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Extension To MusiQue – A Dynamic Platform For Music Interchange

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Abstract

Application of technology restricts its boundaries to only technological advancements of pre-existing main stream entities (Such as mobile phones pc's and virtual technologies such as Artificial intelligence, Mean Stack, Neural Science Data mining and IOT etc.) The Study has been done to follow and amend the applications of these technologies to the welfare and development of Music Industry. As the world proceeds towards the more and more Board Based(Computer Based) implementations. The way of existence of traditional music industry must also evolve by the introduction to these technological facilities to it. The more it (Music Industry) evolve, leads to the increase in reach of people who pursue music and the way it is perceived .It will also open doors to change the use of Music entities based on traditional ways and implemented in a virtual and more advanced manner. The physical presence of the instruments and traditional way of teaching application and the enactment of various instruments in accordance to it has a physical presence boundation. Physical boundation leads to unavailability of instruments to greater learning capacitive audience. The traditional ways are restricted to have an external interface and their execution via digital/virtual presence will open doors for the further growth of the industry. The motive is to fetch the physical music system and set-up a virtual portal to implement whatever the traditional music and instruments can do, just very efficiently. Virtual Instruments, Microphone- Adaptive Tuner, Groove-Pad, Stave Reader/Generator, Randomizer, Recorder-Looper and Interactive music theory are simple yet very effective norms of music that are to be implemented. The implementation of virtually active technology in music can definitely produce effective music without the boundation of physical purchase and presence of instruments, that even correlates well with interface based learning as well as increased growth areas for further developments in the manner. The virtual instruments allow users to explore music, practice it, further develop and intervene in music industry that has far more greater capabilities of its application. Despite its initial development, there exists far more different and innovative, custom based ways to implement and develop these technologies which indeed proves that the door offered via virtual existence of this technology in this field have unbounded real-world applications that are far more diverse and effective in inclusion to the traditional ways.

1. Introduction

Music has always been implemented and seen in a traditional and physical manner. It has played a greater role in improvement of physical skill towards the music by the practitioner. But seeing the music only from this angle has turned out to be a limitation in the expansion of this field technologically. Mere finding Research Papers on this specific topic show very narrow results which proves the bounded response from both music practitioners and developers. The study has been done in order to figure out the ways in which these two(virtual technology and music) can be collaborated. In this rapid world people need to grab and experience everything quick, and that's where the traditional music will fall out. The traditional music requires large amount of time for muscle skill development over a particular instrument. This also increases the production and usage of natural resources that commit a part in the either the development of the musical instrument or related activities that consume resources on its basis. The collaborated implementation of these technology will redistribute the resources this industry(music) requires and redirect the way people perceive

music, it can lead to a new dimension to the music practitioners, which will be far more convenient, quick learning, adaptive and wide for further developments. The most used and flexible technologies –

HTML, CSS, JAVASCRIPT, MUSIC PRODUCTION TECHNOLOGIES are capable of creating this bridge in this regard.

HTML - The language offers a structural way of presenting the basic skeleton of various designed element.

CSS - CSS offers a wide variety of tools to improve and create well balanced interface that plays a great role of importance in how the instruments are oriented physically and are presented virtually.

JavaScript - The motive of this study has been to implement what a traditional instrument of technology in music does, just very efficiently. The java script offers to create those logics on which these various instruments are based upon.

Music Production - A music production software will allows a user to create customized tone /texture of any possible instrument, beats, metronome or to render pre developed tones.

