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Building a Library of Samples (Kontakt) of The Uzbek Traditional Dutar

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With the development of the media industry (film production, production of computer games, advertising), musical works created using digital technologies have become especially in demand. Such a genre of musical composition as trailer music was born - music for film advertising (trailer, teaser). A similar genre is characterized by the use of various audio effects libraries and musical instruments. Over the past decade, a galaxy of digital musical instrument library companies has grown. Among the companies, such giants as Spitfire, Cinesamples, Heavyocity, Soundiron, Native Instruments [1] etc. Some are focused on reproducing the sounds of the instruments of the classical orchestra in digital format, others on creating libraries of traditional folk instruments. Famous such libraries as of Arabic instruments, Turkish, Iranian, Indian, Japanese and others. The companies are focused on the production of digital instrument libraries, which are almost as good as the living ones in sound quality. Digitalization of musical instruments is a historical process that takes place in technogenic civilizations.

From the history of Uzbekistan, it is known that in 1935 work was carried out to unify folk instruments. One of the goals of this work was the need to familiarize the broad masses with polyphonic music and the achievements of world musical culture through folk instruments. The instruments that were created “not yesterday” were rethought in their mission for the benefit of the ideology of equality and enlightenment of the broad masses: “Folk instruments, as the most popular, had to play an important role in the widespread promotion of musical literacy, in fostering the perception of polyphonic performance and identifying folk talents. However, the lack tempered, incomplete, insufficiently wide scale, the weak sound of most instruments and the overly strong of some of them limited their use on the concert stage, narrowed the repertoire, and did not allow the performance of works of other peoples” [2].

In a short period have been created:

1938 – Orchestra of Uzbek folk instruments;

1943 – a special experimental laboratory for the reconstruction of folk musical instruments;

1948 – Department of folk instruments (Tashkent Conservatory);

1949 – Chair of folk Instruments (Tashkent Conservatory).

By 1977, the production of advanced folk instruments reached 80 000 instruments. The goal has been achieved. Polyphony was widespread among the masses, but what was the price? The authentic modes characteristic of traditional music has been forgotten for a long time. And only in 2012, the Omnibus ensemble team recreated the playing in authentic Uzbek scale within the frameworks of the Maqomat project [3].

Digital tools are created for those who do not have the opportunity to use a real tool, because:

- 1) the cost of a real instrument is much higher than a digital one;
- 2) the composer does not have the opportunity to master the instrument;
- 3) there is no way to resort to the services of an instrumentalist for various reasons.

Thus, acquiring a digital instrument, the musician uses it at any convenient time and at the same time does not incur additional costs. Digital technologies are practical and tend to attract more youth.

The first native library of samples of the Uzbek traditional dutar was released. This became possible for several reasons, for example, on August 15, 2017, a resolution was adopted by President of the Republic of Uzbekistan Sh. Mirziyoyev PD-3212 "On the organization of the Union of Composers and Bastakors of Uzbekistan" [4], which helped to strengthen the material and technical base of the organization and made it possible to directly implement ideas on creating a library of samples of the Uzbek traditional dutar. Team work with the famous performer on the dutar, ustoz Guzal Muminova, who is especially open to experiments, and sound engineer Gafur Makhkamov, as well as complete creative freedom in the recording

studio at the Union of Composers and Bastakors of Uzbekistan, were an incentive to develop a digital analogue of the dutar.

Dutar is a traditional two-stringed plucked instrument of the peoples of Turan and Iran. Playing techniques vary by region. The mastery of the instrument lies in the ability to perform many different techniques of the left and right hands.

The creation of a digital analogue of the instrument would not have been possible without an integrated approach, interdisciplinary interaction. Sound engineering, design and programming – three whales, thanks to which it becomes possible to create a library of samples.

For clarity, we give a list of the stages of work on the library and short advices on the implementation of its creation:

1. Analysis of the capabilities of the instrument.

At this stage, information about the instrument is collected. This list may consist of data on the techniques of playing the instrument, on the range. In the performance on dutar, there are a lot techniques of the right and left hand (bilak zarb, rez, pirrang, mordent, arpeggio, pizzicato, etc.) mainly play in parallel intervals such as a 4th, 5th and less often 3rd.

