful gadget for them.

4. System Installation:

Our system consists of two parts:

- Hardware
- Software

4.1 Hardware:

Hardware consists of a 532nm laser of green color as a source of receiving sound by hitting with a reflecting surface such as looking-mirror so that it is received to the control unit where sound processing is done. The laser after reflection meets the photodiode where it converts light into electrical energy which further goes to the controller and filters.

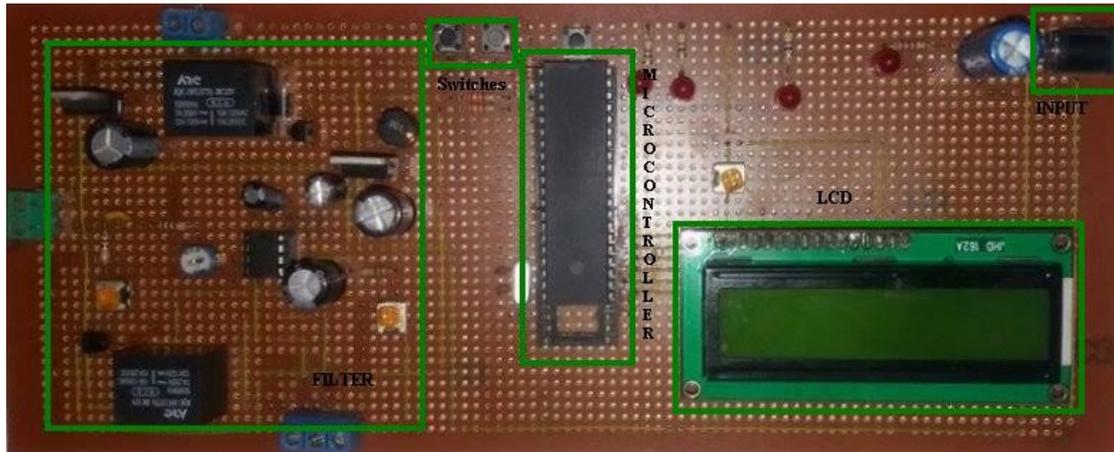


Figure 4: Receiver Picture

When sound reaches the other end, it passes through the audio jack connected to the laptop where audio recording software plays it along with the display of waveform.



Figure 5: Audio jack connected to laptop [5]

4.2 Software:

The software we used is Audacity. It is recording software, free and easy to use with audio editor and recorder. Any other recording software can also be used.

5. Working:

The project is supplied with a voltage of 12V. The two switches turn on and off the power supply of laser and the system. The LCD displays the name of project at first and then the status of laser and power. Microcontroller IC regulates the current, controls the output of LCD and make the components work together. When the laser light strikes the photodiode after reflection, it converts light into current, further the amplifier IC increases the power and signal, low pass filters stops the high frequency distortion and gives away clean sound. Relays perform its function and cause switching. Voltage regulator IC regulates the voltage and finally the filtered and processed sound achieved is received to us from the speakers and the waveform and voice recording can be done using audio software.

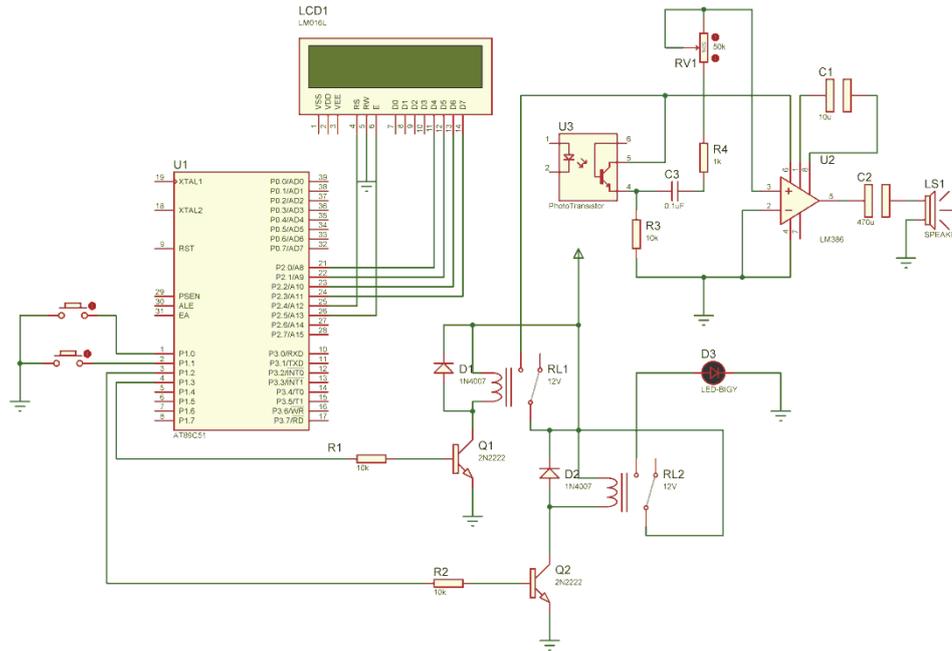


Figure 6: Circuit Diagram (Made in Proteus software)

6. Advantages:

Our system has many advantages regarding security like it will help in reducing criminal activities which in result will reduce terrorism. It will allow easy spying on doubtful people. Counter attack can be done very well, when we can know the enemy's strategies already. It can reach out of range places very easily like mountainous areas or where there is signal or climbing issues. Eavesdropper's chances of getting caught are very low as it is operated from a far off place. It cannot be jammed or hacked, since it uses its own medium (laser).

7. Conclusions:

This paper explains about the system that allows eavesdropping. While developing this system many things were achieved and a few which can be done like wireless voice transmission to the control unit which can be made to a more far off distance, voice recognition software that can be used to detect specific voices of specific targeted person, white colored laser can be used as compared to colored for less chances of getting caught, automatic laser angle adjustment can be done instead of manual adjustment to save time, system can be made more sensitive to retrieve sound from more thick reflecting surfaces.

8. References:

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