Dancing To Music

Our idea for the project would be programming the robot to dance to a given music.
The main parts of the work would be recognizing the music and moving accordingly to it's rhythm and musical notes.
To specify the project we will have to concretize variables such as the way the music gets recognized and processed, the length of the music played and the movements of the robot.

Possible scenario

The robot has just executed the hello movement when suddenly music starts playing and the robot perceives it. The robot begins to move to the beat of the music and, depending on the pitch of the notes, performs its movements to varying degrees.
Possible single movements could be

- shaking or turning the head,
- rotating the arms,
- moving the arms up and down or
- taking steps forward and backward.

These single movements can be performed alone or combined in different ways with each other.

The loop

1. Sensing	2. Thinking	3. Acting
Read in the music from the microphone or audio jack sensors of the computers	Retrieve characteristics of the sensed music such as bpm	Depending on the bpm (or other music characteristics) execute certain dance move keyframes

Music recognition

A way of recognizing the music is giving it the robot as an input.
To process the music we could possibly use different python functions such as ***scipy.io.wavfile.read*** [1], which returns the sample rate in samples/sec and the data from an WAV file. We can get a WAV file by converting a MP3-file into a WAV file using the open source library ***pydub.AudioSegment*** [2]. We could then handle this data numpy array by defining different sets of motions for different amplitudes.

Another way of processing the music could be converting the MP3 into a numpy array with the library ***pyaudio.PyAudio***[3] and handling it afterwards.

Music analysis

Libraries such as **PyAudio** provide support to retrieve bpm or similar features from audio files.

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[1] https://docs.scipy.org/doc/scipy/reference/generated/scipy.io.wavfile.read.html
[2] https://stackoverflow.com/questions/3049572/how-to-convert-mp3-to-wav-in-python
[3] https://stackoverflow.com/questions/17657103/how-to-play-wav-file-in-python

Keyframe generation

In order to dance, we will provide several dance moves to the robot as keyframes. The keyframes can be generated using the **Choreographe software** (http://doc.aldebaran.com/2-1/getting_started/installing.html).