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Dr. Ulrich D. Einbrodt
University of Giessen, Germany

Alter Garten 6a
35112 Fronhausen
Germany
E-mail: Ulrich.D.Einbrodt@musik.uni-giessen.de

**“Welcome to the Machine“ - Pop Songs out of the Computer: The Era of PC-Musicians.**
(Abstract)

Nowadays, many sound devices are available as virtual computer programmes: Moog sounds, drum machines, sequencers, even a Hammond B3 software is on the market.

The complete accompaniment comes from the PC. Programs like *Cubase* record and combine Midi and Wave files with sophisticated effect plug-ins.

A great deal of modern pop music uses these electronic sounds and recording techniques. As a rule, the only remaining live recordings being the vocals and guitars.

Copying and editing of tracks, mastering of sounds and dynamics becomes a main task of the PC musician: No expensive string orchestra has to be booked, no setting of microphones be planned: Drums, strings, everything is on sound cards or external devices.

The paper will demonstrate the PC musician, show examples of modern popular music, and will put the PC musician as a new kind of “instrument player” beside the traditionally working musician. This kind of recording process has just begun; the paper will venture a look into the future and present possibilities.

**“Welcome to the Machine“ - Pop Songs out of the Computer: The Era of PC-Musicians.**

Besides the classical musician, the jazz musician, the studio musician, the one who sings in a choir, the music teacher, the blues guitar player and many others, the nineties constituted the PC-musician (Wehnhardt 1999: 3), who combined all these special types as he prepares and prints out scores for his orchestra, choir, rock band or theory class; he arranges, records and produces his ideas and saves them to hard disks.

Earlier (10 or more years ago), musicians who wanted to make recordings of their music had to have at least a microphone and a cassette recorder. The result was often disappointing. For more professional recordings, they had to invest in expensive technology such as tape recorders, mixing consoles and effect devices.

A tape machine capable of recording eight, sixteen, or more tracks was an expensive piece of hardware. In addition, the multitrack-tapes that ran at fast speed were expensive as well. Once recorded, no further editing to individual tracks was possible. A mixing console that could handle many tracks, provide at least three band equalisation and routing opportunities was the second important device for recording. For professional results, effect devices such as reverb, delay and compression units were absolutely necessary.

A good reverberation unit as a stand-alone device will cost at least several hundred Pounds. Besides, innumerable numbers of cables, microphones, patch-bays, and other things had to be taken into account. Adding all costs, the equipment is usually far beyond reach for many musicians. A professional studio, therefore, had to be booked for hours, days, or weeks.

Nowadays a personal computer offers exciting – and much cheaper – opportunities. For about 300 Pounds a programme like *Cubase* includes a virtual tape machine with up to 64 tracks. No extra tapes are needed; all recorded material goes directly to hard disk. Also there is full parametric equalisation, a number of built-in effects in amazingly good quality, and the opportunity to expand the range of effects by simply applying other plug-ins. Sophisticated plug-ins as a valve-sound EQ, analogue tape delay, imitations of overdriven magnetic tape characteristics and many others are available.

Furthermore, all virtual devices are already connected; just choose reverb, for example, for one track and delay for another; the modules are ready to work properly.

The PC musician can choose whether to make wave recordings or use midi sounds, in addition, a great number of sound libraries on CD-ROMs offer further sounds for keyboards, such as natural piano or organ sounds, if needed. Also there are sounds of all thinkable instruments and natural effects.

By non-destructive editing and undo opportunities, a PC musician is free to experiment. With the looping, copying and shifting of parts, the work is much more comfortable than with magnetic tapes.

Whitney Houston’s: “My love is your love” is a good example of this modern composing and production technique in popular music: Simple

looping of a Cabasa groove and an also simple synthetic bass line provide the austere, but effective background of this song. The Cabasa rhythm is a typical application of an artificial sound and groove, repeated over and over in perfect timing. A soft rim shot snare is added on beats two and four and very soft in the background a hihat on eighth notes. Programmed just once, this percussive groove goes on for nearly the whole song without any alteration, for it has simply been copied. The ultra low deep bass line is typical as well for providing an artificial, boomy bass sound. The electric piano, however, might have been played and recorded live, but possibly with extra quantizing or editing.

