

In the Mixxx: Novel Digital DJ Interfaces

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Abstract

We present an interactive system, Mixxx, for live DJ'ing using digital sound files. The design of the system is approached from two directions: Through Contextual Design using contextual interviews and video recordings and Open Source development where feedback and ideas are generated by developers and users from the open source community. Our contextual interviews show that DJs use a significant amount of their time on tracking and synchronizing songs using the traditional setup with turntables or CD players. By making beat information an integrated part of our DJ software Mixxx, synchronization is done automatically and DJs can use more time to attend other parts of the mix. We provide an intuitive interface for mixing with beat information that allows the same level of flexibility as with the traditional setup but facilitates new creative ways of mixing.

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General Terms: Design, Human Factors.

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INTRODUCTION

Over the last 40 years a new type of musician has evolved, the Disc Jockey (DJ). According to one of the classics in modern DJ'ing [6], the role of the DJ is to “track down greatness in music and squeeze it together.” The musical form and expression of DJ'ing are unique in that already recorded and produced music tracks form the unit of music produced by the DJ. The DJ takes what others have created, blends and alters it, to form a unique *DJ set*.

The work presented here is motivated by the lack of good interfaces for digital DJ software [5]. It is driven from two directions: One is a study of DJ work practices, based on contextual inquiry and video recording of professional DJs playing live. The second direction is that of open source development of the DJ software Mixxx [3, 4]. Developers and DJs who have an interest in DJ interfaces are generating and developing ideas, some of which are outstanding and were not discovered during the contextual interviews. The diversity of the people reached through

open source development is wide and covers both artistic and technical minded people.

DJ'ING TODAY

Like most other musical instrument playing, DJ'ing involves manual tasks that demand specialized gestures and leads to a high cognitive workload. It often takes years of practice to perform the tasks adequately for live performance. The most important tasks include song selection and mixing. Mixing two songs so that they blend together, without an audible start and end of one song, is referred to as *beat mixing* [6]. The process requires *beat matching* [6, 5], i.e. that two tracks are matching in tempo and sometimes also in pitch, in the region where the two songs is mixed. The process involves not only the haptic skill of using the mixer and turntable, but also *split hearing* [6], the ability to attend to different musical pieces in each ear.

Beat matching is a task where technical skill can be shown off but little artistic and creative expression is possible. By analyzing video recordings of DJs in live situations, we have found that a significant amount of time is spent in beat matching, even by professional and highly skilled DJs.

Traditional Setup

The traditional setup consists of two turntables or two DJ CD players and a mixer. Good points about this setup include tangible objects that have to be moved around and manipulated which gives the audience something to look at. The DJ has to do many manual tasks, i.e. search for records, cue records, mix, and apply sound effects. Furthermore, the turntables are good controllers for audio playback. A DJ turntable or CD player has a large platter, that can be used to search for starting points, temporarily speed up or slow down playback, and also has a pitch slider that is used to adjust playback speed. Furthermore, the devices have few or no modes and are simple to operate. However, the setup also has problems, the equipment and records are heavy to transport, the change of tempo involves a change in pitch, something that is not the case with digital DJ equipment.

DIGITAL DJ'ING

Over the last five years, research and development of digital DJ systems has started and evolved. Today some of the leading commercial systems [1, 2] are stable and give visual feedback and efficient control through the use of analog DJ turntables. The turntables act as controllers to the DJ software, and thus bring together the efficiency and portability of digital music, with the effective control of the

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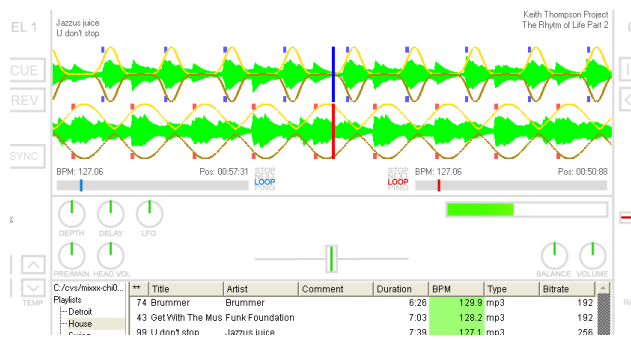


Figure 1. Screenshot of two tracks in Mixxx with BeatFilters and automatic beat synchronization. The yellow lines show the regions where the BeatFilter is applied.

analog turntable. However, the solutions provided by leading software such as Traktor [1] are based on the traditional DJ setup metaphor, i.e. two playback devices and a mixer. This setup has proved useful over the entire history of DJ'ing, but was formed not only by its practitioners but also by the limitations of the analog equipment. Only few attempts to provide new ways of interacting with the music has been explored in a commercial setting while at the same time focusing on the music track as the fundamental unit of musical performance.

In academia, projects such as AudioPad [8] and Block Jam [7] have demonstrated new and intriguing ways of controlling musical playback. However, such systems are based on sequencing software not designed for playback of already edited music tracks but rather composition from pre-arranged samples and synthesis engines.

IN THE BEAT

Based on input from DJs and developers in the design of Mixxx, and our work in analysis of the DJs work practices, we have proposed a new interface where the central idea is to lower the cognitive load of beat mixing, and at the same time provide a new way of mixing that allows for open ended transformation of songs.

The workload is lowered in the live situation by using digital music with annotated beats. The beat information is used to provide automatic synchronization of two tracks, and effectively removes the burden of beat matching. This feature is also found in some commercial software. Temporary speed changes of the songs allow for adjusting the phase offset of the beat in the synchronized songs. Thus the same level of flexibility is preserved as in the traditional setup, where no automatic synchronization is available.

Mixxx allows a new way of driving effects and filters that is synchronized with the beat in the music. We call the technique BeatFilter, essentially a time localized filter. Using BeatFilter it is possible to apply a filter or a sound effect only to a part of the song relative to the beat, e.g. to filter out only the bass drum or hi-hat of a song (Figure 1),

and use that to blend with other musical tracks. This is done without continuously attending the filter knobs of the mixer.

Combining BeatFilter with automatic beat synchronization, it is now possible not only to remove the manual task of synchronizing two tracks, but also to provide a more effective way of applying time varying filters. This allows for open ended sound and timbre changes. With BeatFilter it is possible to use only small components of a musical song, and thus more playback devices can be provided to the DJ without him getting lost in the manual task of beat matching.

CONCLUSIONS

Based on input from the Open Source community and analysis of DJ work practices, we have designed Mixxx, a new system for digital DJ'ing. Benefits of Mixxx include: 1. Cognitive load is heavily reduced by introducing automatic beat mixing, and 2. BeatFilters that allows for creative and open ended mixing of multiple tracks, by blending timbre relative to the beat of a song. While automatic beat mixing is also possible using commercial DJ software, BeatFilters provide a new feature with an open ended design and at the same time preserves the music track as the basic musical unit in DJ'ing.

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