## Signals Project

(milestone I)

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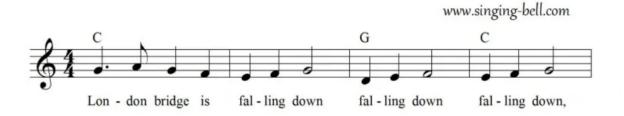
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Tutorial: T-26

#### • Description:

My code is simply generating the song "London Bridge is falling down" using notes of the fourth octave with the right hand only . It consists of 13 piano notes with different durations 0.3 or 0.6 sec , with gap between every note of 0.1 sec. The whole song is 6 sec. The music Sheet is shown in the figure below.

#### London Bridge Is Falling Down



The code starts by importing the needed libraries

such as: import numpy as np

import matplotlib.pyplot as plt

import sounddevice as sd

Then making a t on x-axis by using linspace method starting form 0 to 6 with 12\*1024 divisions.

After that the frequencies , duration and stating time of each note each is represented in an array.

Then inside a for loop recalling the formula:

```
xi t = \sin 2\pi f i t [u(t - ti) - u(t - ti - Ti)]
```

for each note using its f[i] (frequency) and ti[i] (starting time of the note) and Ti[i] (duration of the note) and adding it to the output signal x.

Lastly, the output signal x is plotted and played using sounddevice.

### Full code:

```
import matplotlib.pyplot as plt
import sounddevice as sd
import numpy as np
t = np. linspace(0, 6, 12*1024)
f = [392.00, 440.00,
392.00,349.23,329.63,349.23,392.00,293.66,329.63,349.23,329.63,349.23,
392.00]
ti = [0, 0.4, 0.8, 1.2, 1.6, 2, 2.4, 3.1, 3.5, 3.9, 4.6, 5, 5.4]
Ti = [0.3, 0.3, 0.3, 0.3, 0.3, 0.3, 0.6, 0.3, 0.6, 0.3, 0.6, 0.3, 0.6]
x=0
i=0
for i in range(len(f)):
  x+= np.sin(2*np.pi*f[i]*t)*(t>ti[i])*(t<(Ti[i]+ti[i]))
  i+=1
plt.plot(t, x)
sd.play(x, 2*1024) //where 2*1024 is got from 12*1024/(6-0)
```

# • <u>Plot:</u>