For all who might say a digital recording sounds cold, it is possible to make the recording sound warm or old by applying artificial noise, hum, and even analogue scratching sounds. This kind of technique is often used in modern hip-hop or pop productions for a certain effect.

R. Kelly likes to use this effect often, for instance in his title “When a woman’s fed up”. Here artificial, constant noise is applied to give the impression of an old analogue Long Playing Record that has been played too much. The effect is added only very slightly, louder scratching sounds are not included.

As traditional recording equipment requires lots of space, the PC studio needs no effect racks, no big consoles; everything is in the programme, packed together comfortably. In addition, these programmes are not only designed for recording applications; score printing, sound editing, sequencing, and composing are combined to one luxurious working place.

Therefore, the PC musician will need only one PC as his main instrument. In case more than two signals should be recorded at the same time, a special soundcard that provides several inputs and outputs would be the only extra device.

All-in-one programmes like the described *Cubase* can be combined with virtual drum machines and sequencers. *Rebirth*, for instance, simulates devices like the bass sequencer TB 303 and the drum machines TR 808 and TR 909, all these are hardware devices from the early eighties that gained a kind of cult status and are hardly available nowadays. The programme is able to produce the original sounds in just one software, and with authentic sound quality. This programme can be connected to *Cubase* in such a way so that individual drums go to individual tracks for recording. It is understood that the programme is much cheaper than buying all the original hardware devices.

The song “Alles Goethe zum Geburtstag” (Drum n’ Bass Version) by Uli E. was recorded using the *Rebirth*: Here the *Rebirth*-sounds of two TB 303-Sequencers and the TR 808 and 909 drum machines are combined. Parts of the bass sounds are slightly delayed with the built-in effect. No further programmes were used for this phase of production. This mix, however, was transferred as a basic background into *Cubase* to add vocals and guitars for alternate takes.

Bands like *Kraftwerk* used synthesizers as their main instruments instead of traditional ones. Along with other bands of the Art & Electronic Genre such as *Pink Floyd* they helped to popularise the synthesizer. Usually, musicians want to create their own sounds. In *Cubase*, a software synthesizer is included. Whereas synthesizers are usually an area for keyboarders, most software synthesizers do not have a manual at all; they work like expanders where the parameters can be changed. Similar to the old modular synthesizer systems with many input and output jackets, some virtual counterparts offer virtual cables to join the different modules. There are even many shareware synthesizers available, as “Synthia“, where eight oscillators, filters and mixers can be combined by virtual cables, or “VAZ“, which acts without cables and gives a wider range of modulation possibilities through the use of analogue faders, and a built-in sequencer can arrange a certain number of steps for playback. Both synthesizers are capable of producing Moog-like sounds.

For experimental music, programs like the *Aleatoric Composer* work with random operations and algorithms to create a kind of music that might remind of John Cage’s era of throwing dices.

As *Cubase* is a programme for PC musicians who like to make, compose and record their original ideas, there are also wave-sequencing programmes that tend for a different kind of PC musician. Here, the beginner is aimed at or the musician who likes to use pre-recorded sample material. Programmes like *Dance Engine*, *Hip Hop DJ*, and many others are for those who are not so technically minded and who do not want to bother with original creations. They like to have inspiration by preset sounds and by pre-recorded samples, ready for instant use. These programmes offer the opportunity to create a dance, hip-hop or techno song with a few clicks. These musical styles are suitable for these programmes as they might be structured with the use of comparatively short wave loops. As it is possible to import wave files, these programmes can be used in a more creative way as well, but, however,

not with all the opportunities that *Cubase* offers. On the other hand, many of these wave-sequencing programmes are remarkably low-priced and therefore offer a good start for experimenting. Lately, the market has been expanded by programmes that do not only include pre-recorded wave files for dance, hip-hop, or techno; even wave sequencers for classical music, like *My Symphony*, invite to try out loops of classical instruments that will be combined to sequences that remind of Beethoven or Bach.

With the use of a large number of CD-ROMs that are available with recorded instrument grooves and loops for all styles, wave-sequencing programmes will be capable of producing any possible musical style.

This kind of musical work might seem to be uncreative, as no original recorded material will be taken. On the other hand, the sounds might be shaped by equalization or effects to add an individual touch. What is more, even the sounds produced by diverse keyboards or sound cards are in many cases not programmed by the musicians who make recordings with them. Every musician who feels inspired will try to create original sounds or shape them with the use of sound editing software to their individual needs. Here we might also think of the electric guitar players who are nearly always looking for an individual sound.

