‘The Sound of Music’
Gone Digital!

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OUTLINE

- Music tutorial guide
- Target user – 5 year olds
- Three modes

Diagram:
- Keyboard
- Speaker
- Monitor
- Corresponding image
- Synthesized note
Modes

1. Instant Playback
2. Recorded Playback
3. Game – 2 difficulty levels

Sorry, try again

Well Done!
## DECODER

- **Assignment of keys to notes and signals**

<table>
<thead>
<tr>
<th>Key</th>
<th>ASCII</th>
<th>signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter</td>
<td>8’h0D</td>
<td>record = high</td>
</tr>
<tr>
<td>Spacebar</td>
<td>8’h20</td>
<td>playback = high</td>
</tr>
<tr>
<td>Backspace</td>
<td>8’h08</td>
<td>reset = high</td>
</tr>
<tr>
<td>Plus</td>
<td>8’h3D</td>
<td>Diff_mode</td>
</tr>
<tr>
<td>Minus</td>
<td>8’h2D</td>
<td>easy_mode</td>
</tr>
<tr>
<td>E</td>
<td>8’h45</td>
<td>C (26.626 Hz)</td>
</tr>
<tr>
<td>R</td>
<td>8’h52</td>
<td>D (293.665 Hz)</td>
</tr>
<tr>
<td>T</td>
<td>8’h54</td>
<td>E (329.626 Hz)</td>
</tr>
</tbody>
</table>

- Counts the length of time the key has been played for
Inputs (written into memory):

- note = [3:0] data_ram
- length = [15:4] data_ram

Outputs (read from memory):

- st_note = [3:0] data_ram
- st_length = [15:4] data_ram

- Address updates on ready signal (when key released)
- note and length are stored in the same memory address
- On-chip RAM memory
VIDEO MODULE

- **Image directory**: scans through ‘real’ images and stores their pixel contents into a ROM
- **Text directory**: creates strings of characters (note name and general messages)
- **Main**: example, for note A/La:

![Image]

- Welcome and Reset screens
SYNTHESIZER

- Synthesizes a musical note from its fundamental frequency and its main harmonics.
- Look-up table for each note (from A to G). The signal for one note will be sampled at twice the frequency to get the signal for the same note an octave higher.
- Will start by synthesizing beeping sounds only, and then include the harmonics.
IMPROVEMENTS

- More notes, including half tones (i.e. sharps and flats) and other octaves.
- More elaborate display, animations during transitions between notes.
- Richer sound.
- Image compression.