The Wumpus
Sampling Synthesizer Keyboard
Damon Vander Lind and Mark Tobenkin

The user records a sample into memory. Pressing different keys on a MIDI keyboard replays the sample with shifts in frequency. Up to ten notes can be played simultaneously.

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Start, End, Vowel Hold

original recording

start time

hold point

end time

hold window size (different scale)

playback from keyboard (at original pitch)

key is pressed

hold window start repeating

key is released

rest of sample finishes

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User Interface

A external monitor allows a user to fine tune their playback.
The user can crop the beginning and end of their sample.
The key which the original sample plays at can be adjusted by tuning.
During recording, a new sound goes directly into sample from ACS7_in.

During keyboard playback, individual NOTE's in NOTES play back the sample scaled in frequency to match the notes pressed on the keyboard.

During loop playback, the sample is replayed on loop scaled by base frequency. Pressing sin_select toggles a sin wave at middle C (for tuning your sample).
Record Mode

The incoming recording is clocked into Memory, and a mux switches the output sound to be the input sound.
Playback Mode

When a key is pressed, it is entered into a queue in Control. Key presses are read out of the queue into Note's as they become available, unless too much time elapses.

For each key pressed, the sample, from start to end, is read out of Sample, and processed through a Note and Echo before being fed into AC97_out.
Echo implements both basic echo, and the more complicated reverb function. Reverb is set through a large number of variables controlling the creation of multiple echos at closely related echo times. The control of this function is simplified in Echo_Control to correspond to two 8 bit numbers that make a basic echo when set to 0.
An Individual Note

The memory manager buffers three frames of memory for the Taylor series module. Taylor asks Memory_manager for a frame T frames away. T is mapped, in the case of window hold, to a cycle of memory addresses going from win_hold_pos to win_hold_pos + win_hold_length. In the case of length rescaling, a segment of memory addresses are repeated or deleted occasionally to lengthen or shorten the sample. Taylor does a second order approximation for frame_out.
Visualizer Module

The visualizer buffers a representation of the recording, and displays all other graphics through use of vectors in the Pixelmaker submodule. Sample_Buffer is accessed to print only the block of pixels meant to display the sound time series.
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