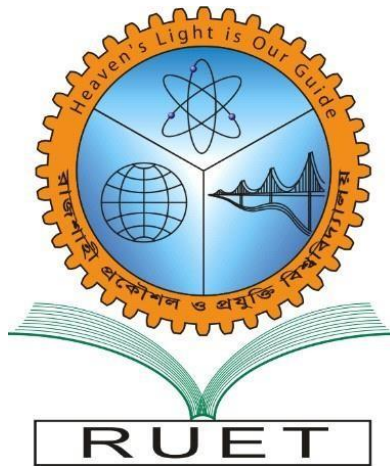# Rajshahi University of Engineering& Technology

Department of Electrical & Computer Engineering

Course No: ECE 4124

Course Name: Digital Signal Processing Sessional

Submitted by:
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Experiment No: 04

Experiment Name:

Study of the Calculation of Signal Delay

Theory:

Cross-correlation can be used to calculate signal delay. Signals from the transmitter and receiver ends can be sent into the built-in Matlab function xcorr(), which will return a range of correlation values. The moment when the correlation value is at its highest suggests a delay..

Code:
```
clc
t=0:0.1:15;
length(t);

s1 = (t>=0 & t<=1);
y = s1*1;
length(s1);

s2 = (t>1 & t<=2);
y=y+s2*2;

s3 = (t>2 & t<=3);
y=y+s3*1;

subplot(4,1,1);
plot(t,y);
title('Transmitted Signal');

s1 = (t>=8 & t<=9);
yy = s1*1;

s2 = (t>9 & t<=10);
yy=yy+s2*2;

s3 = (t>10 & t<=11);
yy=yy+s3*1;

subplot(4,1,2);
plot(t,yy);
title('Received Signal');

subplot(4,1,3);
result = xcorr(y,yy);
plot(result);
```

```matlab
val = 1;
disp('printing values of length index');
for i=1:length(result)
    if result(i)>result(val)
        val= i;
    end
end

index = val/10-1.1;
disp(index);
```
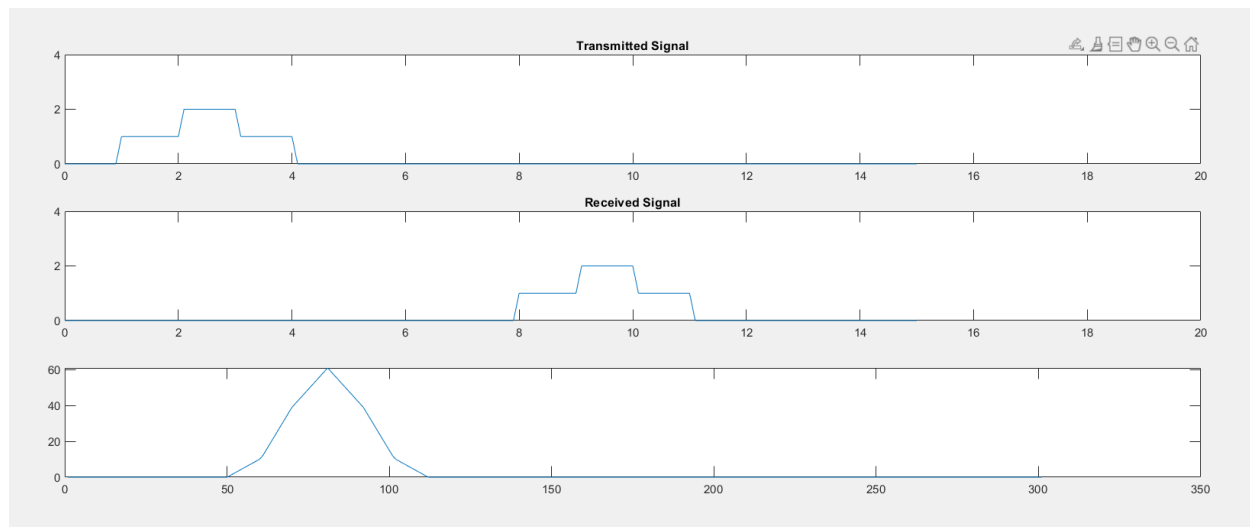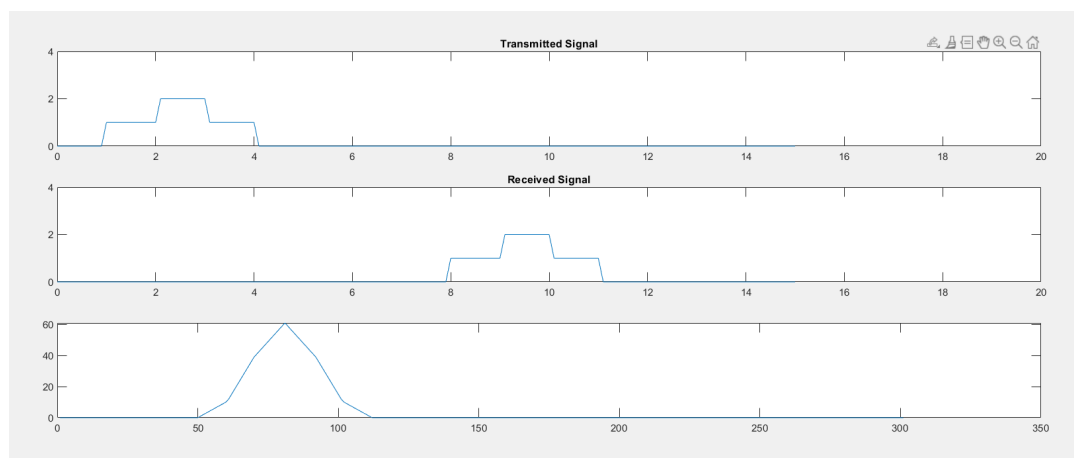
Output:

Fig. 1 Signal delay plot

Fig. 2 Console output

Discussion

The figures show that the transmission had a 7-second delay, and the console output likewise met this requirement.

Conclusion

I have gained knowledge about how to determine the delay between a signal and its delayed form through this project.