Teaching Audio Programming using the Neonlicht Engine

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Angewandte Informatik

Introduction

- In our research we develop an *efficient, easy to use, scalable synthesizer engine: Neonlicht.*
- Neonlicht has been developed with the objective to be used as a teaching tool as part of a study program in digital media.
- With the system we like to improve the quality of teaching in the subject area of audio programming.
- *Neonlicht* can be considered a *didactically* meaningful tool:
  - In a first test course students responded very positively to the engine.
  - No one has had any experience in programming in C++, still, with the support of the teachers, they managed to successfully implement large parts of their audio applications

Neonlicht: requirements and implementation

- simplicity of the underlying program structure
- conceptual comparability with existing standard audio applications
- a reduction (!) in the number of audio functions on the didactically relevant
- flexibility and easy expandability of the basic functions
- low resource consumption, enabling the system to
- run on simple and cheap hardware
- high (professional) quality of synthesis and audio output

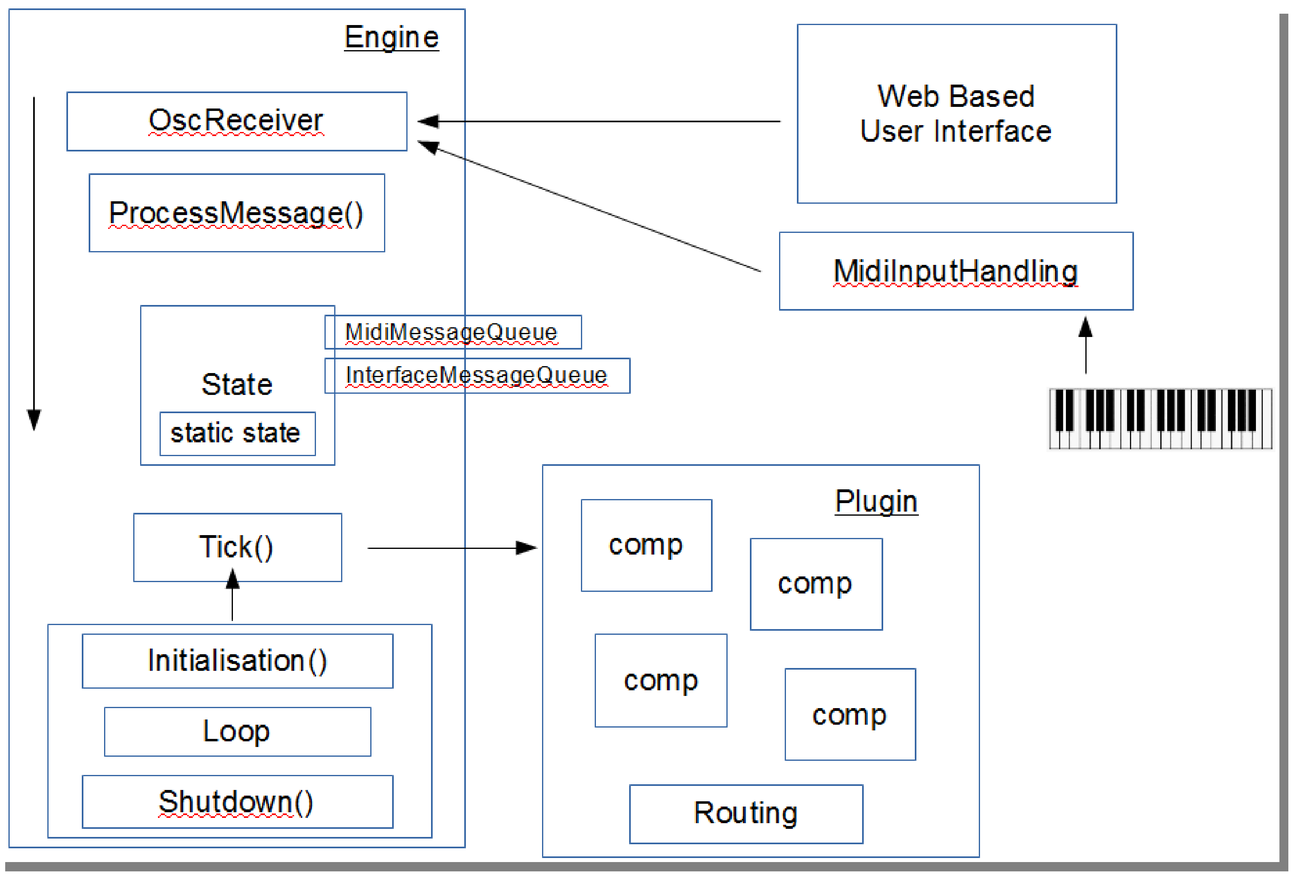

Fig1: The system architecture of the Neonlicht engine

unit generator	*time in µs*
noise1→tick();	0.121
saw1→tick()	0.0314
mixer1→tick()	0.447
square1→tick()	0.0281
onelpf→tick()	0.0389
eg1→tick()	0.053
cosine1→tick()	0.100
phasor1→tick()	0.052
Workshop-16→tick()	1.472

Fig. 2: Time measurements on a Raspberry 3 of a single tick() function call in a subset of the implemented unit generators.

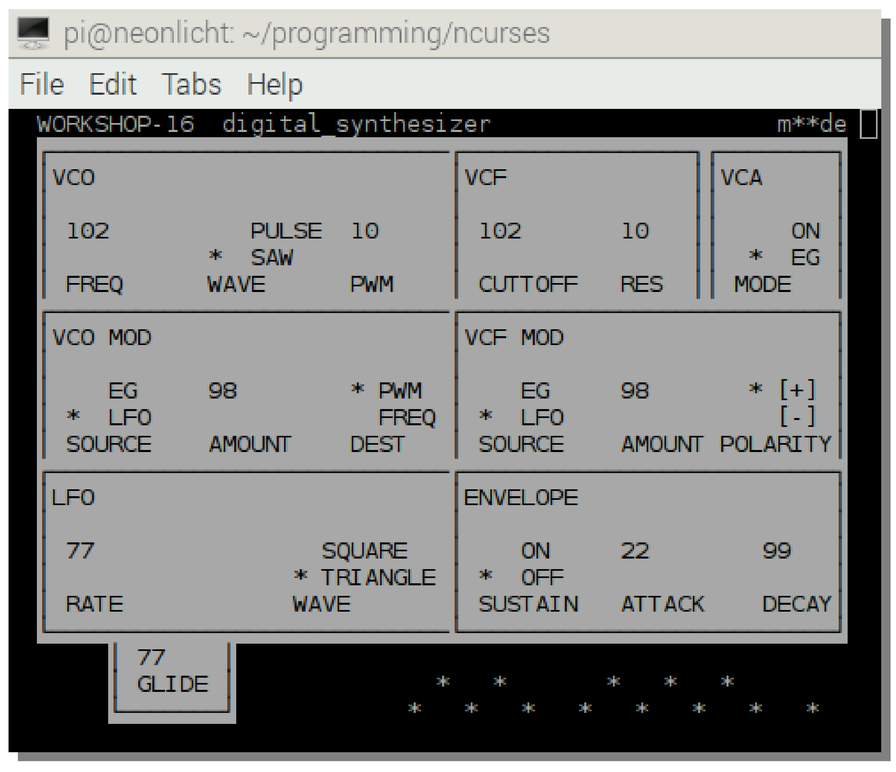

Fig 3: The ncurses interface of the Workshop-16 synthesizer. The GUI of a sound unit developed for Neonlicht could be implemented in almost any technology.

Conclusions

- Neonlicht is oriented towards the efficient development of audio applications in C++ on the Raspberry 3 and offers a high level of abstraction.
- The approach integrates well with a didactic concept of a stepwise teaching method with practical exercises,