AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Choose an item.

Lab report cover page

Assignment Title:	Designing A Message Transmitting and Receiving System for Digital Communication System		
Assignment No:	OEL	Date of Submission:	12.12.2022
Course Title:	PRINCIPLES OF COMMUNICATIONS		
Course Code:		Section:	C
Semester:	Spring 2021-22	Course Teacher:	Abrar Liaf

Declaration and Statement of Authorship:

1. I/we hold a copy of this Assignment/Case-Study, which can be produced if the original is lost/damaged.
2. This Assignment/Case-Study is my/our original work and no part of it has been copied from any other student's work or from any other source except where due acknowledgement is made.
3. No part of this Assignment/Case-Study has been written for me/us by any other person except where such collaborationhas been authorized by the concerned teacher and is clearly acknowledged in the assignment.
4. I/we have not previously submitted or currently submitting this work for any other course/unit.
5. This work may be reproduced, communicated, compared and archived for the purpose of detecting plagiarism.
6. I/we give permission for a copy of my/our marked work to be retained by the Faculty for review and comparison, including review by external examiners.
7. I/we understand thatPlagiarism is the presentation of the work, idea or creation of another person as though it is your own. It is a formofcheatingandisaveryseriousacademicoffencethatmayleadtoexpulsionfromtheUniversity. Plagiarized material can be drawn from, and presented in, written, graphic and visual form, including electronic data, and oral presentations. Plagiarism occurs when the origin of them arterial used is not appropriately cited.
8. I/we also understand that enabling plagiarism is the act of assisting or allowing another person to plagiarize or to copy my/our work.

** Student(s) must complete all details except the faculty use part.*
** Please submit all assignments to your course teacher or the office of the concerned teacher.

Group Name/No.: 3

No	Name	ID	Program	Signature
1	AHMED, ABDULLAH AL MOUDUD	20-42792-1	BSc [EEE]	
2			Choose an item.	
3			Choose an item.	
4			Choose an item.	
5			Choose an item.	
6			Choose an item.	
7			Choose an item.	
8			Choose an item.	
9			Choose an item.	
10			Choose an item.	

Faculty use only

FACULTYCOMMENTS		
	Marks Obtained	
	Total Marks	

Title: Designing A Message Transmitting and Receiving System for Digital Communication System

Abstract:

In this experiment we will understand the concept of message encoding and decoding. We will use the concept of serial transmission and reception of messages. We will also try to understand how the data transmission and reception process is done.

Introduction:

Data transmission and data reception or, more broadly, data communication or digital communications is the transfer and reception of data in the form of a digital bitstream or a digitized analog signal over a point-to-point or point-to-multipoint communication channel. Examples of such channels are copper wires, optical fibers, wireless communication using radio spectrum, storage media, and computer buses. The data are represented as an electromagnetic signal, such as an electrical voltage, radio wave, microwave, or infrared signal. [1]

In most textbooks, the term analog transmission only refers to the transmission of an analog message signal (without digitization) by means of an analog signal, either as a non-modulated baseband signal or as a passband signal using an analog modulation method such as AM or FM. It may also include analog-over-analog pulse modulated baseband signals such as pulse-width modulation. In a few books within the computer networking tradition, analog transmission also refers to passband transmission of bit-streams using digital modulation methods such as FSK, PSK and ASK.

If we Consider the problem of transmitting and receiving a text message, such as “Asif er biye” over a waveform channel such as a twisted pair cable or a wireless RF (radio frequency) link. The design of a system that can accomplish this task requires the following ingredients:

In transmitter side:

1. Step 1: Encoding of the letters of the alphabet, the numbers, punctuation, etc. For example, “A” could be encoded as 0, “B” as 1, “C” as 2, etc.
2. Step 2: Conversion of the encoded message into a serial data stream, e.g., of 0’s and 1’s in the case of a binary transmission system.
3. Step 3: Modulation by the serial data stream of a CT waveform that can be transmitted through the waveform channel.