Wave sequencers might imply a certain danger: As instrument loops of good quality are available and their number is increasing rapidly, no one will be able to say if, for example, the guitar pattern in a new number one hit is an original idea and recorded by the musician, or if it has just been taken from a pre-recorded sampling pack. Similarly, the complete song or at least its instrumental background might be the result of simple clicking and combining of pre-recorded grooves.

What will be the next steps of the described technology? At first, we realized a kind of miniaturization due to computers: The big audio studio has become a small, but even more efficient computer studio. In addition, the recording and editing process became less and less expensive. This technology will run on even smaller, modern laptop computers as well. Then, musicians are more flexible where to use it, even recordings in rehearsing rooms and live takes of performances will be easier to accomplish.

It will not take long until even a mobile phone will be capable of recording at least two stereo tracks in CD quality, up to half an hour or longer. Then there will be even more versatility for quick recordings and snapshots of musical ideas. As the small displays will not be a good place for editing, the connection of mobile phone and PC will transfer the recording to the PC for further editing.

Programmes will become less expensive as well; there are even smaller versions of the *Cubase* programme, like *Cubasis* or *Cubasis Go!* These versions are excellent for recording as well, but the number of effects and options is limited.

The plug-in technique will be developed further so that all thinkable devices can be applied. Sophisticated distortion for electric guitar players is already available and will be enhanced in quality. All kinds of so-called stomp-boxes will all be soon at hand as plug-ins, unless not already included in the main programme: Leslie for organ sounds, more echo, reverb types and double effects for vocals, octave shifters and so on.

Similar to the Rebirth-programme, were a hardware devices are simulated including their sound features as well as their handling, there is also a Hammond B3 software on the market that provides the famous sounds very closely to the original. Going further this way, virtual simulations of any thinkable keyboard will be available soon, similar to modern guitar processors that are able to imitate several well-known amplifiers.

As plug-ins for simulations of three-dimensional spaces are already on the market, one might think of another possibility: Compared to the hologram-technique for pictures, real three-dimensional audio space needs further development. The five channel-surround sound can be regarded as a first step. A music lover might go further and wish to hear the instruments within his living room, but in their virtual locations as well, i.e. he longs for a playback technique that allows identification of the exact location not only by sitting fixed to one listening position. He likes to go around the instruments as if the band would really be playing in his room; he likes to go around the drum set, to go closer to the cabinet of the guitar amplifier, to listen to the change of sound when moving round the cabinet, as some speaker cabinets have open backs, for example. He also would like to hear the experience of a Leslie cabinet, so as the keyboarder has it on stage - close to the instrument, and fully aware of the rotating speakers.

At this stage, the listener might like to change the positions of the instruments as desired, move the organ from left to right, for example. He also might like to change the volumes. As many mixes are perfect only for producers, some corrections or improvements are worth thinking of. For instance, on many recordings of Michael Jackson the vocals are very low in the mix. One should have the opportunity of changing the individual tracks as desired in volume, effects, and balance.

As DVD-Cds can save a lot of data, movies are often offered in several languages, including alternate camera perspectives and additional

material. On an audio DVD, there would be enough space to save all the original tracks of a recording, including some preset mixes, as the radio edit, the drum ‘n bass version, and so on. With a simple menu on the display of special CD-players of even mobile phones, the listener could run through the track settings and change the tracks, sounds and settings to his or her needs.

The PC musician may become an Internet musician by transferring his files over the Internet and having recording sessions with other musicians. This technology is included in the *Cubase* programme as well due to a plug-in that allows virtual sessions. This technology has just started and it has to be improved by better Internet connections with higher bandwidth and more speed. Thinking of a laptop or even a mobile phone as recording device for quick snapshots of musical ideas, applications that are more versatile would be possible. By converting the recording to an MP3 file and, with the new UMTS standard in mind, the mobile phone could transfer the new musical idea to a friend in seconds.

The PC has to be looked upon as an instrument, though it has neither strings nor manuals. It can be compared to the amplifier and to the effect devices of an electric guitar that are to a great part responsible for the sounding result. Similarly, the more important part depends on how the musician handles his instrument. The music comes out of his fingers and out of his genius.

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