Lab # 01: Basics of Signal Processing

Objective:

1. The objectives of this session are to explore different types of digital signal, voice, image and video.
2. Understand the basics operation on signals, images and videos.

Description: MATLAB is required.

Procedure: In this lab we are going to process audio signals and Images.

To record the voice signal use following MATLAB function:

recorder = audiorecorder(Fs,nBits,nChannels)

By default, value of Fs=8000Hz, nBits=8 and nChannels=1.

recordblocking(recorder, time in second)

To play the audio file use MATLAB play function:

play(recorder)

Store data in double-precision array to plot.

myRecording = getaudiodata(recorder)

To read the image use following MATLAB function:

A = imread(image_name);

To read the video and frames use following MATLAB function:

V = VideoReader(video_name)
frame = read(V,index)

LAB TASK

1. Record a voice with default sampling rate and perform following operations:

a) Flip your audio signal, play the voice and plot the signal using subplot.
b) Add 2 *cosines* into audio with frequency ranging from 1kHz to 1.5Hz, play the voice and plot the signal using subplot.
c) Divide the array of your audio into two equal parts, save the divided arrays into two variables (let say a and b) and add both **(a+b)**, play the resultant voice and plot the signal using subplot.
d) Perform **[(a*2)+(b*0.5)]**, play the resultant voice and plot the signal using subplot.
e) Add 4 cosines with frequency ranging from (5Hz to 4kHz) into audio signal, play the resultant voice and plot the signal using subplot.
f) Drop the sampling rate of your audio by dropping every other sample consecutively 5 time, plot the signals using subplot.

2. Take two gray-scale images of same size and perform following operations:

a) Read the images in two matrices.
b) Take transpose of the matrix and display the resultant images using subplot.
c) Add two images and display the result.
d) Read an image then multiply matrix of image with 0.5 and display the result.

3. Take a video and read.

a) Read a video, split it into frames and display all the frames.

Home Task

b) After completing above task, now put the frames back into video in reverse order and play the video.

What to submit:

After you have completed your tasks, insert your code and figures in word file and submit it on the LMS as pdf.