**Graeme Smith**
**Andrew Johnston**
Creativity and Cognition Studios,
University of Technology, Sydney
PO Box 123
Broadway, NSW, 2007
Australia
grasmith@gmail.com
aj@it.uts.edu.au

# Interactive Software for Guitar Learning

## Abstract

*In this paper we present software designed to help address problems encountered by beginning guitarists, using interactive software to find effective solutions to enhance the learning process. Software can be utilised to improve a player's ability to hear mistakes in their performance, as well as to create a fun and entertaining learning environment to motivate the player to practice. A software prototype has been developed, which served as a basis for usability testing, to highlight the usefulness of various methods of feedback and provide a way forward in developing valuable software for guitar tuition.*

## Introduction

In the early stages of learning a musical instrument, such as guitar, a player may lack awareness of mistakes in their performance, due to the high level of concentration required to play the instrument. The player may be making mistakes without realising, resulting in the continued practice of incorrect technique. This can slow the learning process, and may discourage the player if they do not improve and do not understand why.

Listening skills are important to develop, which allow a player to hear mistakes whilst performing. Playing along with a song recording is a common approach to practising, however this can wash out the sound of the player's performance, with mistakes going unnoticed. Playing without a recording can sound bare, and it can be difficult to maintain a good sense of timing.

This project aims to provide insight into ways of overcoming the difficulties encountered when trying to listen to a performance and play at the same time. An interactive software system has been developed and evaluated, aiming to help develop listening skills and make practicing a more enjoyable experience, by providing intuitive feedback to players.

## Instrumental Music Education Software

For decades research has been conducted to find effective ways in which software can assist in the learning of musical instruments. Percival, Wang and Tzanetakis [6] have surveyed recent work in computer-assisted musical education, and explain that a complex system for music education should have clearly defined goals, the most important being:

1. Enhancing the lessons with a teacher
2. Enhancing the player's practice
3. Motivating the player

The choice of these goals dictates the purpose and intended users of the software, and presents several important factors that need to be considered, including whether to give feedback during or after the performance, whether to present the information qualitatively or quantitatively, and how to motivate a player.

## Feedback During or After a Performance

Giving real-time feedback during a performance allows a player to realise and correct errors whilst playing, whereas giving feedback after a performance allows for critical sections of the performance to be highlighted and examined in more detail than is possible whilst playing.

Iwami and Miura [3] state that a player can be more aware of their weak points and tendencies if they recognise mistakes whilst performing. It is important to give careful consideration to the player's cognitive load when providing feedback during a performance. Playing an instrument can require a high level of concentration, particularly for beginners. As such, real-time feedback needs to be simple and easy to understand. It should not distract the student from listening to their performance [6] and forming mental models of their desired performance. Music-oriented video games, such as SingStar (http://www.singstargame.com), Guitar Hero (http://www.guitarhero.com) and Rock Band (http://www.rockband.com), accommodate a wide range of users, with differing musical ability, and provide very simple and intuitive real-time feedback.

On the other hand, Percival, Wang and Tzanetakis [6] argue that software interaction should occur after a performance, as means of confirming and correcting a student's judgement. A player can listen to their performance whilst playing, and then see if the software agrees with their understanding of the performance. A re-

view can provide a complete view of a performance, which can be useful in identifying mistakes and problem sections, as well as evaluating the accuracy of specific performance characteristics. However, a performance review should not be so time consuming that it detracts from actually playing the instrument.

Both approaches provide significant benefits if used appropriately, and we found a combination of the two was most useful. Careful consideration needs to be given to ensure that a player does not become dependant on the feedback. The focus must remain on teaching the player to listen to their performance, so that when the software is taken away they will be able to identify their own mistakes.

## Quantitative and Qualitative Feedback

While traditional feedback provided from a music teacher during a lesson is qualitative in nature, data captured via computer interfaces enables a detailed quantitative look at a player's performance.

Qualitative feedback can be used to provide advice on mistakes in a performance, or to simply give the player an overall impression of how well they are playing. In either case, it generally results in a more human-like style of feedback. This requires a level of 'intelligence' in the software to interpret the quantitative data, as seen in the Piano Tutor [1]. While software can be used to simulate human feedback, it is important not to forget about the important role that human teachers play. A human teacher can make intuitive decisions on a student's weak points, and read into the subtle psychological aspects of learning, such as providing encouragement to a disheartened student.

