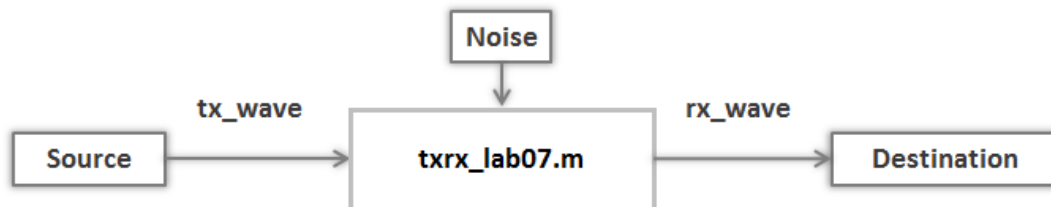


Help

LAB 7 TASK 4 - CHANGE THE TRANSMISSION DISTANCE

You will investigate the effect of the transmission distance on the distribution of the received signal.



```

1 % Copy your code from Task 3 below
2 SPB = 50;           % bit time in samples
3 distance = 14;      % transmission distance
4 tx_bs = [1:1280] > 640; % generate bit sequence of 640 0's and 640 1's
5 tx_wave = format_bitseq(tx_bs,SPB); % create waveform following protocol
6
7 % transmit and receive over noisy channel
8 [rx_wave,start_ind,rx_min,rx_max,sigma] = txrx_lab07(tx_wave,distance);
9 sample_ind = start_ind + 2*SPB-1 + SPB*[0:1279]; % choose subsampling points
10 signal_samples = rx_wave(sample_ind); % extract samples
11
12 xhist = 0.1:0.01:0.7; % centers of histogram bins
13 % Do not modify code above this line
14
15 subplot(2,1,1)
  
```

Correct

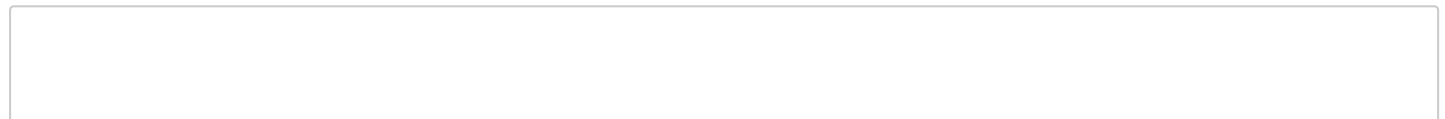
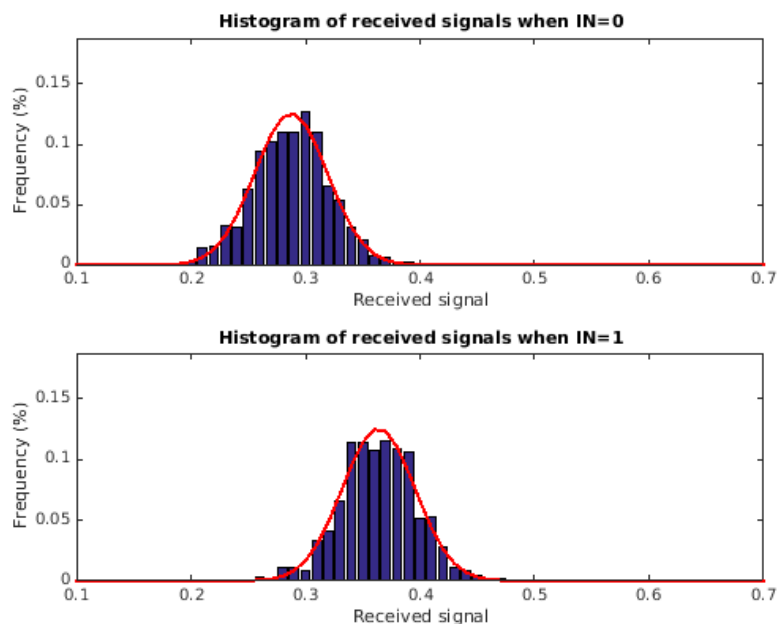


Figure 1



Check

Reset

Save

Hide Answer

You have used 1 of 10 submissions

INSTRUCTIONS

Step 1: Copy your code from Task 3

Copy your code in Task 3 where you generated the empirical and predicted histograms for the received signal when $IN=0$ and $IN=1$, respectively.

Step 2: Effect of the transmission distance

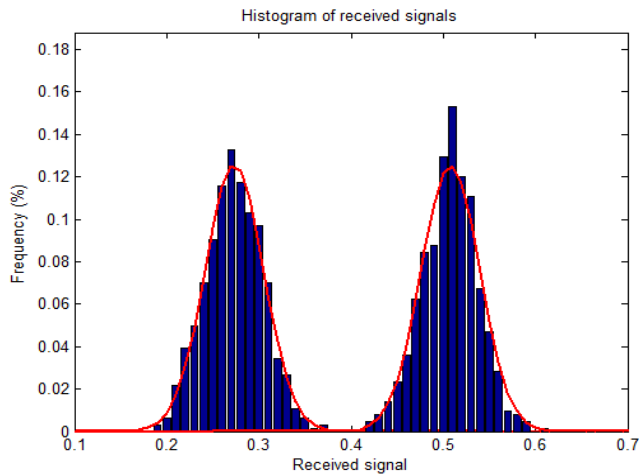
In Task 3, you generated the histograms when the distance between the transmitter and receiver is set to 8. Try adjusting the transmission **distance=8** to **distance=10**, **distance=12**, **distance=14**, and observe the resulting histograms corresponding to different transmission distances. You do not need to submit your work for this task. Based on your observation, **answer the question below** for credit.

