In [1]:
```
#Visualizing audio signals

import numpy as np
import matplotlib.pyplot as plt
from scipy.io import wavfile
```

In [2]:
```
# Read the audio file
sampling_freq, signal = wavfile.read('file_example_WAV_1MG.wav')
```

In [3]:
```
#Print the shape of the signal, the datatype, and the duration of the audio signal:

# Display the params
print('\nSignal shape:', signal.shape)
print('Datatype:', signal.dtype)
print('Signal duration:', round(signal.shape[0] / float(sampling_freq), 2), 'seconds')
```

```
Signal shape: (176400,)
Datatype: int16
Signal duration: 4.0 seconds
```

In [4]:
```
# Normalize the signal
signal = signal / np.power(2, 15)
signal
```

Out[4]:
```
array([ 0.13412476,  0.46185303,  0.59729004, ..., -0.17880249,
        0.02139282,  0.22033691])
```

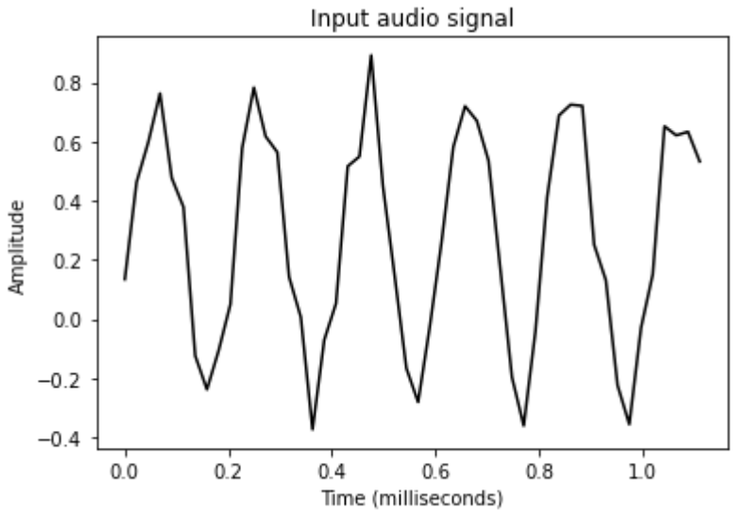
In [5]:
```
# Extract the first 50 values
signal = signal[:50]
signal
```

Out[5]:
```
array([ 0.13412476,  0.46185303,  0.59729004,  0.76208496,  0.47634888,
        0.37820435, -0.12423706, -0.2383728 , -0.10632324,  0.04962158,
        0.57736206,  0.78207397,  0.61700439,  0.56335449,  0.14212036,
        0.00634766, -0.37332153, -0.07064819,  0.05218506,  0.51599121,
        0.54907227,  0.89120483,  0.44967651,  0.14599609, -0.16659546,
       -0.28103638, -0.02450562,  0.26043701,  0.58129883,  0.71896362,
        0.67022705,  0.53536987,  0.171875  , -0.19683838, -0.36080933,
       -0.04162598,  0.41189575,  0.68762207,  0.72436523,  0.72009277,
        0.25115967,  0.13131714, -0.22442627, -0.35601807, -0.02987671,
        0.15075684,  0.65115356,  0.62036133,  0.63259888,  0.53204346])
```

In [6]:
```
# Construct the time axis in milliseconds
time_axis = 1000 * np.arange(0, len(signal), 1) / float(sampling_freq)
time_axis
```

Out[6]:
```
array([0.        , 0.02267574, 0.04535147, 0.06802721, 0.09070295,
       0.11337868, 0.13605442, 0.15873016, 0.1814059 , 0.20408163,
       0.22675737, 0.24943311, 0.27210884, 0.29478458, 0.31746032,
       0.34013605, 0.36281179, 0.38548753, 0.40816327, 0.430839  ,
       0.45351474, 0.47619048, 0.49886621, 0.52154195, 0.54421769,
       0.56689342, 0.58956916, 0.6122449 , 0.63492063, 0.65759637,
       0.68027211, 0.70294785, 0.72562358, 0.74829932, 0.77097506,
       0.79365079, 0.81632653, 0.83900227, 0.861678  , 0.88435374,
       0.90702948, 0.92970522, 0.95238095, 0.97505669, 0.99773243,
       1.02040816, 1.0430839 , 1.06575964, 1.08843537, 1.11111111])
```

In [7]:
```
# Plot the audio signal
plt.plot(time_axis, signal, color='black')
plt.xlabel('Time (milliseconds)')
plt.ylabel('Amplitude')
plt.title('Input audio signal')
plt.show()
```



In [ ]:
```
```