Quantitative feedback aims to take a more objective look at a performance, and is useful for measuring the accuracy of a player's performance. Feedback may be presented in the form of a graph, showing both the expected and actual performances. Interpreting graphs may require some musical knowledge, to identify sections that were within an acceptable accuracy range and sections that were incorrect. Therefore, this style of feedback is more suited to assisting a teacher in a lesson, and not as relevant to a student practising alone. Alternatively, quantitative feedback can be given in the form of an accuracy score, which can be useful for motivation and self-improvement. The software must be robust and accurate, so as not to disadvantage, confuse or aggravate players. However, with an art form like music, there is no strict right or wrong, and a mathematical dissection of someone's performance is sometimes not helpful. A computer may not know what is actually right or wrong, and may penalise creative expression.

## Motivation

Percival, Wang and Tzanetakis [6] comment that motivation is the single most useful factor when using software for music education. They claim that the benefits of keeping a player motivated and interested in learning outweigh the benefits of effective multimedia feedback. Motivation can be achieved by instilling positive feelings in a player, such as a sense of achievement after skill improvement, and by providing a player with a fun and entertaining environment with which to perform.

Positive feedback is an important aspect of the learning process, providing a player with encouragement to stay motivated. Positive feedback is an aspect of music education software that is often overlooked, with many systems focussing solely on identifying mistakes in a performance. Whilst the mistakes identified may be accurate and relevant, it may not be very motivating for a player.

Juul [4] notes that learning to play an instrument, such as guitar or piano, can be very tedious, whereas instrument simulation games, such as Guitar Hero and Rock Band, empower the player with the feeling that they are superbly skilled. Williams [4] adds that part of the appeal of instrument simulation games comes from the compressed learning curve, which gives the player the satisfaction of having learnt a skill.

If a player has fun playing their instrument, they will be keen to practice. An effective way to achieve an entertaining performance environment is to provide a social element. Music is a form of creative expression, and should be shared with other people. A player may lack motivation to perform music without anybody listening. The Family Ensemble [5] system aims to make practising a shared experience, to increase motivation and encourage a deeper appreciation of music. The StarPlay (www.starplaymusic.com) system instils motivation by simulating that the player is part of an orchestra. Facilitating competition, among peers or against oneself, can be another powerful motivating factor.

## Designing Software for Guitar Tuition

This section outlines the approach taken to design software for guitar tuition, with the aim of finding effective techniques to:
- Motivate a player to practice
- Develop a player's listening skills

A software prototype has been developed, which has served as a basis for usability testing, to provide insight into methods of effective feedback, as well as key areas for further development in interactive guitar tuition. The prototype is designed to be a framework for a more advanced and feature-rich system.

Usability testing was conducted in two stages: during design and development of the prototype, and after the final iteration of the prototype. Tests were conducted with beginner and intermediate players in the first stage of usability testing, to shape the design towards the needs of the target users. The second stage of

testing involved professional players and music teachers, to gain ideas for improvement. Seven participants were tested, with a diverse range of skills in guitar, music and computing. The testing sessions were filmed, to enable careful review of their experiences with the software and suggestions.

## Prototype Design

This section details the final iteration of the prototype design, including some outcomes from usability testing which impacted the design.

### Features

The prototype was designed for use in a typical practice session. The user is selects a song to play, along with some settings, including what speed to play the song at, whether to play the whole song or just part of it and whether to loop the song. Using code from the open source Tux-Guitar Java program (http://www.tuxguitar.com.ar/), Guitar Pro (http://www.guitar-pro.com) and Power Tab (http://www.power-tab.net) song files may be loaded by the software.

The software is divided into two main stages: the performance and the performance review. During the performance, the player is accompanied by a MIDI version of the song, reading from the scrolling guitar tablature and receiving simple accuracy feedback (Figure). After the performance, the user is given an accuracy score and is able to review their performance accuracy (Figures 2 and 3). They may listen to a recording of their performance, which may be played along with the MIDI song tracks.
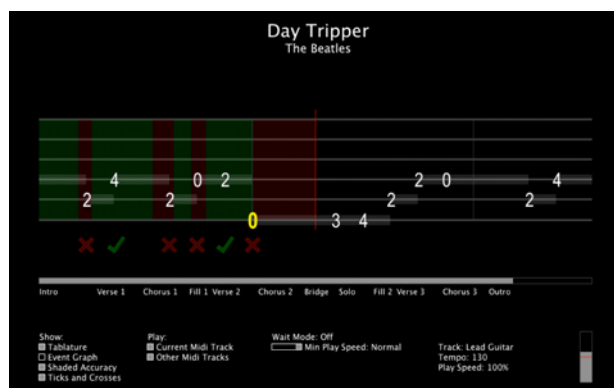