2. Literature Review

Collaborative implications for music and technology have been proposed earlier as well. It is evident, that the piano was invented in the 1700 century in Italy. The instrument found its popularity as it is a key as well as a string instrument which itself defines its beauty. In a survey conducted by the Japan-guide.com in 2001, Piano was found to be the most popular and commonly preferred instrument of all time*[1]* and henceforth it has been evolving with its physical structure but overall the traditional structure is somewhat the same even when produced from factories or handmade customized pianos. According to another survey by YAMAHA, Synthesizers, which are a mini-digital version of pianos are gathering popularity these days due to portability, affordability, and the possibility of adding more technological advancements in them*[2].* The sound, if considered as a physical quantity, can be categorized on the behalf of-either a sound can be useful for us within a frequency (called music) or a sound that is not useful(or non-musical sound over a specified frequency). The book RAAG TAAL DARSHAN By-Akhil Bhartiya Gandharv Mahavidyalaya states that "dhwani" (*means sound*) can be considered in two ways - "Sangeetupayogi" (*useful for music*) also called "NAAD" and "nirupayogi" (*irrelevant for music*) *[3]*. Hence the very existence of any instrument or any part of music is based upon this principle which arises the need to tune instruments in order to get a useful frequency. An instrument can be tuned only my matching a pre-defined frequency with the required frequency of the instrument by lowering or increasing the observed note frequency. A sound turns into a music composition as soon as it follows a rhythm. Rhythm is a set of well defined "small intervals of sound" that repeats itself a given number of time within a given time signature which the music follows. Time signatures(a specific type of time interval) facilitate the further feasible manner to present the beats among the music baseline. It is as important to represent music as it is to play music. It allows one to learn a pre-composed arrangement quickly and provides a faster and clear interpretation of notes in a written manner*[4].* Music is easier to study and share if it is written down. Western music specializes in long, complex pieces for large groups of musicians singing or playing parts exactly as a composer intended. Without written music, this would be too difficult. Many different types of music notation have been invented, and some, such as tablature, is still in use. By far the most widespread way to write music, however, is on staff. In fact, this type of written music is so ubiquitous that it is called a common notation.

3. Proposed Model

By playing a specific note, while making an instrument play that particular frequency in a specific time signature (i.e. the set of given time intervals divided into equal parts) completes the music. Each of these can be implemented by either creating a virtual instrument, tuning the given instrument and including the time signatures or in layman language-Rhythm implemented via production of beats.

3.1 Pre-Requisites an Instrument

The first requirement to create an instrument is to know the instrument. Each instrument has a different structure by which it implements music. Different instruments are categorized on the basis of their structure(the physical appearance), the note producing entity in the instrument, the way in which notes are oriented on the instrument and the Specific way in which one is required to interact with the instrument. For example the piano consists of a box type structure containing different number of keys, depending upon whether it is a regular piano, Grand piano or synthesizer. The piano is an acoustic instrument consisting of keys and strings. The length of the string is inversely proportional to the octave of a key (i.e. b3 key will have a longer string attached to it than b6 key where 3 and 6 denote the octave in standard music theory). Whereas synthesizer, also known as electronic/digital piano is just a compact and pre-set

version of an acoustic piano. In comparison to piano it has less warmer sound and is comparatively Touch sensitive (i.e. The volume of the note played is proportional to the strength by which a key is pressed). Creating a virtual piano would require an interface i.e. structural representation of piano(a structure that looks and operates like a piano). The structure will include the set of keys presented in Chromatic order (The original and standard arrangement of notes) whereas a physical piano can have as many as 1200 parts*[5]*.

3.1.1 Creating an Instrument Virtually

Each key should be able to play a pre-recorded sound of the same octave and same note increasing as per standard chromatic rules. Another way of implementing it could be, selecting a note frequency for a key and by increasing the note value as per chromatic as the key value increase, the frequency shall also increase. For example note A has a frequency of 440Hz in 4^{th} octave which means the instrument's sound producing entity can vibrate 440 times in a second if the tone quality matches 4^{th} octave. Now by increasing the value of Hertz for say for 26.2Hz,it will produce the tone for A# note i.e. 466.2Hz. This can easily be achieved by implementing through JavaScript. Similarly it can be implemented for all 12 chromatic notes as well.

3.2 Tuning

Tuning an instrument means balancing the frequency value of the sound producing entity such that it becomes useful in the context of music. Different instruments have different tuning or no tuning /permanent tuning. For example the acoustic guitar can have standard tuning(EADGBE),drop D tuning(DADGE) etc. The piano has permanent chromatic tuning (A A# B C C# D D# E F F# G G#)over any number of octaves. Any beat instrument requires tuning as well. The pull on the diaphragm determines the note value, which can be increased or decreased by adjusting the tension on the diaphragm.

3.2.1 Tuning Virtually

A tuner can be created in two ways:

1. The first method requires the presence and skill of a musician. A tone of same frequency and same texture (preferably) is produced by an already tuned instrument (master instrument). The master instrument could be any perfectly tuned instrument although Tanpura is preferred to tune most of the instruments. A harmonium or keyboard that has a good sustenance of sound can also be used for tuning purposes. Creating a virtual tuner of this type would only require the standard tuning set and pre-set of tones by which a specific instrument can be tuned .The interface should be able to play each sound for a substantial amount of time for say at least 5 seconds and allow the user to tune in.

