Tone Removal

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The tone SunshineSquare have unwanted tones at the end and this project “Tone Removal” aims to remove the unwanted sounds at specific frequencies.

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| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| Hz | 4715 | 3150 | 1570 | 0 | 4720 | 1600 |
| A | 1.7970 | 0.4450 | -1.2514 | -2 | 1.7995 | -1.2246 |

Table 1. A table listing the frequency in Hz, the digital frequency, and A for each tone. At first no.1~4 was used to remove the beeping sound, and then no.5~6 was added to clear the remaining noise from no.1 and 3 frequency.

For the frequency response 𝐻(exp(𝑗𝑤̂)) = sigma(b\_k\*exp(-j𝑤̂k)) (k = 0:M), a nulling filter [1, A, 1] was selected for the tone removal. A was introduced as -2\*cos(w), where w=2\*pi\*f/fs is the 𝑤̂. The selected filters are shown in the table 1.

텍스트, 스크린샷, 다채로움, 라인이(가) 표시된 사진

자동 생성된 설명

Figure 1. a spectrogram of the cleaned-up tones (figure 6) and the original tones (figure 1). Some noise still seems to remain on 1600 frequency; however, played result did not show the noise.

Using multiple nulling filters and convolving the filters successfully removed the noise. Filtering the tone by using the frequency term allowed us to disunite the noise from the speech and to remove the separated unwanted tones.