

# Wireless Audio Communication Through Laser Beam

## SEMESTER II PROJECT

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# :Content

Introduction

Advantages and disadvantages of Laser

Working of Transmitter and Receiver Components

Working of Combined Circuit

Frequency Response of Audio Signal

Variation in Gain by Changing the Medium and its Density

Variation in Gain by Varying the Distance Between Transmitter and Receiver

Noise Removal

RESULTS AND DISCUSSIONS




# Introduction

Lasers have been used for communication purpose for many years to transmit information via CD, DVD etc. In 1964 laser was used by NASA for airplane communication and after that in 2013, data on earth was received by a craft orbiting the moon through pulsed laser. M.Toyoshima et al. have presented their work on laser communication link between LEO satellite and ground station. In November 2014 the first ever gigabit transmission was realized through laser communication system by European Space Agency (ESA). Since then many advancements have been made in this field. In this mode of communication, the information is transferred through free space without any obstruction

# Advantages and disadvantages of Laser

## Advantages

- .It has high information carrying capacity and high speed •
- High bandwidth, (wavelength separation of 1 nm, can give •  
.bandwidths of hundreds of Gigahertz)
- .It does not need high energy •
- .It does not need a require a wire to transfer data •
- It is free from electro-magnetic interference. This phenomenon •  
is used in optical wireless communication through free space for  
.telecommunication as well as computer networking

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- It is less damaging compare to X-rays and hence widely used in medical field for treatment of cancers.
  - Single laser beam can be focused in areas smaller than 1 micro diameter. One square micro area is needed to store 1 bit of data. This helps in storing 100 million data in one square cm. Due to this fact, laser is being used in laser CDs and DVDs for data storage in the form of audio, video, documents etc.



# Disadvantages

The essential disadvantage of free space laser communications systems is that they require •  
.direct line-of-sight

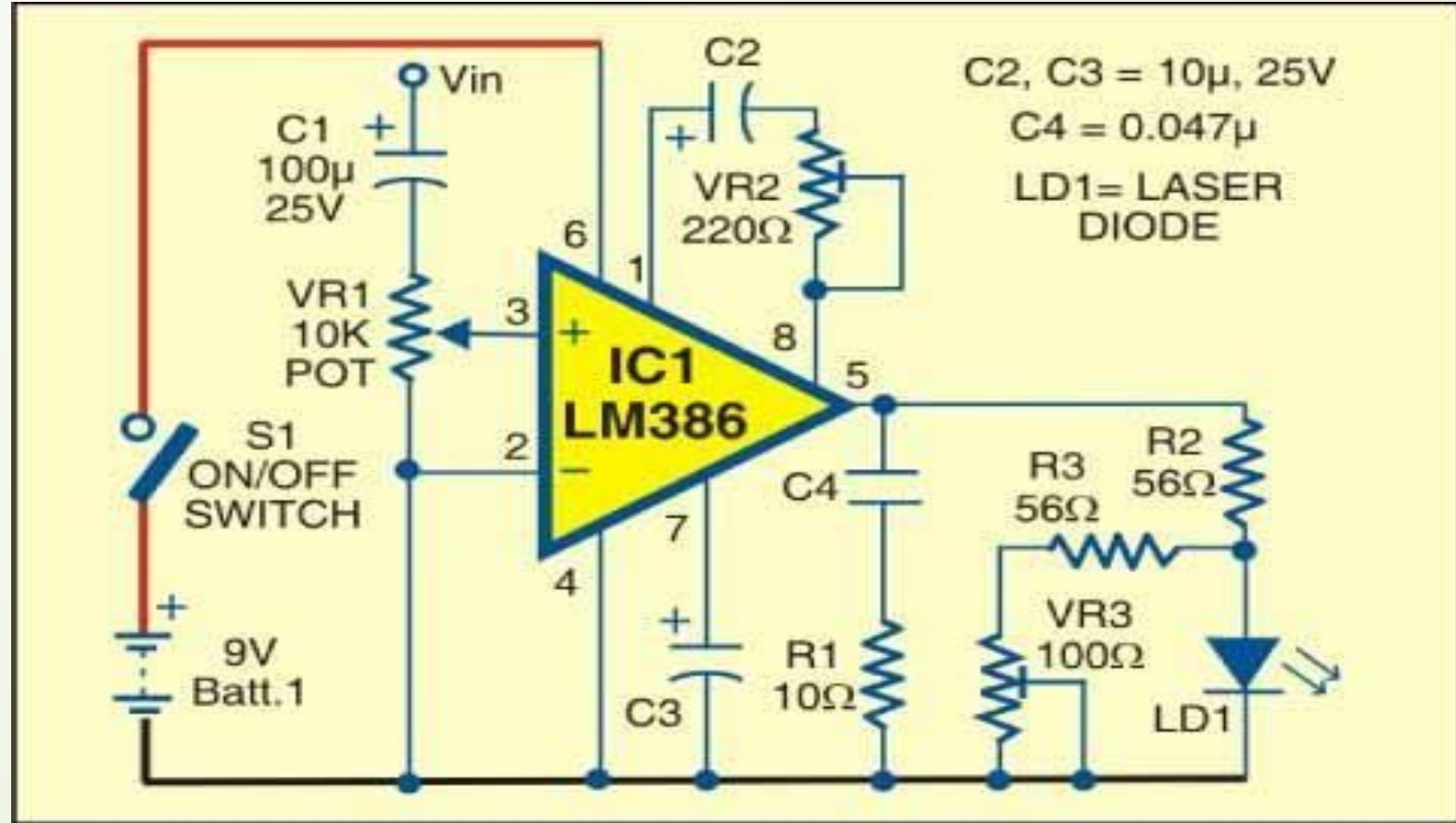
Operational distance is also a variable if there are Intervening materials such as rain, smoke, •  
.fog, glass etc. which reduce the light intensity by a combination of absorption and refraction