Figure 1. Performance stage, with real-time feedback given on the scrolling tablature.
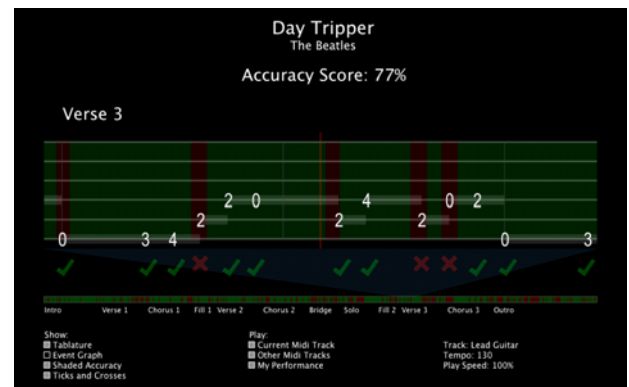


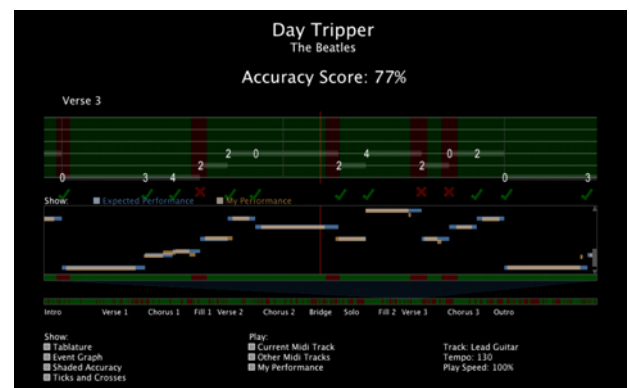Figure 2. Performance review, feedback given on the tablature.



Figure 3. Performance review, showing both the tablature and piano roll displays.

One of the key considerations in designing the software was for it to suit the needs and expectations of a variety of players with differing skill levels. As such, the user is given control over what is heard and what is displayed. Through use of checkboxes (at the bottom of the user interface), the user may toggle between the audio tracks played, as well as the notation and accuracy feedback style displayed.

### MIDI Playback

Using TuxGuitar code, a MIDI song is generated from the loaded song file. The player has the option of hearing or muting the current track they are performing and the backing tracks. It was found that hearing the current MIDI track whilst performing can be useful to hear differences between what is being played and what should have been played. On the other hand, muting the current MIDI track allows a player to hear their own performance more clearly. To enhance the experience, one user suggested acquiring the actual song recordings, however there are licensing issues and may be difficulties synchronising the song recording with the song tablature file.

## Notation Display

Using an approach similar to that used in the Digital Violin Tutor [8], simple notation styles were chosen, to assist in the rapid development of skills. The user may toggle between two display formats: guitar tablature and piano roll notation. Tablature presents a simple and intuitive notation that can be read whilst playing, whereas piano roll offers more detail and is useful when reviewing a performance. Both displays can be viewed together, as seen in Figure, allowing the player to experience the benefits of both notation styles simultaneously. We recognise that musical score would be a useful addition, as noted by several music teachers, and this is an area for future development.

## Tablature

Guitar tablature is a style of guitar notation often used by beginner and intermediate players, due to its simplicity and resemblance to the physical appearance of a guitar. It consists of six lines, which represent the strings of the guitar. Fret numbers are placed on the lines to represent notes to be played.

An important consideration is the notation of time in an animated notation display. There are two key approaches to this: karaoke style and scrolling displays. The karaoke style involves using a bouncing ball or changing the colour of the notes or lyrics, as seen in SingStar. On the other hand, a scrolling display, implemented in both Guitar Hero and Rock Band, uses a time bar to indicate when to perform each note. A scrolling display allows a player to maintain a good sense of timing, as it moves at a consistent rate. For this reason we have implemented a scrolling tablature. The tablature scrolls horizontally across the screen, and a vertical time bar indicates when each note is to be played. Notes are highlighted when they need to be played, by increasing the size of the font and changing the colour.

All usability testing participants found the scrolling tablature easy to follow in terms of note onset timing, and the accuracy of striking notes at the correct time was observed to be quite good. However, difficulties were encountered with recognising which string to play, and the strings have been made thicker and further apart to overcome this.