2. The second method is by dynamic implementation using microphone. A system is needed to be developed according to the standard set of frequencies for particular instruments. Each frequency has magnitude. The user plays the instrument and the real time audio via microphone is taken as input to the system the virtual tuner compares the input frequency and standard frequency. Depending upon how less or more the input frequency is, the system shows the amount of frequency left or excess which is required to meet the standard frequency.

3.3 Beats

A beat denotes a looped sequence that repeats itself in a given time interval. A sequence of beat is or various beats that fit in together are referred to as rhythm. A beat is different from a note playing instrument as the beat is played for a very small time interval and is strongly sustained on a specific note only, variation in the note value is not allowed. There are different categories of instruments that offer beat production as Drum-set(that can also internally differ depending upon the number of pieces it offers), Bongos, Tabla, Dholak and many more. The instruments differ from each other due the tone quality of the material by which a diaphragm is made and the scale/root note on which it is tuned.

3.3.1 Creating Virtual Beats

Virtually developed beat producing instruments can be really innovative. As only a slight change in the tone/texture of the beat can create tremendous number of beats. One way of implementing it will be producing looped beats in time sequences, a row of a specific type of tonal beat quality is selected and is a time interval with specific number of time signatures. Another beat with a different tonal

quality, same time interval and time signature is also selected that can over-lay on the previous one. In the same way any number of different types of beats can be added in the same time interval and signature. Another way of producing beats could be a free-way method. Pre-sets of sounds of different beats are selected. They can be arranged in a matrix or any other feasible form. The difference from the previous method of implementing beats is that these will be completely customizable. The beat should play when and only when user plays that beat and not in a loop. This will allow the user to manipulate the type and sequence of beats as per requirement and versatility. The beauty and variation of this type offbeat production is limitless and serves a great demand in music-industry.

4. Phases of Proposed Model

The development of such a collaborative approach can be visualized in 2 phases:

4.1 The System

The system should be capable of producing and generating the exact orientation and logic being the instruments and various indirect resources that corresponds to it. The physical logic and the music theory must be combined in such a way that logic correlates and presents exactly what the instrument is trying to do.

4.2 The Interface

Each instrument has its own type of structure. The sound that the instrument produce depends greatly on the way the notes are oriented on that particular instrument. Though the music theory is all the same for each and every instrument but every instrument has this capability to produce the similar set of notes in a different way. For example, a string instrument will allow sliding over notes but a key instrument will not. Moreover the interface should be designed in such a way which is user friendly i.e. it looks like a traditional instrument, works like a traditional instrument, interact like a traditional instrument but is far more accurate, easy learning and efficient.

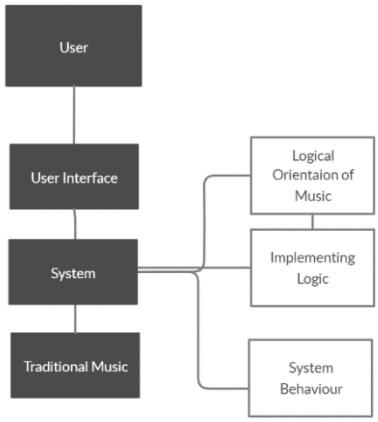

Figure 1: Dataflow Diagram Of Phases

5. Conclusion

Implementing and combining the present level of technologies gives a wide approach to the user. It not only makes it resource efficient but also makes music available to the greater audience. The implementation shows that in no time there will be more and more developments in the same field which will require fast processing and easy availability and here's where these type of advanced and combined technologies would serve in. This has been mere a method to study how the music industry can move on to a different road of perspective of seeing music ,how the basic and intermediate traditionally observed musical entities can be implemented using current technologies. Although this concept has a limitation of pre-set values but these will certainly get diminished as soon as we will proceed more in the concerned development of interface based musical instruments that support both physical and virtual presence. In this paper we have observed how various technologies can be used to orient music using basic web development technologies (HTML, CSS, JavaScript) with inclusion to music production to make music more efficient and feasible to all.

6. References

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