# Working of System

*Working of Transmitter Components (1*

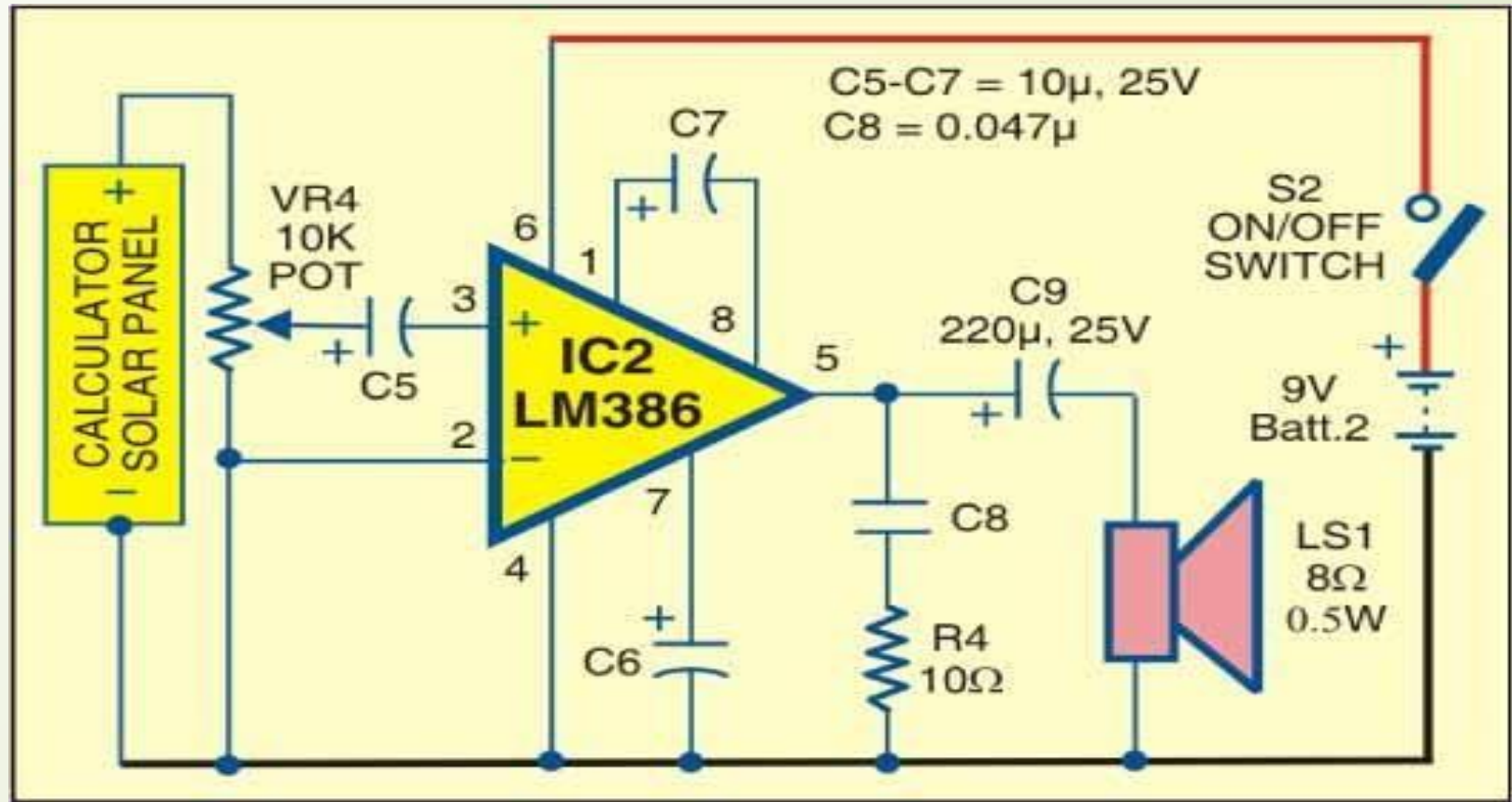