LAB 7 TASK 4 - QUESTION 1 (1/1 point)

Suppose our communication system uses infrared light signals to transmit bit streams in a classroom. The experimental conditions were as follows:

1. The lights in the classroom were turned on during the measurement.
2. The distance between transmitter and receiver was 10cm.

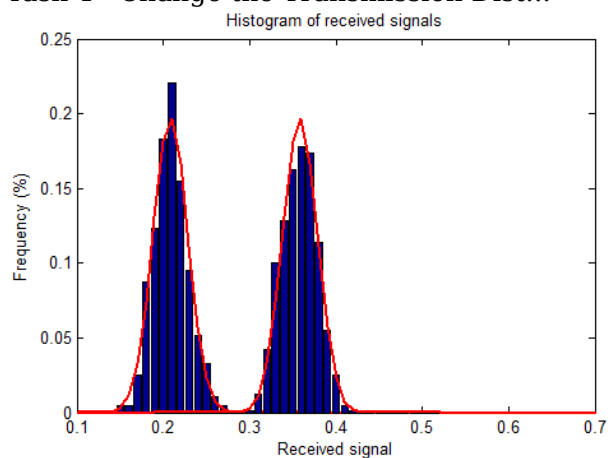
Under these conditions, we observed the following histograms of the received signals for $IN=1$ and $IN=0$, which are plotted in one plot for easier comparisons.



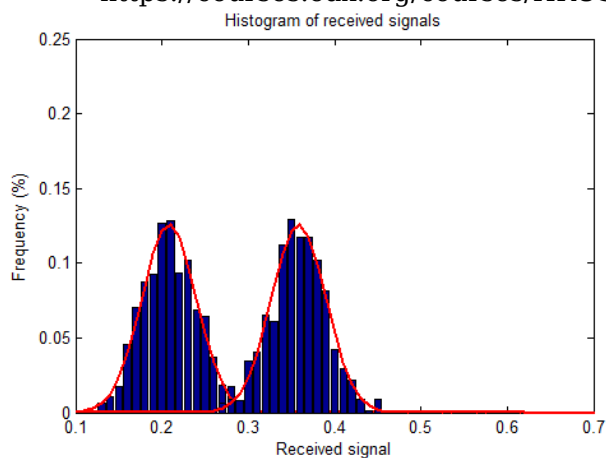
Suppose now that the experimental conditions are changed. In particular:

1. The lights in the classroom are turned off. This reduces the background light intensity and also reduces the power in the noise, since the classroom lighting is the primary source of noise in the channel.
2. The distance between transmitter and receiver is increased to 18cm.

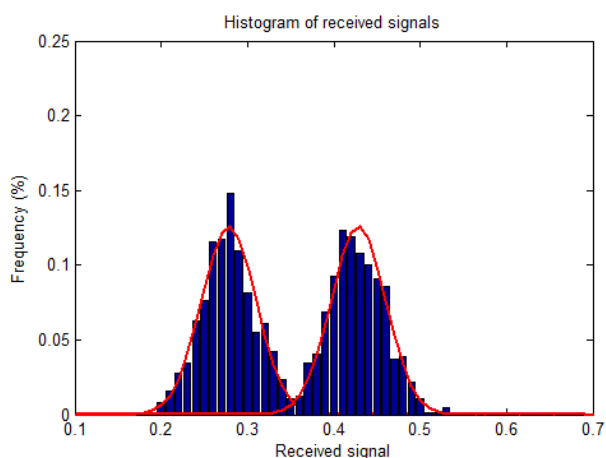
Which one of the following figures is most likely to be obtained as the distribution for the received signal under the new conditions.



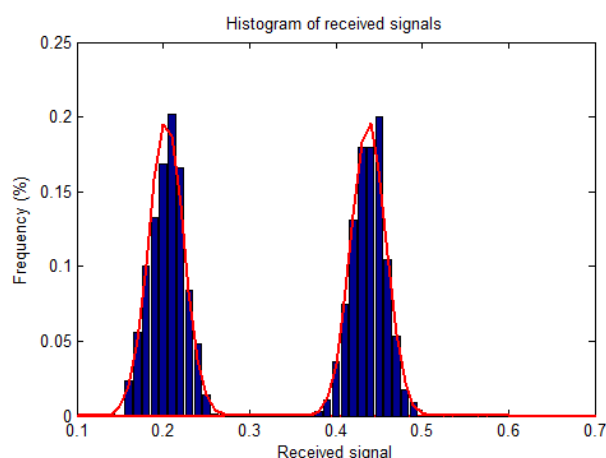
(A)



(B)




(C)



(D)

Please select the correct answer.

- ☒ A 
- ☐ B
- ☐ C
- ☐ D

EXPLANATION

When the light is turned off, there is less ambient light. Thus, the amplitude of the offset signal will be decreased. This causes a decrease in the values of rx_{min} and rx_{max} , which will be reflected as a leftward shift of the histograms, which is seen in (A), (B) and (D).

When the light is turned off, there is less power in the noise. Thus, the standard deviation of the Gaussian distributions will be decreased. This causes the values of the received signals to be more tightly clustered around rx_{min} and rx_{max} , which is seen in (A) and (D).

Lab 7 Task 4 - Change the Transmission Dist...

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the histograms to shift closer together, which is seen in (A),(B) and (C).

The only plot displaying all three characteristics is (A).

Hide Answer

You have used 2 of 2 submissions

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