



Weekly Homework

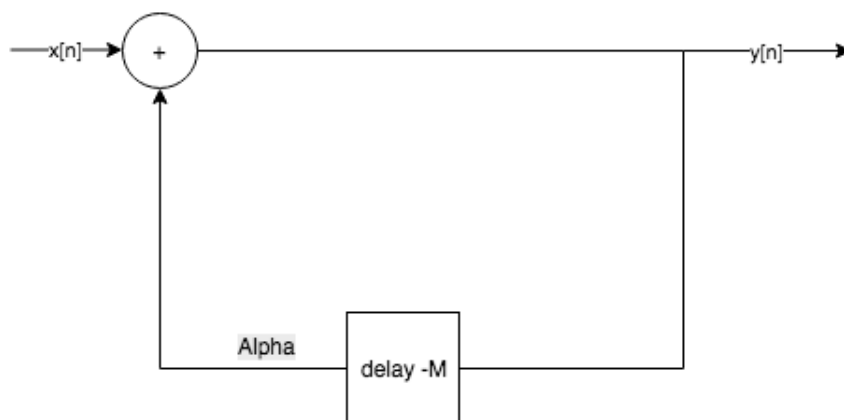
Dr. Sameti

CE 40242: Signals and Systems

Please consider the following:

- You must mail your homework with subject in following pattern “PracticalHW1-YourStudentID” to rsoltani97@gmail.com
- Attach your codes and report to your homework.
- For any question contact me at rsoltani97@gmail.com

In this homework we’re going to implement Karplus-Strong algorithm. Karplus-Strong is a simple algorithm for synthesizing musical sounds. Below figure show block diagram of the algorithm.



In Karplus-Strong, M , α and x are called delay, decay and timbre of the system respectively. Timbre signal is 0 except first M samples and $y[n]$ is 0 for $n < 0$.

$$y[n] = \alpha y[n - M] + x[n]$$

- a. Initialize system with $M = 80$, $\alpha = 0.95$ and set x equal to a random uniform vector in range $[-2, 2]$. Compute y for $N = 9000$ samples. Plot and play generated signal.
- b. Change α and keep other parameters fixed. What is the effect of α on the output?
- c. Change N and keep other parameters fixed. What is the effect of N on the output?
- d. Change M and keep other parameters fixed. What is the effect of M on the output?
- e. Generate three signals each with $\alpha = 0.99$ and $N = 9000$ and set M 's equal to $[70, 55, 40]$ respectively. Set x equal to a random uniform vector in range $[-2, 2]$ for each signal and then concat generated signals. Plot and play final signal.
- f. A Matlab function named "flanger.m" is attached to your homework. This function takes an input audio signal and generates an output audio signal. Apply this function to your generated signal from last section. What is the effect of this function on the signal?