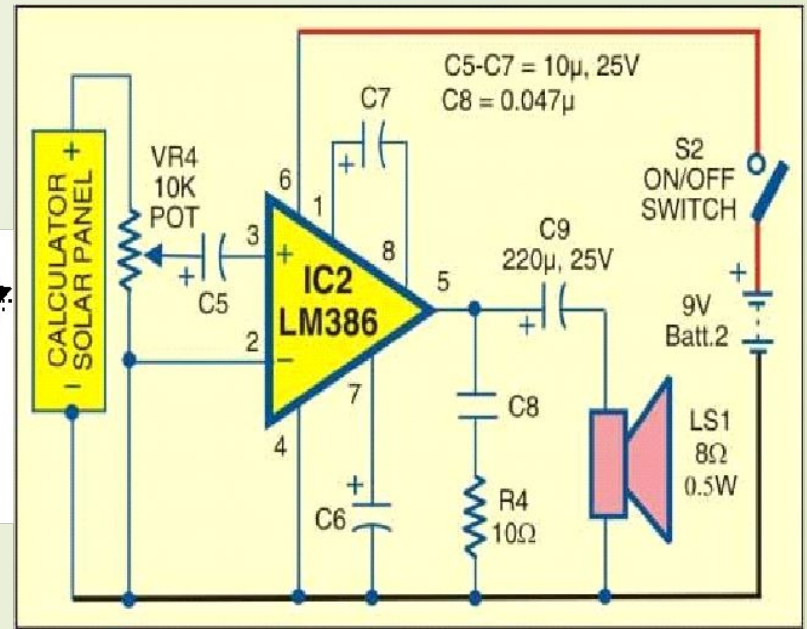
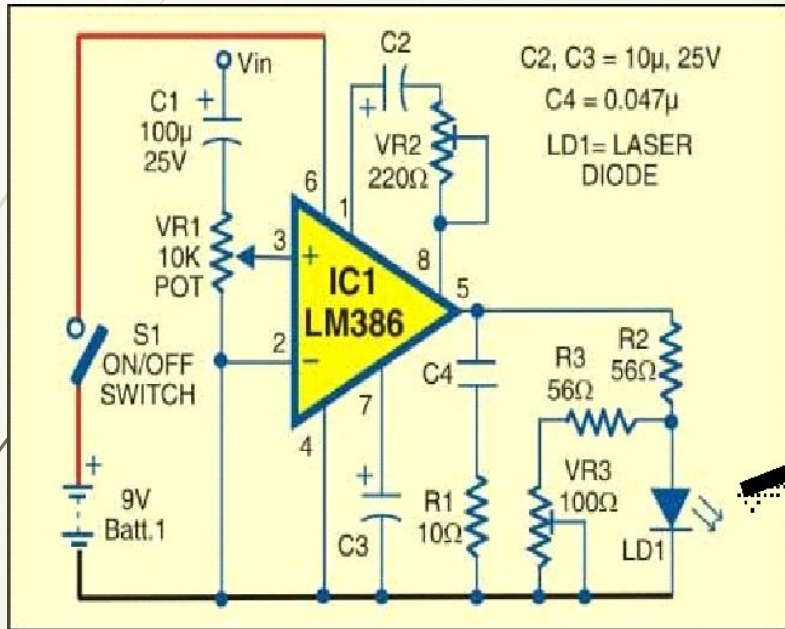