One of the disadvantages of tablature is that it has no rhythmic notation, which makes accurate sight-reading near impossible. For this reason, guitar tablature is often used when the rhythm of a melody is already known, or is accompanied with a musical score. An attempt to overcome this was made in the prototype by displaying the duration of each note as a semi-transparent bar, as shown in Figure. However, the usability testing participants did not find this entirely useful, and this is an area for further de-

velopment. Several music teachers suggested a hybrid notation, using music score notation to indicate rhythm on a guitar tablature.

Several music teachers noted that it would be good to see notation for fingering on the tablature. We experimented with displaying the finger number in small text above or next to each fret number on the tablature. This looked acceptable for simple riffs, however, the tablature become cluttered for music containing chords, significantly decreasing its readability. Notation aside, the player still needs to translate the finger notation into how to position their hand, which would be a difficult task whilst performing a song. It is likely the player would make a mistake the first time, then look at the display to understand the fingering, and then attempt the section again. As a result, virtual demonstration, such as video and 3D computer animation, may be a more effective way of illustrating fingering, as it simulates a teacher's demonstration in a lesson.

To help establish a more inviting and comfortable environment, one teacher suggested making the tablature look more like a guitar, to make it feel more like music and less like a graph. A picture of the guitar headstock could be added to the left edge of the tablature, and the tablature could be made to look more like a fretboard.

## Piano Roll

Piano roll is a bar graph style notation, based on the physical appearance of a piano, whereby the vertical axis contains the notes of a piano and the horizontal axis represents time. The piano roll display (Figure) allows the user to compare their performance to the expected performance, in terms of pitch and timing. The visibility of the expected and actual performances can be toggled using checkboxes. The user is able to zoom into the graph using the mouse scroll wheel, and can navigate using the arrow keys.
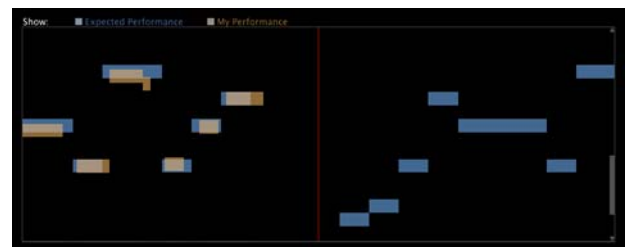


*Figure 4. Piano roll display.*

By presenting a detailed view of their performance, a player may be able to understand why sections of their performance were inaccurate; for example, piano roll effectively illustrates the timing accuracy of a performance, allowing for easy recognition of early, late, missed and incomplete notes. While incorrect notes are evi-

dent, it can be difficult to determine the reason for a wrong note, such as fingering the correct fret but the wrong string.

Unfortunately most users found the piano roll to have a very scientific look, which was not well received by beginners. SingStar was noted as having a very effective piano roll notation, as seen in Figure. This presents a more symbolic style of feedback, with the expected note bars being 'filled up' when the correct note is performed and incorrect notes being represented with smaller bars. While this offers less precision, it is a more intuitive notation. One teacher commented that this simplistic, non-scientific look makes a player feel more comfortable and not be quite as afraid to make mistakes.



*Figure 5. SingStar screenshot [2].*

## Performance Accuracy Feedback

Feedback given on the accuracy of a performance aims to assist a player in understanding if, how and why their performance differs from the expected performance. This can provide insight into aspects of a performance that a player may have otherwise been unaware of. Ultimately, the feedback given to the player should be designed to enhance their listening skills.

Accuracy feedback is given to the player both during and after their performance. The tablature is intended to be viewed during the performance, and is annotated with accuracy information. The piano roll is more useful after the performance, offering a more detailed look at the performance.

## Real-Time Feedback

Whilst performing, the user may receive accuracy feedback in the form of green and red shading on the tablature, and/or ticks and crosses under the tablature. The user is able to toggle the visibility of each feedback style via the checkboxes, allowing them to use the feedback style that suits them best, or even turn off real-time feedback if it is distracting.

The shading on the tablature indicates green for correct sections and red for incorrect sections. This allows the player to recognise if part of a note was performed accurately or not. Beginner users found this style of feedback to be too detailed.

