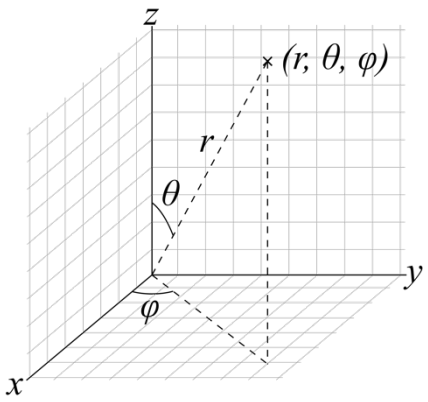
Spherical coordinates

(r, θ, φ) gives the radial distance, elevation angle and azimuth angle.

In this project, you need to obtain the ***azimuth angle*** $\varphi \subset [0, 2\pi)$ from the IMU sensor.



Impulse response and the binaural signal output

The impulse response is the output of a system when its input is an impulse signal.
For any linear, time-invariant system, the output can be calculated by the ***time-domain convolution*** of the input signal and the system impulse response. For the digital signal, this convolution can be done by a filtering process. To generate the binaural signal output, we need to select an impulse response as a filter in the following dataset according to the set direction (azimuth angle). The input audio signal for the filtering process has been provided in 'IMU_additional_resources'. As an initial step, please store the music file on the SD card.

Dataset

In the dataset, 12 azimuth angles (variable name: azimuth) and the corresponding spatial impulse responses (variable name: IRs) are provided. The azimuth angles are in range of $[0, 330]$ in degrees with an increment of 30 degrees. By default, the front direction is set to 0. Increasing the azimuth angles indicates counterclockwise rotation of the listener.

* Tip: You will need to round the IMU outputs to be multiples of 30.