# ***Working of Receiver Components (2***



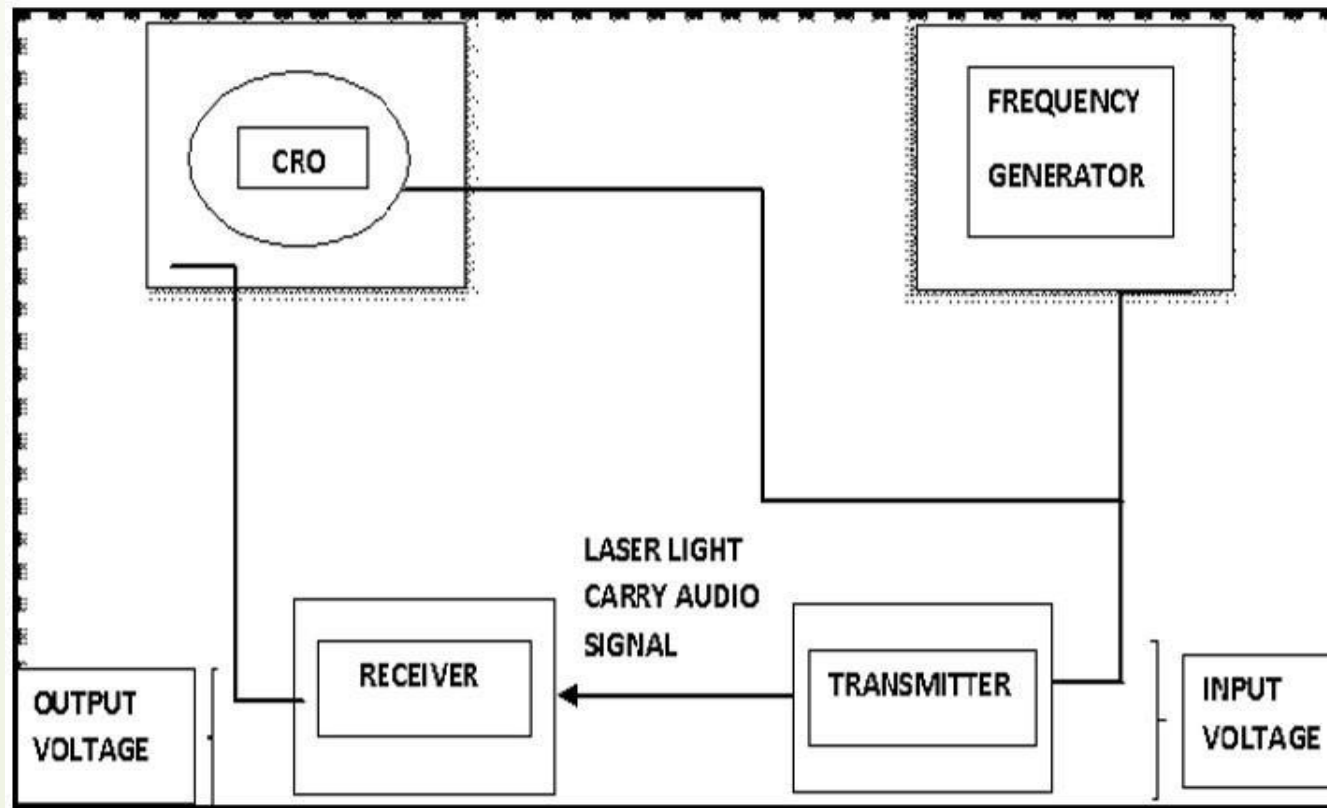


# ***Working of Combined Circuit (3***





# **Frequency Response of Audio Signal (4**



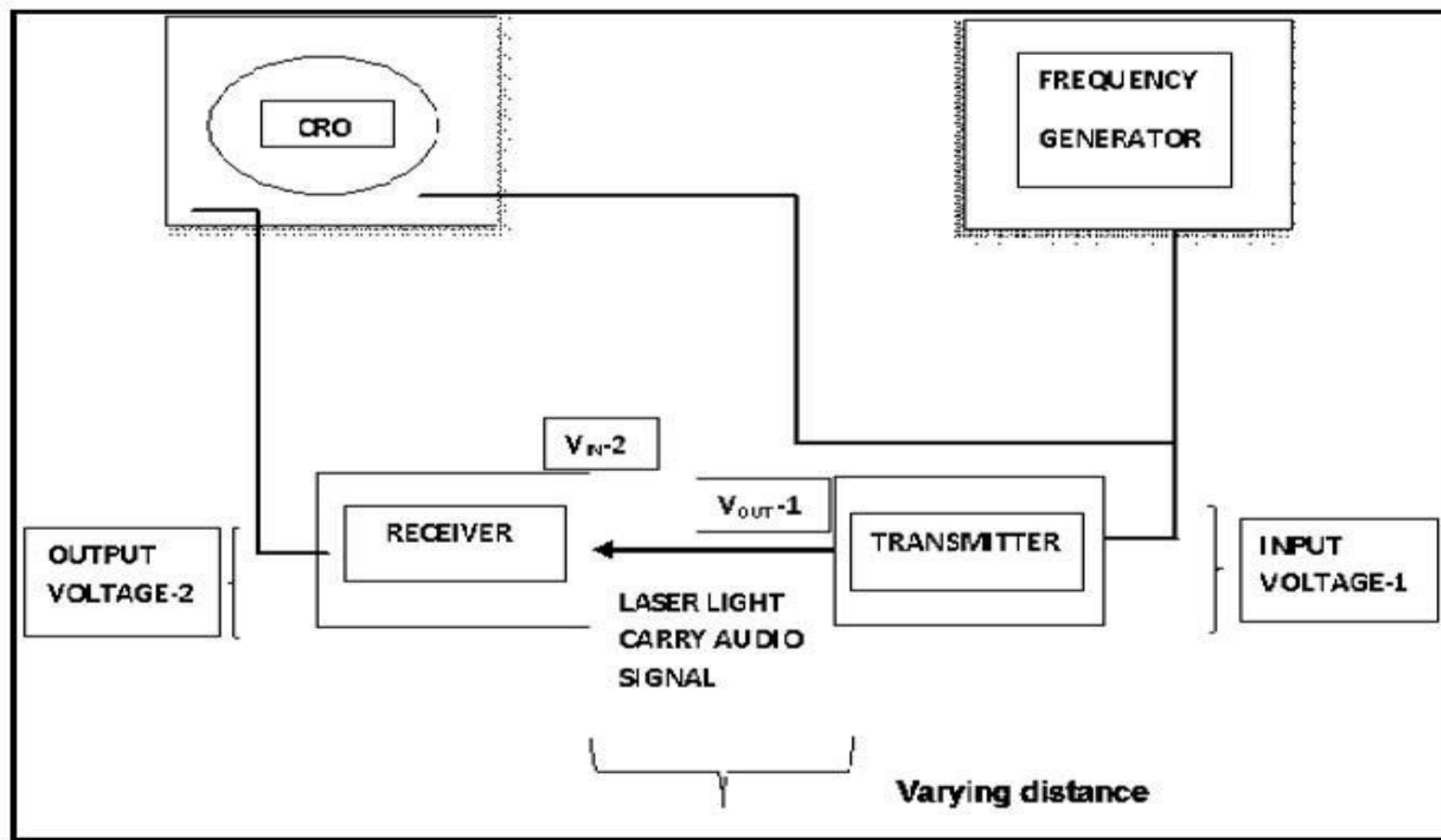


# **Variation in Gain by Changing the Medium (5 and its Density**



# **Variation in Gain by Varying the Distance (6 Between Transmitter and Receiver**







## 7) *Noise Removal*

A major headache will be the noise coming from the speaker. Some common sources of noise in the circuit are:

