HKUSTx: ELEC1200.1x A System View of Communications: From Signals to Packets (Part 1)

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LAB 3 TASK 3 - DECODE THE RECEIVED WAVEFORM (SANDBOX)

In this task, you will implment the process of recovering the bit sequence `rx_bs` from the received waveform `rx_wave`. This is the process that is implemented by the function `waveform2bitseq.m` that we used in Lab 1 and the function `receive` used in the lab demo video.
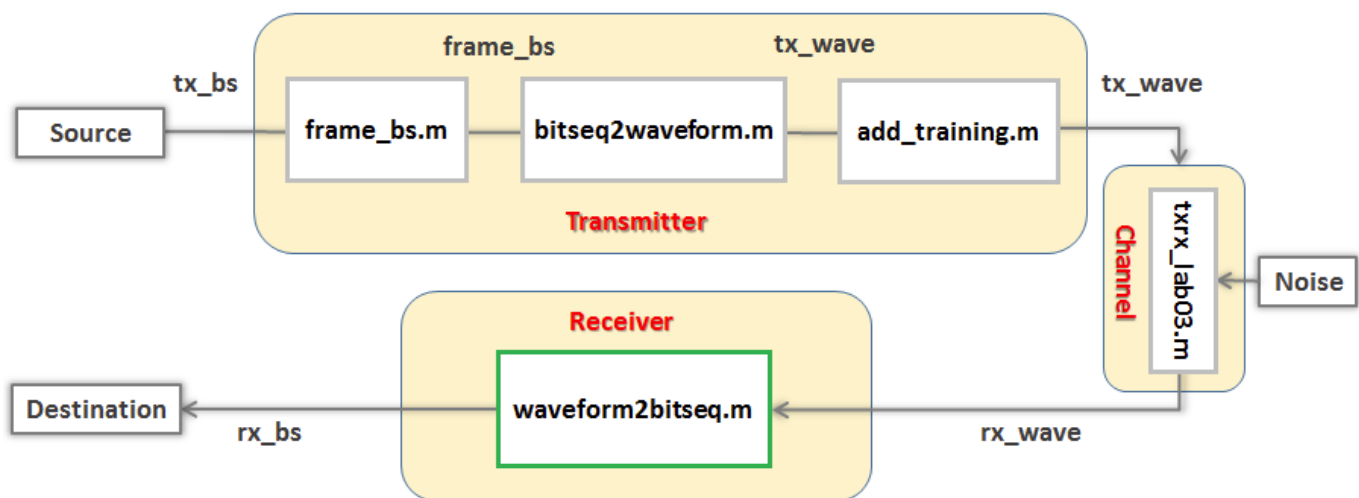
The MATLAB code in the window below simulates the transmission of a random bit stream over the communication channel under two different scenarios: one where the distance between transmitter and reciever is 10cm and the bit time is 50 SPB and the other where the distance is 15cm and the bit time is 20 SPB. Your goal is write code that can recover the transmitted bits from the received waveform `rx_wave` in both situations.

```
1 % setup transmission parameters
2 distance_list = [10 15];
3 SPB_list = [50 20];
4 num_dist = length(distance_list);
5 BER = zeros(1,num_dist);              % store bit error rates
6 setup_lab0303; % setup other storage variables
7
8 tx_bs = rand(1,1280) > 0.5;   % create sequence of 1280 random bits
9
10 for i = 1:num_dist,
11     distance = distance_list(i); % transmission distance
12     SPB=SPB_list(i);              % bit time in samples per bit
```
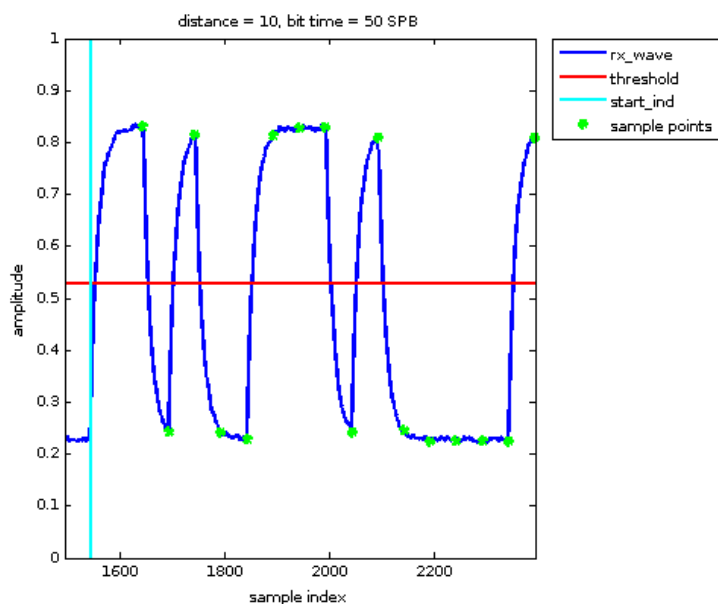
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```
14      % transmitter %
```

Correct

```
threshold = (max(rx_wave)+min(rx_wave))/2;
sample_ind = start_ind+2*SPB-1+SPB*[0:1279];
rx_bs = rx_wave(sample_ind) > threshold;
```

Figure 1

distance = 10, bit time = 50 SPB

Figure 2

distance = 15, bit time = 20 SPB

The BER at distance = 10, bit time = 50 SPB is 0

The BER at distance = 15, bit time = 20 SPB is 0

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