In receiver side:

4. Step 4: Demodulation of the received waveform at the output of the waveform channel to obtain the received serial data stream.
5. Step 5: Conversion of the received serial data stream to a sequence of character codes.
6. Step 6: Decoding of the received character codes to the received message

Matlab Code and result:

Transmitted signal:

Code

```
function dn = asc2bn(txt)
dec=double(txt)
p2=2.^(0:-1:-7)
B=mod(floor(p2'*dec),2)
dn=reshape(B,1,numel(B));%Bytes
to serial conbversion
end
clc;
clear all;
close all;
Transmitted_Message= 'Asif er
biye'
%Converting Information Message
to bit%
x=asc2bn(Transmitted_Message);
% Binary Information
bp=.000001;
% bit period
disp(' Binary information at
Trans mitter :');
disp(x);
```

Result

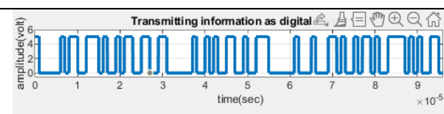
```
Transmitted_Message =

    'Asif er biye'


dec =

    65   115   105   102    32   101   114    32    98   105   121   101


p2 =

    1.0000    0.5000    0.2500    0.1250    0.0625    0.0313    0.0156    0.0078


B =

     1     1     1     0     0     1     0     0     0     1     1     1
     0     1     0     1     0     0     1     0     1     0     0     0
     0     0     0     1     0     1     0     0     0     0     0     1
     0     0     1     0     0     0     0     0     0     1     1     0
     0     1     0     0     0     0     1     0     0     0     1     0
     0     1     1     1     1     1     1     1     1     1     1     1
     1     1     1     1     0     1     1     0     1     1     1     1
     0     0     0     0     0     0     0     0     0     0     0     0
```

Figure 1: Converting message to binary format

Code

```
bit=[];
for n=1:1:length(x)
 if x(n)==1;
 se=5*ones(1,100);
 else x(n)==0;
 se=zeros(1,100);
 end
 bit=[bit se];
end
t1=bp/100:bp/100:100*length(x)*(bp/100)
;
subplot(4,1,1);
plot(t1,bit,'lineWidth',2.5);grid on;
axis([ 0 bp*length(x) -.5 6]);
ylabel('amplitude(volt)');
xlabel(' time(sec)');
```

Result



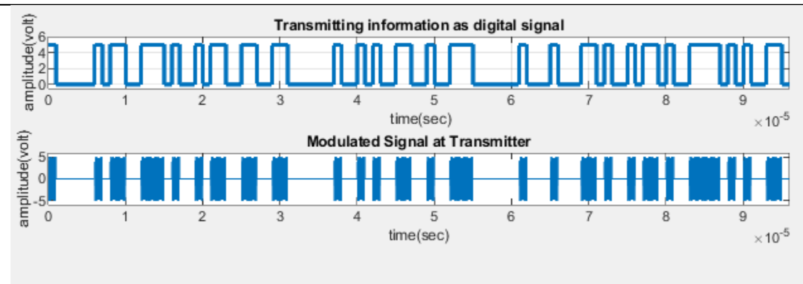
title('Transmitting information as digital signal');	

Figure 2: Representation of transmitting binary information as digital signal

<table>
<tr><th>Code</th><th>Result</th></tr>
<tr><td>

```
A1=5; % Amplitude of carrier
signal for information 1
A2=0; % Amplitude of carrier
signal for information 0
br=1/bp;
% bit rate
f=br*10; % carrier frequency
t2=bp/99:bp/99:bp;
ss=length(t2);
m=[];
for (i=1:1:length(x))
 if (x(i)==1)
 y=A1*cos(2*pi*f*t2);
 else
 y=A2*cos(2*pi*f*t2);
 end
 m=[m y];
end
t3=bp/99:bp/99:bp*length(x);
subplot(4,1,2);
plot(t3,m);
axis([ 0 bp*length(x) -6
6]);
xlabel('time(sec)');
ylabel('amplitude(volt)');
title('Modulated Signal at
Transmitter');
```

</td><td>



</td></tr>
</table>

Figure 3: Binary-ASK modulation

<u>Receiving signal:</u>

Code	Result

```
disp('**********')
disp(' Message transmitted
through a Transmission
medium');
disp('**********')
%Channel Noise%
t4=bp/99:bp/99:bp*length(x)
;
Rec=awgn(m,10);
subplot(4,1,3);
plot(t4,Rec);
axis([ 0 bp*length(x) -6
6]);
xlabel('time(sec)');
ylabel('amplitude(volt)');
title('Received signal at
Receiver');
```