Channel Noise

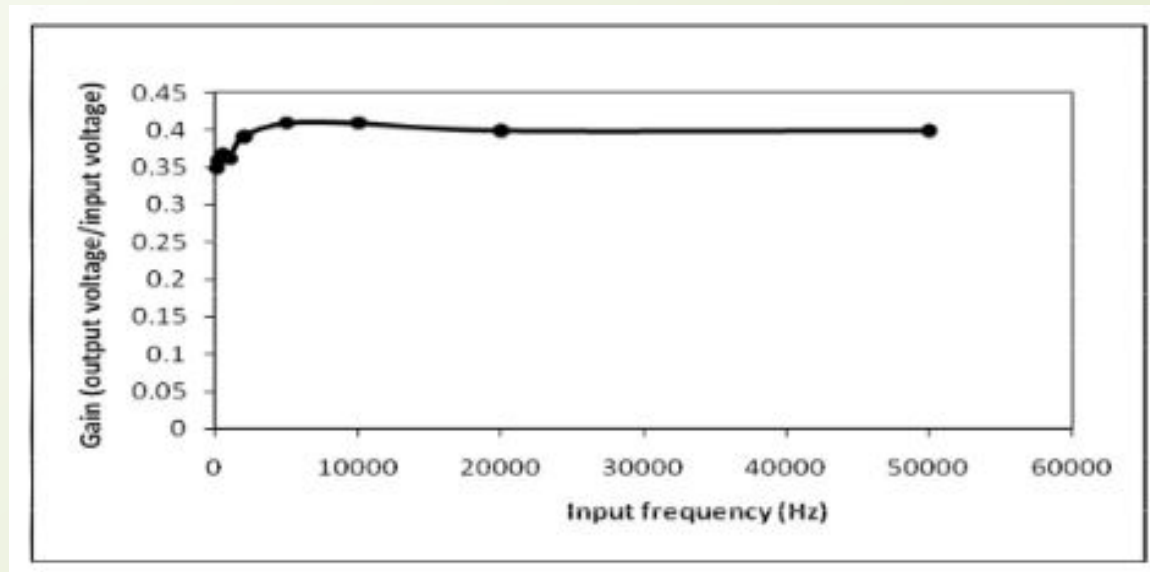
Cheap speakers

Unwanted signals received by the solar panel due to