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Abstract

The Pitch-Bend controller is probably the most widespread commercial ancillary controller found on keyboard synthesizers and controllers. Due to the polyphonic, harmonic nature and the notation of Western Classical music, pitch bend has never been a significant parameter for musical expression. In general, pitchbend controllers are used little or not at all in synthesizer performance. Asian music traditions, such as the South Indian Karnatic and South-central Vietnamese Ca Hue traditions, demonstrate unique pitch-orientated ornamentation. Accurate, computer-transcriptions of ornamentation have been undertaken and new performance techniques for synthesizer have been developed in order to perform traditional repertoire. This poster presents the basics of Karnatic music and Ca Hue music ornamentation, in theory and practice, together with a discussion of performance strategies such as controller techniques and instrument configuration

Introduction

This paper presents the results from a single project of a broader research effort aimed at developing a new music repertoire for live-performance-based synthesizer ensemble. This project aims to adapt virtuosic performance practice and string-instrument instrumental techniques from selected Asian music traditions. These Asian music traditions include the densely ornamented South Indian Karnatic music and South-central Vietnamese Ca Hue music traditions. Other concurrent areas of research include: a historical survey of synthesizers and synthesizer control interfaces, a study into the aesthetic symbolism, iconography and design of the South Indian vina, the development of the LDR controller, the construction of ensemble of LDR control interfaces (2 LightHarps & a LaserLyre) and the development of notation for the ensemble. Private vocal and instrumental tuition was also undertaken on a regular basis in Karnatic vocal, Vietnamese-Đàn tranh (a 17 stringed Vietnamese zither) and-Đàn bầu (an unusual Vietnamese monochordal zither)

Karnatic music

The South Indian Karnatic Music tradition is very rich in ornamentation and the music lacks true vibrato or modulation (Deva, 1981). The tradition boasts the existence of over three thousand different *ragas* or melodic sets of *swaras* (*swara*; a pitch combined with ornament). Often *ragas* with exactly the same pitches are distinguished by ornamentation or *gamaka*. *Gamaka* is a comprehensive term and includes all shakes, glides, trills, swings, stresses, cuts and jerks (Kumar, 1987). With the exception of cuts, *vettu*, all of these ornamentations are pitch-bend type gestures. *Gamaka* performs an integral, rather than just a decorative function in Karnatic music. *Gamakas* are pitch specific and in addition have specific ascending (*arohana*) and descending (*avarohana*) forms. Pitch-bend is also used to define the tala and beat structure through sung vowels while other *gamakas* are related to phrasing, melodic cadences and virtuosic performance practice within *raga* extemporization.

The study focused on three main systems of contemporary *gamaka*: the "Panchadasa" vocal and vina *gamakas*, the instrumental system of ten *gamakas* and Subramma Dikshitar's system of "fifteen *gamakas*". *Gamakas* included in the study are; *karpita*, *lina*, *andolita*, *plavita*, *sphurita*, *pratyahata*, *tirupa*, *ahata*, *ravai*, *khandimpu*, *vali*, *jaru*, *kurula*, *nokku*, *odukkal*, *orikai*, *tribhinna*, *namita* and *misrita gamakas*. *Gamakas*; *tirupa*, *sphurita*, *karpita*, *lina*, *andolita*, *plavita*, *vali* and *kurula* belong to the family of oscillatory *gamakas* and are differentiated by their respective oscillatory speeds, (Ayyangar, 1980). Other *gamakas*, such as; *ravai*, *ahata*, *pratyahata*, *khandimpu*, *nokku*, *oddukal*, *orikai*, *erra-jaru* and *irakka-jaru* belong to the family of accents, stresses and slides. Although *ahata*, *pratyahata*, *nokku* and *odukkal* are all similar stress type *gamakas* they are differentiated by their technical execution on the vina and violin, (Swift, 1990), (Viswanathan, 1977).

Vietnamese Ca Hue

The art of musical ornamentation in Ca Hue music is known as *hoá mỹ*, which can be translated as meaning "artistic flowers"; (*hoá* –flowers, *mỹ*– as in *Mỹ thuật* a term meaning the "Arts"). Another term for ornamentation is *luyênláy*. This term literally means "bending" and is similar to the Karnatic term *gamaka*. *Luyênláy*, is also used as a term to describe the groupings and combination patterns of smaller specific ornaments some of which are instrument specific, (Nguyen, 1984), (Hung, 1990). The melodic inflexions found in the spoken Vietnamese language also form an important source for the creation of musical ornamentation.

There are two ornaments that are common to both vocal and instrumental traditions; *rung* and *mô*, (Hung, 1990). The term *nhấn*, is sometimes used in conjunction with these other terms and translates as meaning pressure. *Rung* is a pitch based oscillatory ornament which demonstrates a uniform oscillatory speed. Unlike Indian music *gamakas*, oscillations in Vietnamese music are not further subclassified by their pitch compass and speed. The ornament *mô* is best described as a 'perk' or stress, (Hung, 1990). It is performed on the *dàn tranh* by bouncing the finger of the left hand on the string resulting in a sharp rise and fall in pitch. Perks can be played singularly or repeatedly, like *sphurita gamaka* on the *vina* in Karnatic Indian music. *Mô* and *rung* can be combined to form ornamentation aggregates or *nhân luyênláy*, (Hai, 1984). Ornaments specific to the *dàn tranh* are the terms *voát* and *nhay*. *Voát*, means sliding and could be best described as a slur or slow bend to reveal a higher tone. *Nhay* means jumping and is a faster accented slur to a higher note, (Hai, 1984).

Transcription and Synthesizer technique

Data was collected in the form of recordings made of Melbourne based musicians. Performances were recorded and then digitized and analysed by a Macintosh computer. An analyses program was used to determine the fundamental frequency and transcriptions of the ornaments were obtained. Ornaments were studied first in isolation and then in the context of traditional repertoire and improvisation. Microtonal tuning systems were programmed directly into the synthesizer and via computer using the program MAX.

It was found that Karnatic music could be adapted to synthesizer quite successfully. In order to do this however, the use of a breath controller (to control volume) and the use of a pitchbend wheel-extension proved to be necessary. The best form of pitchbend extension was found to be a 4-5 inch section of lightweight bamboo. A pitchbend range of +/- 5 semitones was found to be adequate for the execution of nearly all the *gamaka* with the exception of *jaru*; slides. It was found that the performance of *jaru* (slides) could be accomplished by the use of synthesizer portamento. Complex and virtuosic *stahya* and speed phrases were adapted to synthesizer in mono-mode while others could be played entirely on pitchbend controllers.

Adapting Vietnamese ornamentation and instrumental techniques proved to be more difficult. Firstly, ornamentation associated with the monochordal zither, the *dàn bầu*, proved to be very intricate and virtuosic. The use of synthesizer modulation for *rung* ornamentation was soon abandoned due to the subtlety and variation of these ornaments. Negotiating the dead-spot of commercial synthesizer controllers was also difficult. Some success was obtained using a magnetic proximity controller to effect pitchbend but a great deal of practice is required to master this. *Đàn tranh* techniques were harder to translate to the synthesizer due to the use of polyphonic pitchbend. Polyphonic pressure and the use of multi-timbral setups, proved to be the most successful approaches to dealing with this issue. Designs for a specialised LaserZither synthesizer controller are in progress to deal more specifically with this issue.

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