Transmutation: Für Holz und Silizium

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Transmutation: Für Holz und Silizium is a multi-channel musical performance that blends the acoustic sounds of a traditional Ghanaian balafon with digital sound processing via SuperCollider. Developed over one and a half years, this piece reflects an engagement with both electronic and acoustic musical forms. The performance initiates with a single strike on the balafon, which is then digitally captured and processed to generate diverse sound textures and structures, including polyrhythmic, tonal, and atonal elements. This transformation involves several custom-developed SuperCollider modules that manipulate the sound through techniques such as feedback delays, chord modulation, Shepard tones, and multi-channel delays. The process culminates in a cyclical return to the original sound. The performance explores the broader theme of transmutation, bridging the gap between analog traditions and digital innovation in a live improvisational setting.

Keywords Minimal Music, Electro-acoustic, Balafon, SuperCollider, Transmutation, Improvisation.
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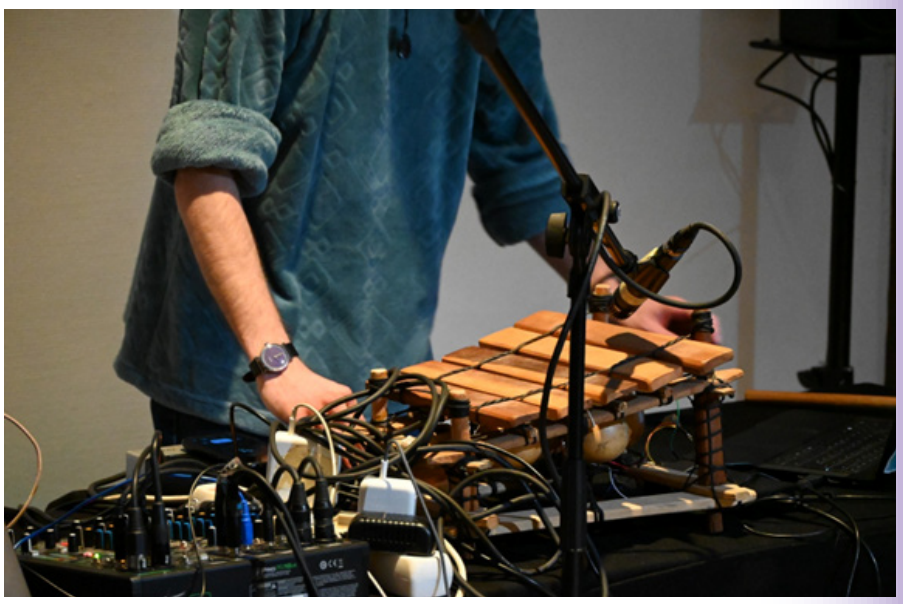

Fig. 1. Photo of the performance at *Errant Sound*, Berlin.

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The performance *Transmutation: Für Holz und Silizium* (Transmutation: For Wood and Silicon) is a multi-channel musical composition with improvisational elements. A Ghanaian balafon serves as the sound material and self-developed algorithms in SuperCollider as the sound processor. By recording a single hit of the balafon at the beginning of the performance, this material is transformed and altered in real time into polyrhythmic, tonal and atonal soundscapes.

Background & Idea

The performance was developed over a period of one and a half years and reflects my relation to electronical and acoustic instruments and media. During my residency at pIAR (perforcrazy International Artistic Residency) in Kumasi, Ghana, 2022, I started experimenting with a five-wood pentatonic balafon that I bought at the local market. At that time, I was particularly interested in experimenting with analog and electronic sound sources combined. But I was also torn between the use of technological media and the acoustic use of instruments, which was very prevalent in Ghana. So, I began to modify the balafon and incorporate it into my artistic practice. Coming from a jazz guitar background, it was important to me to develop an environment that would process everything live and leave room for improvisation.

I decided to start the performance with only one hit of the balafon, which serves as the sound material. This material is then transformed by the technology into all kinds of materials. At the end, it returns to its original form, still sampled. Although the sound is the same, the perception of it is very different due to the experience of the performance.