the surrounding lights

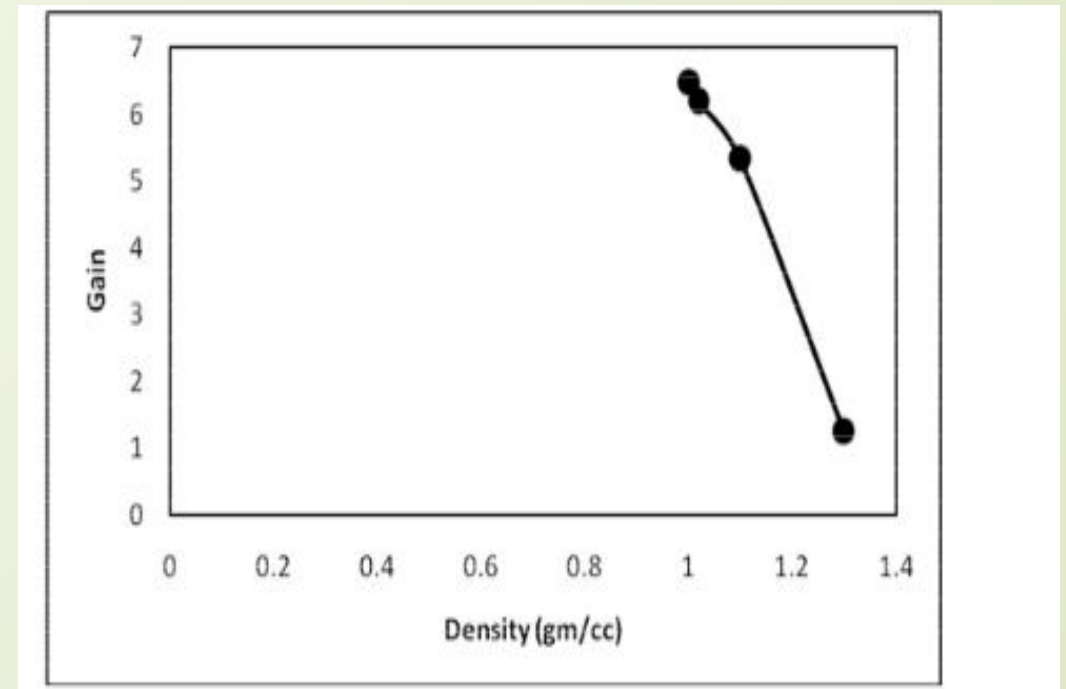
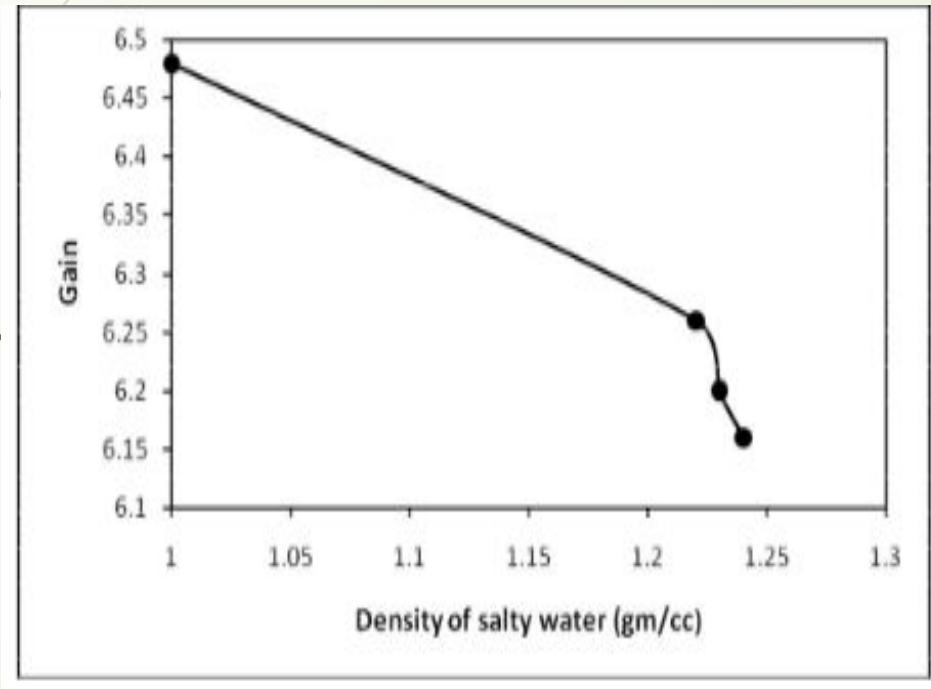
Noise due to circuit

