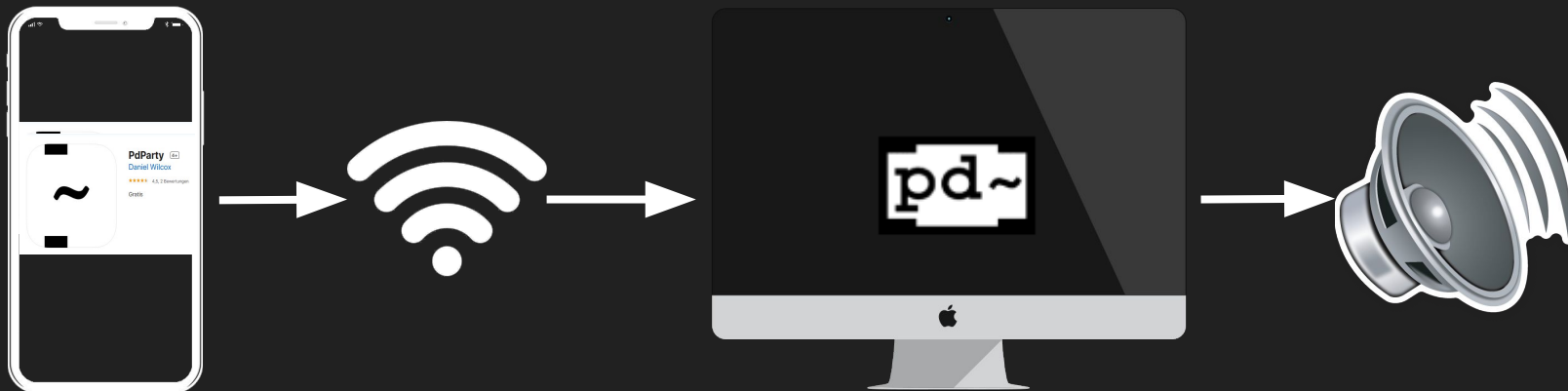




IMU Controlled Additive Synthesis

Realtime Audio Programming in C (SS20)

Dozenten: Markus Hädrich und Thomas Resch
Heller (347233), Seipel (415387), Deffner (415682), Sailer (415647)



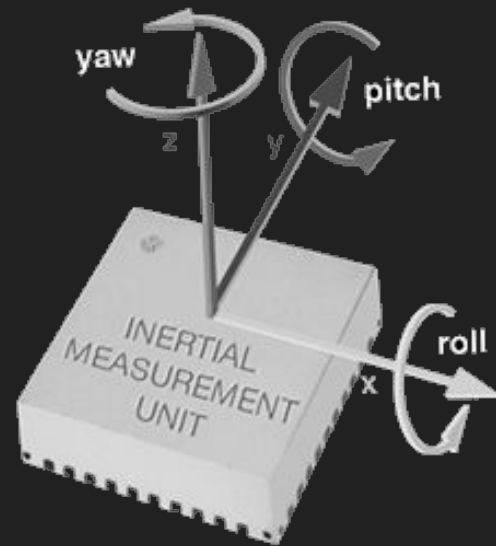
- Motion Sensor Data from PdParty App
- Gyroscope and Accelerometer (6 DoF)
- via OSC (Open Sound Protocol)

- pd object: Additive Synthesis
- pitch / overtone control of our patch by motion sensor data from iPhone

Video-Demo

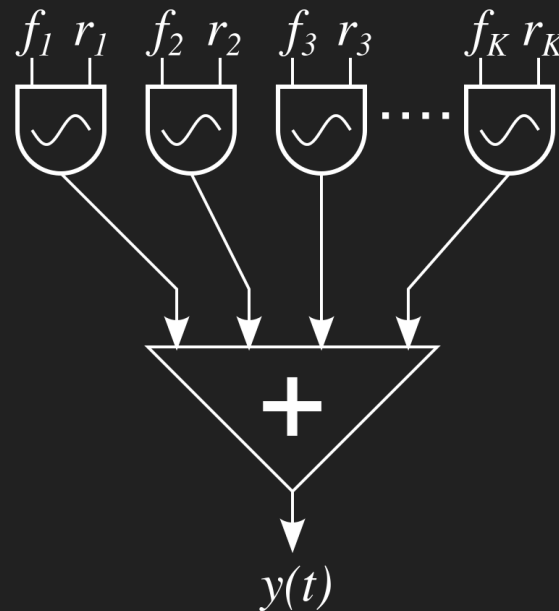
Inertial Measurement Unit (IMU)

- consists out of accelerometers and gyroscopes
- measures 3D linear-acceleration and angle velocity with respect to a reference axes
- very precise / sensitive

