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ECE 498MH – Signal and Image Analysis
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Final Project

Saturday, December 13, 2014
Fall 2014

Story Narrative:

This short story is about a happy flower, who likes the daytime and is friends with the sun, but is afraid from the dark nighttime. As the sun rises every day, the flower merrily sings out beautiful melodies (the Für Elise), but as soon as the nighttime began to fall, the happy flower's mood changed and she no longer felt happy. She was so scared of the dark that she heard creepy cries and screams throughout the night. One night, the moon introduces himself to the happy flower, and introduces his fellow stars. The happy flower soon discovers that they are friendly creatures too, and they become friends. The happy flower is no longer afraid of the dark, and she spends the rest of her nights singing cheerful melodies to the moon and the stars too.

Dramatic Structure:

- Protagonist: the happy flower.
- Antagonist: her fear of the dark.
- Conflict: the fear of the dark makes the happy flower unhappy and makes her hear screams and cries at night.
- Climax: The moon reaches out to the happy flower.
- Resolution: the happy flower befriends the moon and the stars and sings cheerful melodies to them too.

Video Sequence:

Start Time	End Time	Segment Description
00:00	00:04	Title image. The image is filtered using a 2D FIR LPF (Lab 6) designed with Matlab's *firpm* function with the following parameters: `firpm(19, [0 0.2, .4, 1], [1 1 0 0])`
00:04	00:11	Narration
00:11	00:23	Beethoven's Für Elise synthesized from periodic repetitions of damped sinusoids (Lab 2). The synthetic tone follows the RTTTL code detailed below
00:23	00:47	Narration
00:47	00:53	Screams with reverberations added using a feedback delay (Lab 3).

		The screaming sound effect is downloaded from YouTube [1]. The feedback delay is implemented according to the following equation: $$y[n] = x[n] - 0.9y[n - \tau]$$ where y[n] is the output at sample [n]; x[n] the input at sample [n] and y[n-τ] is the output at τ previous samples.
00:53	01:04	Narration
01:05	01:13	The moon talking. This audio is filtered using a sequence of notch filters with cutoff frequencies from 0 Hz – 500 Hz, effectively producing a HPF at 500 Hz (Lab 5)
00:47	01:13	This image is filtered with an edge detection filter – a Sobel Mask (Lab 4)
01:13	01:28	Narration
01:28	01:42	Twinkle Twinkle Little Star synthesized from periodic repetitions of damped sinusoids (Lab 2). The synthetic tone follows the RTTTL code detailed below
01:42	01:46	End image filtered using a 2D FIR LPF (Lab 6). In the background, a sequence of the vowels /a/ and /i/ resynthesized using a Fourier series and damped (Lab 1)

The animations in the video were created as plots and Matlab, which were all compiled using Matlab's *VideoWriter* function. The audio was spliced in with Windows Live Movie Maker. The image displayed from 01:28 – 01:42 was produced as a sequence of 20 plots slowed down in time (k = 4) (Lab 7).

Synthesized Tunes from Nokia's RTTTL (Ring Tone Text Transfer Language)

- Beethoven's Für Elise:
  d=4,o=5,b=125:8e6, 8d#6, 8e6, 8d#6, 8e6, 8b, 8d6, 8c6, a, p, 8c, 8e, 8a, 8b., p, 8e, 8g#, 8b, 8c.6, p, 8e, 8e6, 8d#6, 8e6, 8d#6, 8e6, 8b, 8d6, 8c6, 8a, p, 8c, 8e, 8a, 8b., p, 8d, 8c6, 8b, a., q [2]
- Twinkle Twinkle Little Star:

d=4,o=7,b=120: 4c7, 4c7, 4g7, 4g7, 4a7, 4a7, 2g7, 4f7, 4f7, 4e7, 4e7, 4d7, 4d7, 2c7, 4g7, 4g7, 4f7, 4f7, 4e7, 4e7, 2d7, 4g7, 4g7, 4f7, 4f7, 4e7, 4e7, 2d7, 4c7, 4c7, 4g7, 4g7, 4a7, 4a7, 2g7, 4f7, 4f7, 4e7, 4e7, 4d7, 4d7, 1c7, q [3]

[1] https://www.youtube.com/watch?v=GPJ1uQwmNHk

[2] http://free-ringtones-4u.co.uk/Beethoven-Fur-Elise.html#

[3] http://forums.parallax.com/showthread.php/120349-Button-Selects-Rtttl-Tune-BS2 (with modification)