A number of teachers mentioned that a big problem for beginners is not playing each note for its full duration. If a player thinks they have played mostly correct, by playing notes at the right time, they may find it demoralising to see red sections on the tablature and receive a low score. From this, the tick and cross style of feedback was suggested and implemented. This simplifies the feedback to a Boolean response for each note: the note was either played mostly correct or mostly wrong. One teacher noted that this tick and cross style of feedback provided more incentive to play accurately and try to generate a tick under each note. To increase motivation, a brighter tick could be used to indicate that a note was very accurate. The tick could be replaced with icons or animations, such as smiley faces or thumbs up signs, to target specific users, such as children and adults.

## Performance Review

A performance review allows the student to receive more detailed feedback than they can interpret whilst playing. After a performance, the player is given the opportunity to review their performance accuracy and hear their performance again. Using performance reviews may slow the learning process, as the player spends less time actually playing the instrument. We have minimised the time needed to review a performance by providing a complete view of the performance accuracy under the tablature or piano roll display (Figures 2 and 3), allowing the player to easily find and skip to critical sections of their performance.

The player is given an accuracy score, which simply indicates the percentage of time they played correctly. While this is not the most ideal method of calculating a player's performance accuracy, most users found that their score improved the more they played, prompting motivation to improve their sore. Providing a more detailed and reliable accuracy score is an area for further development.

## Performance Evaluation

Performance evaluation can be divided into two stages. The first stage is transcribing the performance using real-time pitch tracking, to translate the audio signal into a more meaningful representation. The second stage is to compare the transcribed performance to the expected performance, using a matching algorithm, to assess the accuracy of the performance.

## Pitch Tracking

The pitch tracking functionality was implemented using Pure Data, an open source graphical programming environment that can be used to process real-time audio. Pure Data was chosen for its speed and robustness with audio signal processing. The fiddle~ object estimates the pitch and amplitude of an incoming audio signal, both

continuously and as a series of MIDI note events [7]. A window size of 2048 was required to detect all of the notes on a guitar with standard tuning. Unfortunately, this reduces the precision of onset detection. The attack detection provided by fiddle~ does not offer high enough precision to be of benefit, and the bonk~ object is suited to detecting percussive attacks, rather than guitar attacks. We implemented attack detection by detecting spikes in the amplitude output from fiddle~ (output approximately every 23 milliseconds). An independent signal power analysis is required to achieve accurate attack detection, which is a possible area for future development, however user testing by experienced players indicated that accuracy of the prototype was adequate.

While monophonic pitch tracking has reached high levels of accuracy, polyphonic pitch tracking is still an area of avid research, with a reliable real-time solution yet to be developed. This project does not aim to make any improvements to polyphonic pitch tracking, but rather utilise existing technologies to design software with the focus of providing effective feedback to a player.

## Matching Algorithm

Percival, Wang and Tzanetakis [6] comment that there are no clear-cut 'correct' or 'incorrect' answers when assessing a musical performance. Decisions need to be made to determine if a note is sufficiently in tune and played at an acceptable time. We have developed a simple matching algorithm, which compares the pitch of the expected and actual performances, to inform the player if they played the right notes, and whether they played them at the right time. The matching algorithm determines the percentage of time that the pitch of the actual performance (rounded to the nearest semitone) matched the expected performance. In Figure, the green sections illustrate a match between the actual and expected performances and the red sections represent the performances not matching. This reflects the shaded accuracy feedback presented on the tablature display.
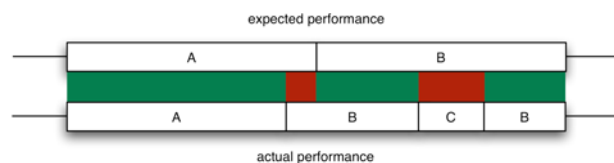


*Figure 6. Performance comparison using the matching algorithm.*

The ticks and crosses are generated by determining the accuracy of the note onset. If the player strikes the correct note within a short period of time either side of when the note should be struck (we found 50 milliseconds to be fair), a tick is generated. Otherwise, a cross is generated

(Figure ). The performance of the rest of the note is not considered, as many beginners feel that as long as they strike the note at the right time they have played correctly.
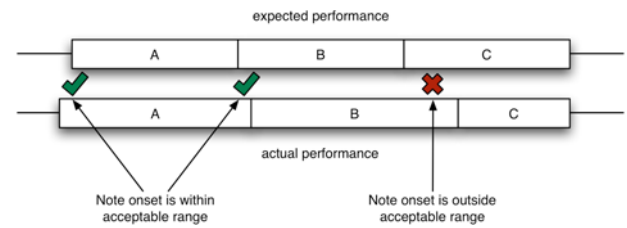