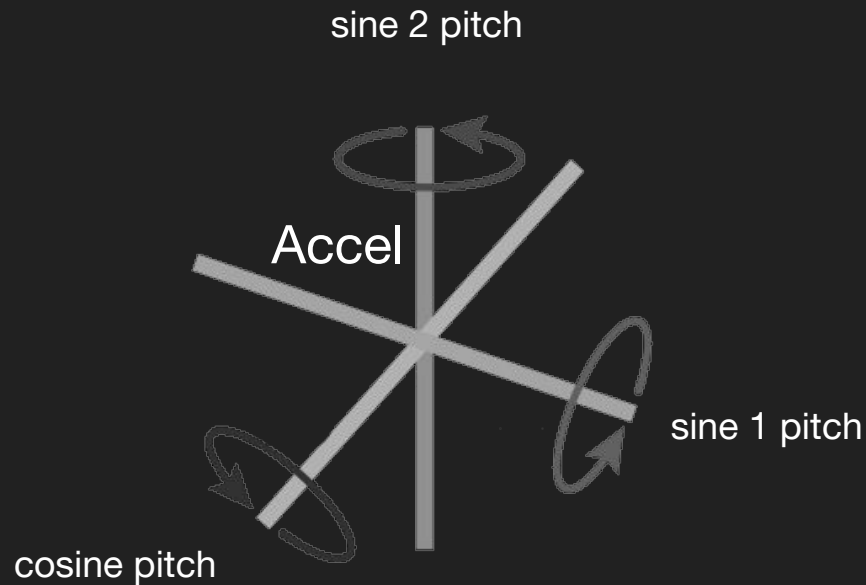
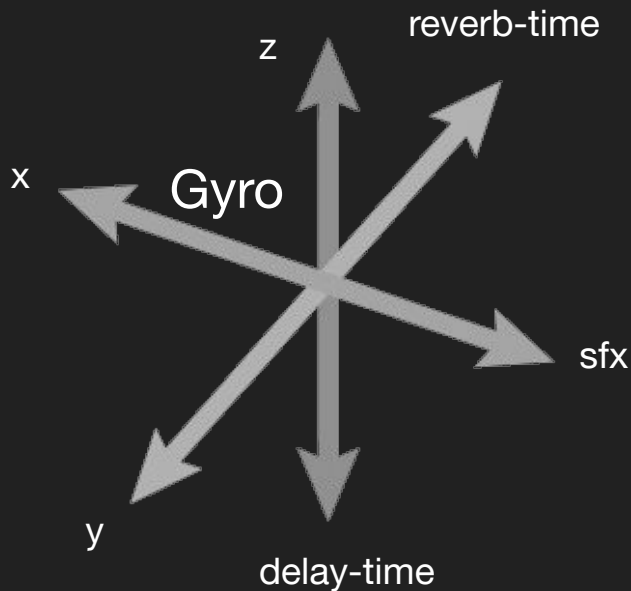


Additive Synthesis

- simple: adding sine waves together
- sine wave / oscillator gets a frequency and amplitude as input
- layering partials (overtones) leads to rich sound synthesis possibilities

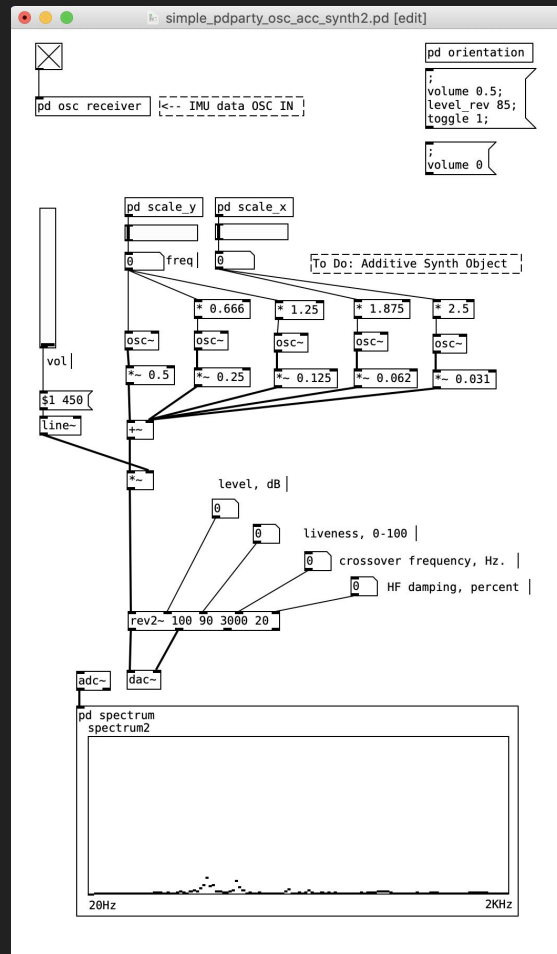


Sound Mapping



Algorithm

- oscillator object with 3 waveforms (e.g. sine, square, sawtooth)
- lookup tables with 44100 samples
- methods:
 - waveform switch (enum)
 - frequency
 - gain



Quellen

- Iosa et al., Wearable Inertial Sensors for Human Movement Analysis (2016)
- Wiemann B., Implementation of an additive sound synthesis for an electronic music instrument (2017)
- <http://danomatika.com/code/pdparty/guide>
- https://en.wikipedia.org/wiki/Additive_synthesis