EE 367 Lab 5

Reverb Effect in Audio

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1 Finding IIR difference equations

In part 1 we will be finding difference equations from block diagrams.

1. For the comb filter of Figure 1, find a difference equation an expression for w[n] in terms of x[] and w[]?
   The output in terms of x[] is:
   $$w[n] = x[n - \tau] + gx[n - 2\tau]$$
   in terms of w[n] is:
   $$w[n] = w[n]$$
2. For the all-pass filter of Figure 2, find a difference equation for w[n] in terms of x[] and w[]?
   w[n] in terms of x[n] is:
   $$w[n] = x[n - \tau] + gx[n - 2\tau]$$
   w[n] in terms of w[] is
   $$w[n] = w[n]$$
3. For the all-pass, find a difference equation for y[n] in terms of w[n] and x[n]?
   y[n] in terms of x[n] is:
   $$y[n] = -gx[n] + x[n - \tau] + gx[n - 2\tau] - g^2x[n - \tau] - g^3x[n - 2\tau]$$
   y[n] in terms of w[n] is:
   $$y[n] = -gx[n] + w[n] - g^2w[n]$$

2 Reverb Implementation

In part 2 of this lab we will be implementing a reverb from a complicated block diagram provided below

1. Paste the sections of your Python code that implement the six digital filters, using your FIFO?

2. Upload your output WAV file with the reverb effect.
   WAV file uploaded.

3 Testing and Verification via Impulse Response

In part 3 of this lab we will be testing that our reverb works using an impulse response.

1. Documentation: Paste a copy of your (scaled and delayed) impulse response into your report.