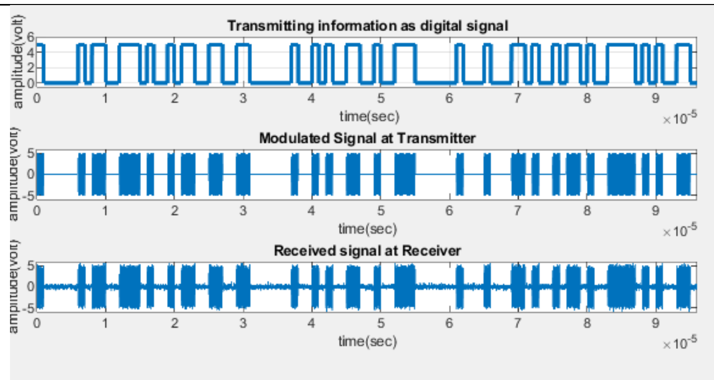


Figure 4: Received signal with added noise from medium

Code

```
mn=[];
for n=ss:ss:length(Rec)
 t=bp/99:bp/99:bp;
 y=cos(2*pi*f*t); % carrier
siignal
 mm=y.*Rec((n-(ss-1)):n);
 t5=bp/99:bp/99:bp;
 z=trapz(t5,mm) ;
% intregation
 zz=round((2*z/bp));
 if(zz>2.5) % logic level =
(A1+A2)/2=7.5
 a=1;
 else
 a=0;
 end
 mn=[mn a];
end
disp(' Binary information at
Reciver :');
disp(mn);
```

Result

Binary information at Reciver :
Columns 1 through 11

1 0 0 0 0 0 1 0 1 1 0

Columns 12 through 22

0 1 1 1 0 1 0 0 1 0 1

Columns 23 through 33

1 0 0 1 1 0 0 1 1 0 0

Columns 34 through 44

0 0 0 0 1 0 0 1 0 1 0

Columns 45 through 55

0 1 1 0 0 1 0 0 1 1 1

Columns 56 through 66

0 0 0 0 0 0 1 0 0 0 1

Columns 67 through 77

0 0 0 1 1 0 1 0 0 1 0

Columns 78 through 88

1 1 0 1 0 0 1 1 1 1 0

Columns 89 through 96

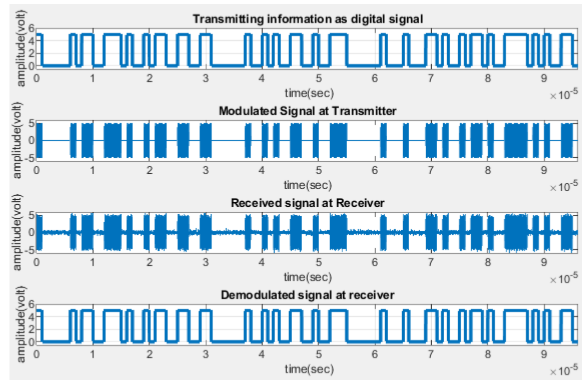
1 0 1 0 0 1 1 0

Figure 5: Binary ASK demodulation

<table>
<tr><th>Code</th><th>Result</th></tr>
<tr><td>

```
bit=[];
for n=1:length(mn);
 if mn(n)==1;
 se=5*ones(1,100);
 else mn(n)==0;
 se=zeros(1,100);
 end
 bit=[bit se];
end
t5=bp/100:bp/100:100*length(mn)*(bp/100);
subplot(4,1,4)
plot(t5,bit,'LineWidth',2.5);grid on;
axis([ 0 bp*length(mn) -.5 6]);
ylabel('amplitude(volt)');
xlabel(' time(sec)');
title('Demodulated signal at receiver');
```

</td><td>



</td></tr>
</table>

Figure 6: Representation of binary information as a digital signal which achieved

Conclusion:

In figure 1 we have converted our text message to binary code using asc2bn function in MATLAB. In the figure 2 we have converted that binary information to digital signal. In the figure 3 we have used that digital signal and convert it to ASK modulation. We have selected amplitude 5 for binary bit 1 and amplitude 0 for binary bit 0. In figure 4 we have Represented our signal as it goes through a medium. We have added some noise to our signal as it occurs naturally when it goes through any medium. In figure 5 we have demodulated our signal as ask demodulation and we have got our binary bit back. In figure 6 we have use that binary information and showed it in signal. Lastly we can see that the received message was similar to the transmitted signal from the graph.

Discussion:

In this report we have transmitted a message called “Asif er biye” through a transmitter and after all modulation and demodulation we have got our main signal back at the receiving end. We have matched our transmitted end result and receiving end result and found that both graph matched.

So we can tell that our experiment was successful.

Reference:

[1]
https://en.wikipedia.org/wiki/Data_communication#:~:text=Data%20transmission%20and%20data%20reception%20or%2C%20more%20broadly%2C,signal%20over%20a%20point-to-point%20or%20point-to-multipoint%20communication%20channel.

[2] AIUB Student Manual