

Audio Filtering

EE23BTECH11013 - Avyaaz*

Parameter	Description
$x(n)$	Input audio signal
$y(n)$	Output audio signal
$H(e^{j\omega})$	Discret Time Fourier Transform of $x(n)$
$h(n)$	Impulse response

TABLE 1: Parameters

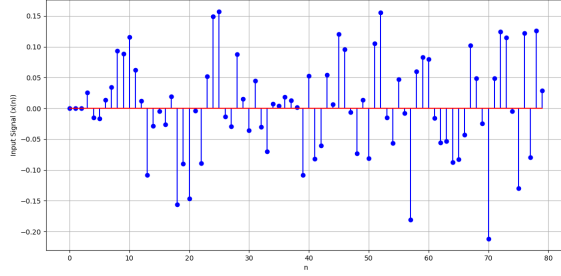


Fig. 1: Plot of $x(n)$ vs n

Output audio signal can be obtained from the difference equation:

$$\sum_{m=0}^M a(m)y(n-m) = \sum_{k=0}^N b(k)x(n-k) \quad (1)$$

where, coefficients of a and b are obtained from the 'noise_reduction.py'

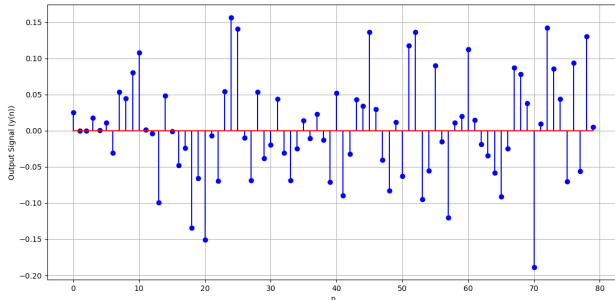


Fig. 2: Plot of $y(n)$ vs n

Here,

$$x[n] \xleftrightarrow{\mathcal{F}} X(\omega) \quad (2)$$

$$y[n] \xleftrightarrow{\mathcal{F}} Y(\omega) \quad (3)$$

$$h[n] \xleftrightarrow{\mathcal{F}} \frac{Y(\omega)}{X(\omega)} = H(\omega) \quad (4)$$

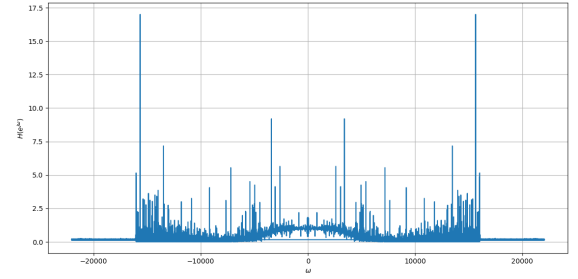


Fig. 3: Plot of $|H(e^{j\omega})|$ vs ω

Here,

$h(n)$ is inverse fourier transform of $H(\omega)$

$$H(\omega) \xleftrightarrow{\mathcal{F}^{-1}} h(n) \quad (5)$$

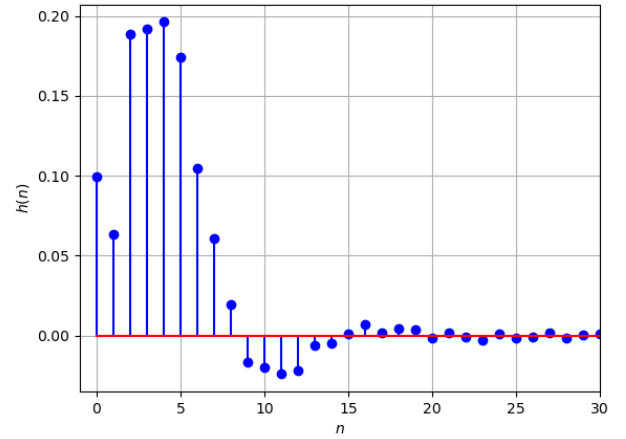


Fig. 4: Plot of $h(n)$ vs n