# *RESULTS AND DISCUSSIONS*

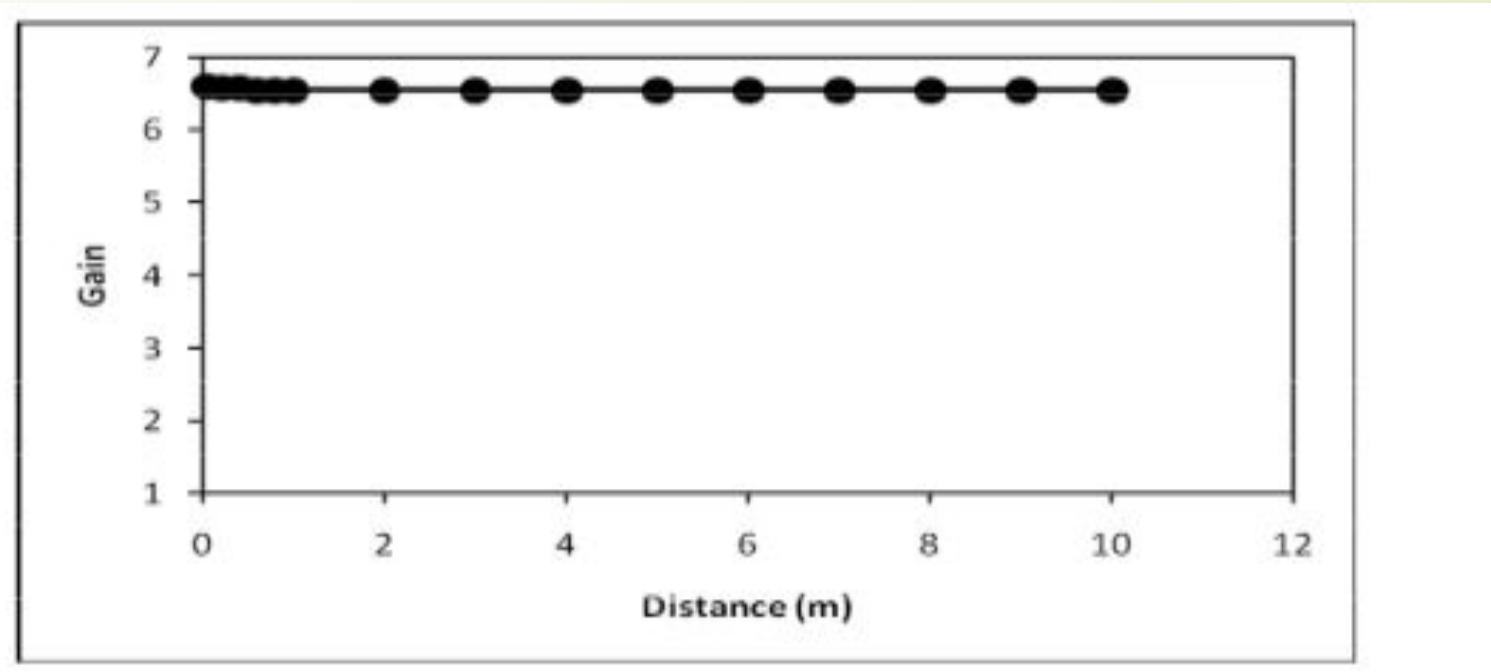
## Frequency Response of Audio Signal (1)



# Effect on Gain by Varying the Density of the (2 Medium



# Effect on Gain by Changing Distance Between (3 Transmitter and Receiver





# Best Wishes