
rir*generator Documentation*

Release 0.1.0

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Oct 28, 2020

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RIR_GENERATOR MODULE

1.1 Module reference

`rir_generator.generate`(*c*, *fs*, *r*, *s*, *L*, *beta=None*, *reverberation_time=None*, *nsample=None*,
mtype=<mtype.omnidirectional: b'o'>, *order=-1*, *dim=3*, *orientation=None*,
hp_filter=True)

Generate room impulse response.

Parameters

- **c** (*float*) – Sound velocity in m/s. Usually between 340 and 350.
- **fs** (*float*) – Sampling frequency in Hz.
- **r** (*array_like*) – 1D or 2D array of floats, specifying the (*x*, *y*, *z*) coordinates of the receiver(s) in m. Must be of shape (*3*,) or (*x*, *3*) where *x* is the number of receivers.
- **s** (*array_like*) – 1D array of floats specifying the (*x*, *y*, *z*) coordinates of the source in m.
- **L** (*array_like*) – 1D array of floats specifying the room dimensions (*x*, *y*, *z*) in m.
- **beta** (*array_like*, *optional*) – 1D array of floats specifying the reflection coefficients

```
[beta_x1, beta_x2, beta_y1, beta_y2, beta_z1, beta_z2]
```

or

```
[(beta_x1, beta_x2), (beta_y1, beta_y2), (beta_z1, beta_z2)]
```

Must be of shape (*6*,) or (*3*, *2*).

You must define **exactly one** of `beta` or `reverberation_time`.

- **reverberation_time** (*float*, *optional*) – Reverberation time (`T60`) in seconds.

You must define **exactly one** of `beta` or `reverberation_time`.

- **nsample** (*int*, *optional*) – number of samples to calculate, default is `T60 * fs`.
- **mtype** (*mtype*, *optional*) – Microphone type, one of `mtype`. Defaults to `mtype.omnidirectional`.
- **order** (*int*, *optional*) – Reflection order, default is `-1`, i.e. maximum order.
- **dim** (*int*, *optional*) – Room dimension (2 or 3), default is 3.

- **orientation** (*array_like, optional*) – 1D array direction in which the microphones are pointed, specified using azimuth and elevation angles (in radians), default is `[0, 0]`.
- **hp_filter** (*boolean, optional*) – Enable high-pass filter, the high-pass filter is enabled by default.

Returns **h** – The room impulse response, shaped (*nsample, len(r)*)

Return type `array_like`

Example

```
>>> import rir_generator
>>> h = rir_generator.generate(
...     c=340,
...     fs=16000,
...     r=[
...         [2, 1.5, 2],
...         [2, 1.5, 3]
...     ],
...     s=[2, 3.5, 2],
...     L=[5, 4, 6],
...     reverberation_time=0.4,
...     nsample=4096,
...     mtype=rir_generator.mtype.omnidirectional,
... )
```

class `rir_generator.mtype` (*value*)

Bases: `enum.Enum`

Microphone type.

b = `b'b'`

bidirectional = `b'b'`

c = `b'c'`

cardioid = `b'c'`

h = `b'h'`

hypercardioid = `b'h'`

o = `b'o'`

omnidirectional = `b'o'`

s = `b's'`

subcardioid = `b's'`

REFERENCES

Python- and C-based [room impulse response generator](#), for use in convolutional reverb.
Official Python port of <https://github.com/ehabets/RIR-Generator>.

EXAMPLE

```
import numpy as np
import scipy.signal as ss
import soundfile as sf
import rir_generator as rir

signal, fs = sf.read("bark.wav", always_2d=True)

h = rir.generate(
    c=340,                # Sound velocity (m/s)
    fs=fs,               # Sample frequency (samples/s)
    r=[                  # Receiver position(s) [x y z] (m)
        [2, 1.5, 1],
        [2, 1.5, 2],
        [2, 1.5, 3]
    ],
    s=[2, 3.5, 2],       # Source position [x y z] (m)
    L=[5, 4, 6],         # Room dimensions [x y z] (m)
    reverberation_time=0.4, # Reverberation time (s)
    nsample=4096,        # Number of output samples
)

print(h.shape)          # (4096, 3)
print(signal.shape)     # (11462, 2)

# Convolve 2-channel signal with 3 impulse responses
signal = ss.convolve(h[:, None, :], signal[:, :, None])

print(signal.shape)     # (15557, 2, 3)
```


INDICES AND TABLES

- genindex
- modindex
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BIBLIOGRAPHY

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- [Hab20] Emanuël Habets. Ehabets/rir-generator: rir generator. October 2020. URL: <https://github.com/ehabets/RIR-Generator>, doi:10.5281/zenodo.4096349.
- [Pet86] Patrick M. Peterson. Simulating the response of multiple microphones to a single acoustic source in a reverberant room. *The Journal of the Acoustical Society of America*, 80(5):1527–1529, 1986. doi:10.1121/1.394357.

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