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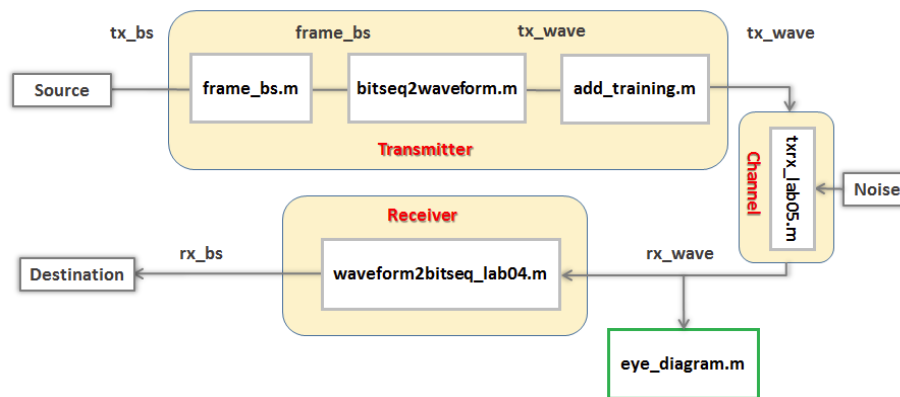
[Resources \(/courses/HKUSTx/ELEC1200.1x/3T2014/a6a8267fef364cccbccd0128d091f11c/\)](/courses/HKUSTx/ELEC1200.1x/3T2014/a6a8267fef364cccbccd0128d091f11c/)

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LAB 5 TASK 1 - GENERATE EYE DIAGRAM (1/1 point)

In this task, you will write code implementing the MATLAB function, **eye_diagram.m**, which is highlighted in green below. This function generates the eye diagram of the received waveform to visualize inter-symbol interference (ISI).



```
1 tx_bs=rand(1,1280)>0.5;      % generate a random bit sequence
2 SPB=20;                      % bit time in samples
3
4 % transmitter %
5 tx_wave = format_bitseq(tx_bs,SPB); % create waveform following protocol
6 % channel %
7 rx_wave=txrx_lab05(tx_wave);  % simulate channel
8 % receiver %
9 start_ind=find_start(rx_wave); % find start bit
10
11 figure(1);
12 % Place your code below that
13 % 1. Creates the eye diagram of rx_wave, plotting "2*SPB+1" samples in each trace.
14 % Hint: use for loop.
15 % 2. To superimpose all the traces on the same plot.
```

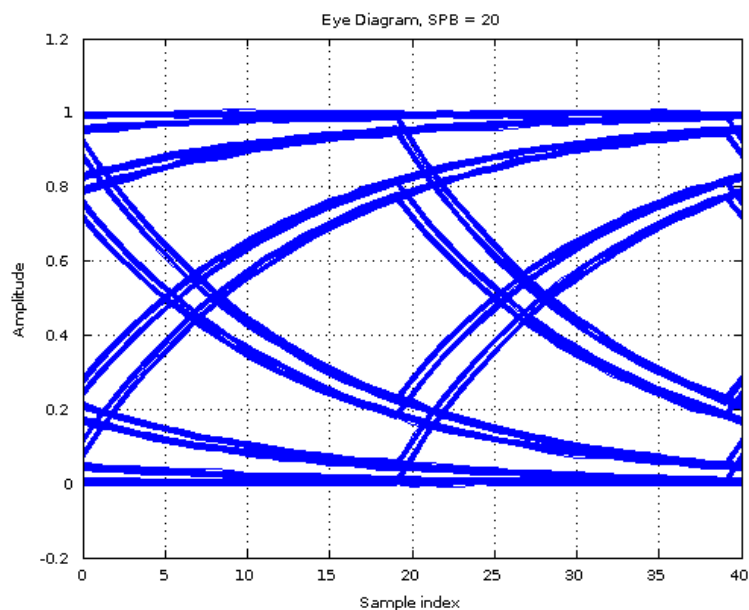
Correct

```

n = [0:2*SPB];
for ctr=0:639,
    offset = start_ind + ctr*2*SPB;
    plot(n,rx_wave(offset+n));
    hold on;
end
hold off;

```

Figure 1



Check

Reset

Save

Hide Answer

You have used 5 of 10 submissions

INSTRUCTIONS

Let's first look at how the code works. The first two code lines define a random 1280-bit sequence and the bit time of 20 samples per bit. The function **format_bitseq**, which you have written, encapsulates the bit sequence into a frame and adds the training sequence. The resulting waveform is transmitted over the channel simulated by function **txrx_lab05**. On the receiver side, the function **find_start** returns the index of the first sample of the start bit.

Step 1: Run the code as presented

After you click on the **Run Code** button to run the MATLAB code as presented, you will see an empty figure labelled with the title "Eye Diagram, SPB = 20". Your task is to write code that fills the figure with the eye diagram of the received waveform **rx_wave**.

Step 2: Plot the eye diagram of received waveform

To complete this task, you should add code under the comments starting with

```
% Place your code below that
```

This code should create the eye diagram of **rx_wave** that satisfies the following criteria.

1. The eye diagram contains 640 overlapping traces showing segments of $2 \times \text{SPB} + 1$ samples from rx_wave .
2. The first segment should start from the index `start_ind`.
3. Segments should be spaced by $2 \times \text{SPB}$.
4. Each trace should be plotted versus indices running from 0 to $2 \times \text{SPB}$.

*Hint: to superimpose all the traces on the same plot, you can use command **hold on**. For more details, see the video Multiple Plots (/courses/HKUSTx/ELEC1200.1x/3T2014/jump_to_id/323f8adb3bf94250b0de9e45b5fc73a3).*

Examine the eye diagram that is generated. Find the height and width of the eye from the diagram. Does the eye appear "open" to you?

Step 3: Submit your work

Once you have completed your work, click on the **Check** button to submit your answer.



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