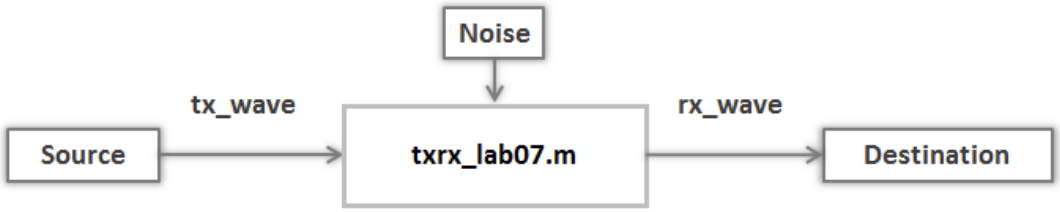
LAB 7 TASK 3 - DISTRIBUTION OF THE RECEIVED SIGNAL (1 point possible)

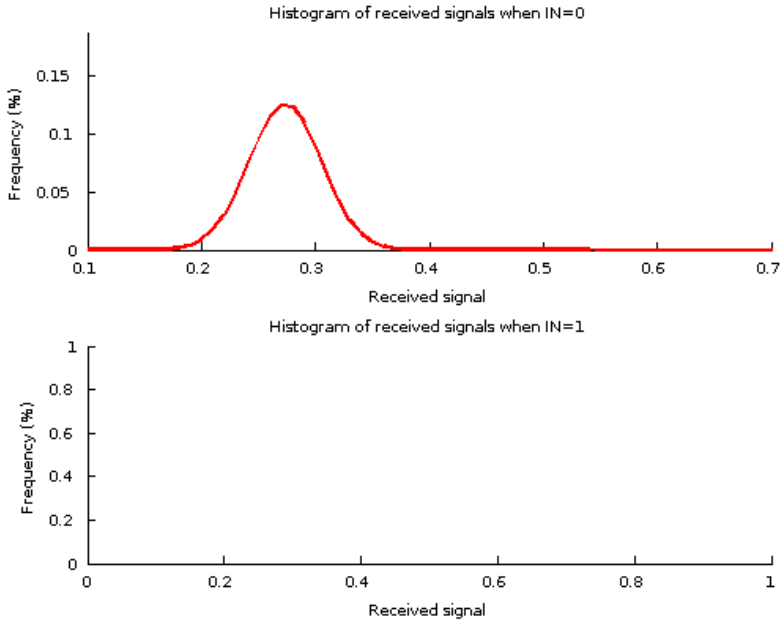
In this task, you will visualize the distribution of the received signal when transmitting bits "1" and "0", respectively.




```
SPB = 50;               % bit time in samples
distance = 8;           % transmission distance
tx_bs = [1:1280] > 640; % generate bit sequence of 640 0's and 640 1's
tx_wave = format_bitseq(tx_bs,SPB);   % create waveform following protocol

% transmit and receive over noisy channel
[rx_wave,start_ind,rx_min,rx_max,sigma] = txrx_lab07(tx_wave,distance);
sample_ind = start_ind + 2*SPB-1 + SPB*[0:1279];  % choose subsampling points
signal_samples = rx_wave(sample_ind);             % extract samples

xhist = 0.1:0.01:0.7;   % centers of histogram bins
% Do not modify code above this line

subplot(2,1,1)
% Place your code below that plots the empirical histogram of the
```

Unanswered

Figure 1



Help

Run Code

Check Save *You have used 0 of 10 submissions*

INSTRUCTIONS

Step 1: Run the available code

After you click on the **Run Code** button, the available code will return a figure with two subplots. The upper subplot will contain the predicted histogram of the received signal when IN=0, much like the initial plot in Task 1. The lower subplot is empty.

As presented, the first part of the program is very simliar to that used in the previous tasks, except that instead of transmitting a bit sequence of 1280 zeros, it transmits a bit sequence of 640 zeros followed by 640 ones.

In this task, your job is to modify the code so that it plots the empirical and predicted histograms of the received signals for the case when IN=0 in the upper subplot. This part of the task is very similar to Task 1. You should also add code so that it plots the empirical and predicted histograms of the received signals for the case when IN=1 in the lower subplot.

Step 2: Modify the code

There are two positions in the code window that need your work.

a. The upper plot is supposed compare the empirical and predicted histograms of the received signal when IN=0. As presented the code only plots the predicted histogram. Based on your work in Task 1, add code lines under the comments

% Place your code below that plots the empirical histogram of the received signal samples when IN=0

to generate the empirical histogram of the received signal when IN=0. Note that the first 640 transmitted bits were 0. Use

the responses of all of these in computing the empirical histogram.

b. The lower subplot is supposed compare the empirical and predicted histograms of the received signal when IN=1. As presented, this subplot is blank. Based on your work above, add code lines under the comments

Help

```
% Place your code below that
% 1. Plots the empirical histogram of the received signal samples when IN=1
% 2. Plots the theoretically predicted histogram
% Plot the empirical and theoretically predicted histogram versus xhist defined above.
```

to compute and plot these versus **xhist**, the same bin centers used in generating the histograms in the upper subplot. We use the same bin centers to enable us to compare the histograms in the upper and lower subplots.

Note that the last 640 transmitted bits were one. Use the respones to all of these in computing the empirical histogram.

You may need to review the description of the code in Task 1, in particular the description of the functions **txrx_lab07** and **plot_ghist**. What are the mean and standard deviation of the received signal when IN=1?

Step 3: Submit your work

Once you have completed your work, examine and compare the histograms in the two subplots. How does the distribution of the received samples when IN=0 differ from the distribution when IN=1?

Click on the **Check** button to submit your answer.