2. Analysis of foreign libraries.

KORON Library - Iran's traditional instruments include string-plucked instruments, one of which is tanbur [5]. The technique of playing the Iranian tanbur is a bit like playing the dutar. The weak point of this library is unrealistic tools. The realism of the sound of a digital instrument is achieved in various ways, one of which is an algorithm at the random circle programming level - random repetition of various samples within the same sound. Thus, the humanization of the sound of a digital instrument is carried out. A similar algorithm is absent in most libraries of high-altitude instruments, which paradoxically does not affect the reputation of companies producing libraries.

3. Creating a library structure.

A text file describing the structure of each element of the library, it can be a map of the location of sounds in digital format, their names and categories, which are grouped according to performing touches.

4. Creating a UI / UX layout.

Based on the structure of the library, a user experience (UX) design is developed, which is a schematic arrangement of design elements from the perspective of their practicality, and then a user interface is developed i.e. graphic design (UI), what the end user sees.

Pic.1. Library design.

5. Writing a part for recording in the studio.

A musical part of the instrument is created in which each sound is written, the technique for its extraction and dynamic shades, sorted by category.

6. Analysis of sound in the studio.

Before the start of the studio session, it is necessary to examine the room for sound refraction zones. Such areas may affect the quality of the recorded sound. It is important to eliminate any acoustic noise, otherwise after audio monitoring it turns out that the sample is unsuitable for further processing.

7. Recording a party in a studio with a performer.

For example, recording only one non legato in a studio can cost several sessions of several hours.

8. Slicing samples.

Having received the audio tracks, we proceed to the stage of slicing into short samples. We pay attention to the attack of sound and attenuation. In places of attack, shock noises arise, which then turn into a distinct pitch. It is important to find a time point where the noise quickly changes to tone, so we won't lose the strike component of any sound, especially dudar.

9. Zoning samples in Kontakt.

After slicing and preparing the samples, they are placed in the Kontakt sampler. Zoning of samples is the placement of sounds by pitch, by category in the program editor. The number of samples, depending on the size of the library, can reach thousands of units, and the amount of data can be several gigabytes. Keep in mind that with a volumetric instrument, the load on the processor increases and the final result cannot be the same in its performance on most computers. One personal computer will cope with the task, while the other will freeze. To avoid this, you need to plan the structure of the library before recording in the studio. Otherwise, it can cost large financial expenses at the design stage.

10. Creating a script.

A script is a program code responsible for implementing all active library elements during use. The Kontakt sampler uses its own KSP programming language. You can learn the basics yourself, but more detailed mastery will require

time-consuming from a year or more. In Europe and the USA, for example, writing code is estimated at \$ 500-1000. If you do not have such an impressive amount, perhaps the project will interest someone in specialized forums for amateurs and professionals creating libraries, in which case, the script will be implemented. Remember that for creating the code, the programmer may require royalties from each sale of the library and discuss this point before signing the contract.

11. Testing.

The final stage in the development of the library is testing the operation of each active element of the system. Simulation of the game by the user in various conditions, such as pace, dynamics, texture.

The full period of development of a digital instrument, depending on the complexity and availability of financial resources, can take from several months to more than a year.

Industry development is moving towards a more realistic sound. A similar trend is characteristic of most visual-digital technologies, where perception plays a significant role. Over teams of sound engineers, composers, designers and programmers work to solve problems. A movement in the direction of technological progress in music technology may begin in our country. Developing industries such as musical instrument factories and digital musical instrument analogue companies. In the future, there will be a noticeable disproportion in the number of graduates of the conservatory and vacant places. It is important to create multi-disciplinary projects that drive the uniformity of musical specializations towards complementarity. We believe that this is feasible that the projects are not dependent on the ethos of musical universities and their subordinate organizations. The consolidation of the creative and scientific community of the Republic in ambitious interdisciplinary projects is necessary. First of all, such a movement is an increase in additional jobs for artisans, sound engineers, composers, designers and programmers.

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