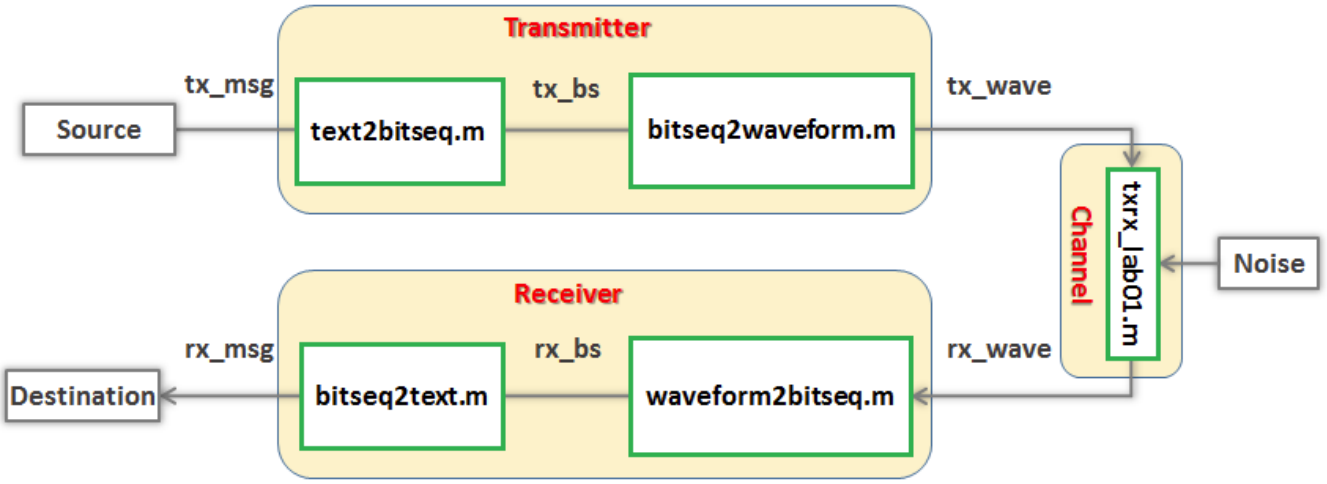
LAB 1 TASK 1 - SEND A TEXT MESSAGE (1 point possible)

You will simulate the communication system shown below, which transmits a text message from a source to a destination over a channel.



The window below contains the MATLAB code that implements this system. If you are not familiar with the MATLAB code, please review the unit What is MATLAB? (/courses/HKUSTx/ELEC1200.1x/3T2014/jump_to_id/51df5c31db76456ca4c259d393f1a0a0) We explain the code in more detail below the window.

```
tx_msg = 'Hi';  % message to transmit
SPB = 10;       % bit time in samples per bit

% transmitter %
tx_bs = text2bitseq(tx_msg);           % change text message to bit sequence
tx_wave = bitseq2waveform(tx_bs,SPB);  % change bit sequence to waveform

% channel %
rx_wave = txrx_lab01(tx_wave,SPB);     % transmit waveform through channel

% receiver %
rx_bs = waveform2bitseq(rx_wave,SPB);  % change waveform to bit sequence
```

```
13 rx_msg = bitseq2text(rx_bs);          % change bit sequence to text message
14
```

Unanswered

Run Code

Check Save *You have used 0 of 10 submissions*

Help

INSTRUCTIONS

Step 1: Run the MATLAB code

Click on the **Run Code** button to execute the MATLAB code in the window.

The results will be shown below the window. You will first see a diagram showing the signals at different points of the communications system; namely, the transmitted bit sequence `tx_bs`, the transmitted wave `tx_wave`, the received waveform `rx_wave`, and the received bit sequence `rx_bs`. After the diagram, you will see the sent message `tx_msg` and the received text message, `rx_msg`. Try to figure out how signals transform at different points of the communication system.

Now, let's look at how the communication system is simulated by using MATLAB code. The first two lines use the assignment operator to define the transmitted text message and the number of samples used to transmit one bit (SPB). If you want to know how to use the assignment operator to define scalar variables, please review the video MATLAB Variables (/courses/HKUSTx/ELEC1200.1x/3T2014/jump_to_id/4ec7f1169af449d382ae8d5780cf306f).

The next set of lines implement the three components of a communication system; namely, the transmitter, the channel and the receiver, in sequence. The functions **`text2bitseq`**, **`bitseq2waveform`**, **`txrx_lab01`**, **`waveform2bitseq`**, **`bitseq2text`** are not standard MATLAB functions, but were written for this lab. In later tasks, we will examine their implementation.

The final set of lines are used to display the results of the simulation. The functions **`diagram_lab01`** and **`display_lab01`** were written for this lab.

Step 2: Change the input message

Change the text message to “Hey” by replacing the first line of code with

```
tx_msg = 'Hey';
```

and click on the **Run Code** button to run the simulation. How does this change affect the signals at different points of the communications system, namely, `tx_bs`, `tx_wave`, `rx_wave`, and `rx_bs`? For example, are the first eight bits of the transmit bit sequence the same? What about the next eight bits? How does the total number of bits in the bit sequence change? How does this affect the length of the transmitted waveform?

Step 3: Change the bit time

Increase the bit time (measured in samples per bit) by changing the parameter SPB from 10 to 20. Change line two to

```
SPB=20;
```

How do the signals change?

Experiment with the simulation and try changing the input message and the bit time, and observe their effects on the signals. Do not change any of the other lines of code. You can click on the **Run Code** button as many times as you like.

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Step 4: Submit your work

When you are finished with your experiments, submit your work for credit. First, change the text message to be sent to "Finished!" and the number of samples per bit to 20. Then click on the **Check** button. Once the page refreshes, scroll to the MATLAB code window to see the feedback. If your code is incorrect, the grader may display some messages above the **Check** button that will help you debug your code. You may submit your work by clicking on the **Check** button a maximum of 10 times. The last time you can click on the **Check** button, its label will change to **Final Check**.