*Heaven's Light is Our Guide*

# Rajshahi University of Engineering& Technology


*Department of Electrical & Computer Engineering*

**Course No:** ECE 4124
**Course Name:** Digital Signal Processing Sessional

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**Experiment Name** : Finding auto correlation and cross correlation of signal using matlab

**Theory** : The concept of correlation in general quantifies the similarity of two spatial- or time-dependent signals x and y . The main property of correlation is that both signals do not have to depend on each other; only statements regarding their similarity can be given.

In signal processing, cross-correlation is a measure of similarity of two series as a function of the displacement of one relative to the other. This is also known as a sliding dot product or sliding inner-product. It is commonly used for searching a long signal for a shorter, known feature.

Autocorrelation, sometimes known as serial correlation in the discrete time case, is the correlation of a signal with a delayed copy of itself as a function of delay. Informally, it is the similarity between observations of a random variable as a function of the time lag between them.

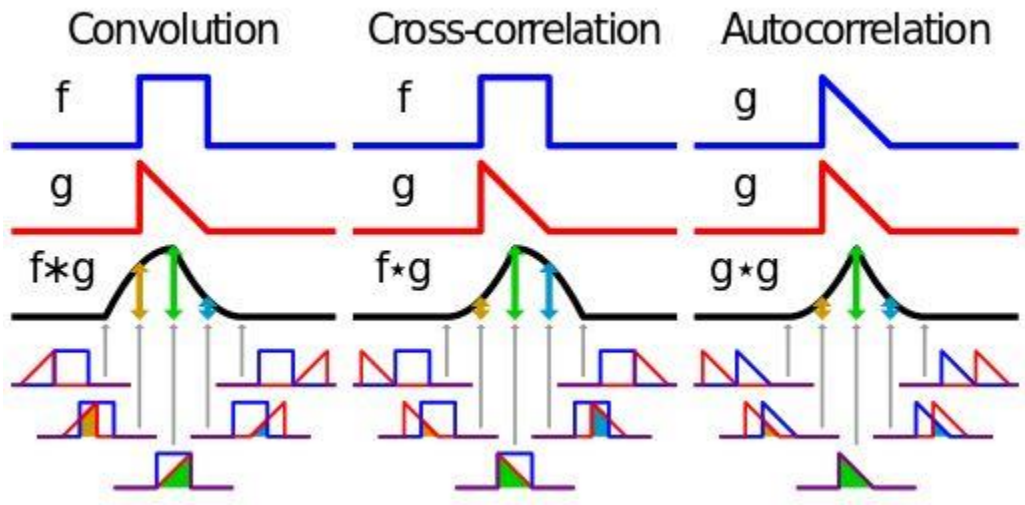


**Figure** : Graphical representation of convolution, cross correlation and autocorrelation

**Code** : (cross)

```
Close all
Clc

x=input('Enter the first array');
h=input('Enter the second array');
h= fliplr(x);

z=[];
for i=1:length(x)
g=h.*x(i);
z=[z;g];
end

[r c]=size(z);
k=r+c;
t=2;
y=[];
cd=0;
while(t<=k)
for i=1:r
for j=1:c
if((i+j)==t)
cd=cd+z(i,j);
end
end
end
t=t+1;
y=[y cd];
cd=0;
end
disp(y);
```

**Code** : (auto)

```
Close all
Clc

x=input('Enter the first array');
h=fliplr (x);

z=[];
for i=1:length(x)
g=h.*x(i);
z=[z;g];
end

[r c]=size(z);
k=r+c;
t=2;
y=[];
cd=0;
while(t<=k)
for i=1:r
for j=1:c
if((i+j)==t)
cd=cd+z(i,j);
end
end
end
t=t+1;
y=[y cd];
cd=0;
end
disp(y);
```

**Conclusion** : The code ran properly in matlab and showed the expected output of cross correlation and autocorrelation using two and one signals respectively.