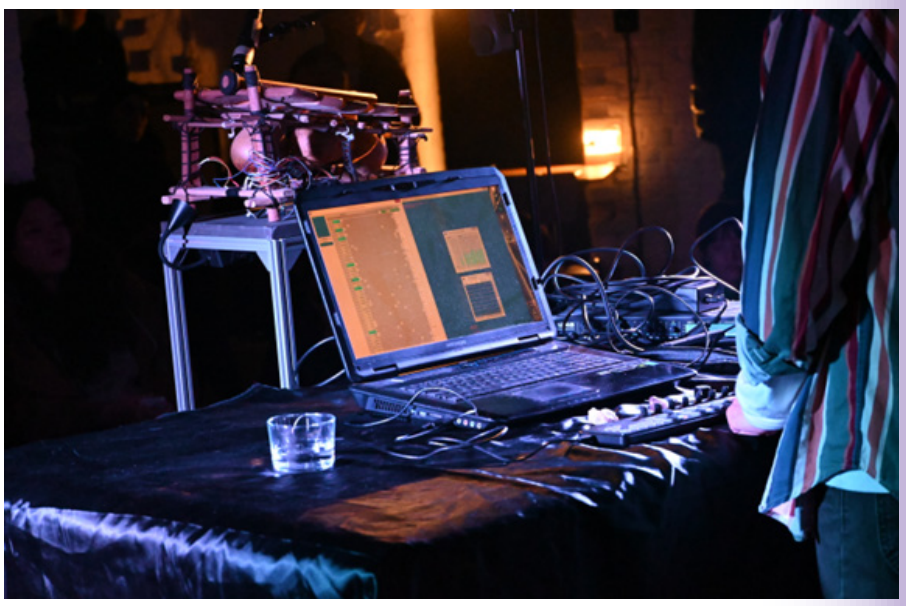

Fig. 2. Photo of the performance at *SOMA ART*, Berlin.

Technical & Artistical realization

Technically, the Belafon serves as the sound source, captured by an SM57 dynamic microphone. It is fed into SuperCollider via the audio interface. Within SuperCollider, the sound is processed by several modules I developed. Besides some extra channels for sub-bass processing, the sound passes through the following modules:

Simple Feedback is just a feedback delay that acts as a looper to initialize the performance.

ChordBuffer captures the sound coming from the feedback delay and channels it into a ring buffer that is read by four headers at different playback rates. These four different playback rates form a four-tone chord. The chord changes periodically, but the selection of the chord is random. There are three chords in five different voicings. The chords are I maj7, II maj7, and V maj7. Harmonization by playback rate modulation instead of pitch shifting not only provides a cleaner sound, but also creates polyrhythmic structures in the respective harmonic relations. Parameters such as tone density, glide between playback rate modulations, and overall pitch control define the sound.

Shepard Buffer is inspired by the Shepard-Risset Glissando, discovered by psychologist Roger Shepard. It gives the impression of a continuously rising or falling pitch, in this case a falling pitch. Five ring buffers record the incoming sound in five different octaves. To achieve the falling pitch, the playback rates are modulated by half, with the highest buffer fading in and the lowest buffer fading out.

Cybernetic Feedback is a self-modulating multi-channel delay. The feedback signal is directly modulating the delay time, slowly crushing the sound into noise-like soundscapes.

Octopus is inspired by elef@nt, developed by Prof. Dr. Alberto de Campo and Hannes Hoelzl. In this case, the module consists of six ring buffers, each with four headers. Each ring buffer modulates the playback rate similar to the chord buffer to different notes, in this case to five different octaves (one octave is doubled). Each buffer is read by four

evenly spaced headers. In addition, parameters such as Density, Master Playback Rate, Lag, Pitchdrift and the Intervals can be modulated.

Spectral Delay is a feedback delay that splits the sound into nine bands. Each band is delayed randomly, depending on the amplitude of the incoming signal. In a second stage, the delayed bands are split again and either frequency shifted or pitch shifted by even numbers. All parameters including frequency range, shift, randomization threshold, and first and second delay phases are modulatable.

HFO is an amplitude modulation of the incoming signal by frequencies ranging from 0.01 to 44100 (sample rate). It crushes the sound and adds texture.

All effects, including multichannel processing, are randomly distributed at each end of the module in the panorama. The piece is dynamically adaptable for N-speakers multi-channel setups. So far, it has been performed in stereo and 8-channel stage setups. In addition, many parameters are modulated simultaneously by a single knob on the MIDI controller. The modulation weight of each parameter is also randomized. This technique is inspired by Prof. Dr. Alberto De Campo and is called INFLUX.

The piece divides into three sections and forms a cyclical movement. The beginning is a single note that is transformed by the *Chord Buffer* into a cycle of three maj7 chords. This is followed by an atonal layer of *Shepard Buffer* and *Cybernetic Feedback*, which introduces the second section. The third and last section returns to the original harmony. This time, however, the original chords are reversed and layered through the *Ocotpus*. Finally, the harmony and rhythm return to their initial state.

Overall, the piece is an experimental approach to the idea of transmutation using analog material and high technology, exploring intuitive practice in algorithmic environments.

Documentation https://vimeo.com/912967760