*Figure 7. Calculation of ticks and crosses.*

## Wait Mode

Wait Mode is a mode of play whereby the speed of the song is adjusted to wait for the correct notes to be played. The user can select the minimum speed for the song to slow down to, as well as the normal speed to play the song. The speed of the song slows down when the expected note is not played, and the speed increases up to the normal speed when the correct notes are played (Figure ).
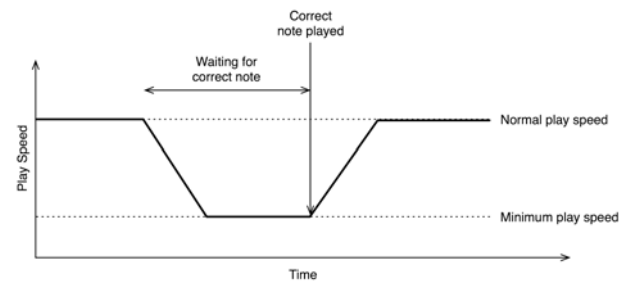


*Figure 8. Timeline for Wait Mode.*

This mode allows the user to ensure they are playing the correct notes in a performance, something which can get lost when the speed of the song is increased. Beginners often need to look at the guitar whilst they are playing, which makes it difficult to look at the computer screen to see what they need to play. Wait Mode aims to give the player time to look at the screen and not feel as rushed in their performance.

The most notable outcomes of usability testing of Wait Mode were the difficulty to maintain a good sense of timing, and the conflicting opinions that emerged as to when the play speed should start slowing down and whether the song should come to a complete stop.

## Minimum Play Speed

Some participants wanted the song to come to a complete stop, whereas others wanted the song to slow down to a specified minimum speed. The main reason for wanting the song to stop is to allow the user to spend time thinking about what they played and how it was wrong, without feeling rushed. If the song is not stopped, the prob-

lem note may be passed over before the player is able to play it correctly.

## Slowing Down

There were three ideas for deciding when to start slowing the song down: as soon as a note is missed, half way through a note if is has not been played, or after a certain number of consecutive mistakes. For the first two approaches, it was agreed that the song should reach the minimum play speed by the end of the note (which may involve stopping). By stopping after a certain number of consecutive mistakes, the player is able to keep a better sense of timing, as the play speed is not continually adjusted for each note.

## Sense of Timing

Most participants found it hard to maintain a good sense of timing in Wait Mode, as the play speed changed too abruptly. It was generally found that the play speed increased too quickly once a correct note is played. While the song may slow down quickly, the return to the normal play speed needs to be more gradual. If the player has been looking at their guitar to find the correct note to play, they will need time to look back at the computer screen to see what they need to play next.

## Implementation

Due to the varied opinions on the behaviour of the play speed during Wait Mode, the user needs to be given appropriate controls to use the software in a manner that suits them. This allows the user to find a balance between maintaining accurate timing and making sure every note is played. Sliders have been implemented on the user interface, to define the minimum play speed, when to start slowing down and how quickly the play speed is changed. For example, the slider for the minimum play speed has one end indicating that the song will come to a complete stop, and the other end indicating that the song will not slow down at all (turning Wait Mode off).

## Possible Future Work

Usability testing provided a wealth of ideas for further improvement to harness the capabilities of software to motivate a player and help develop their listening skills. The key areas for improvement are noted as enhancing the practising experience, providing more intelligent feedback and keeping up to date with pitch tracking improvements.

## Enhancing Practice

Enhancing the experience of practising is one of the key goals of the software developed in this project. Providing players with reminders, integrating video game elements and virtual demon-strations have been identified as notable areas for improvement.

## Practising Reminders

Ideally, a player should not make mistakes that have been discussed in a previous lesson if they practice often enough, by maintaining a regular practice routine. Unfortunately, many students do not follow this, and may forget important information. The software practising tool could assist with this problem by allowing the teacher to enter reminders to be given to a player whilst practising. The software could even be used as an organiser for students, to plan when they will practice, remind them when they need to practice and log the hours of practice. Some players may find this unnecessary, although the teacher may be interested to keep track of the amount of practice a student has done, which may motivate the player to practice.

## Integration of Video Game Elements

Some people will spend hours per day playing video games, trying to advance through the levels of the game and trying beat other players. Music-oriented video games, such as Guitar Hero, SingStar and Rock Band, are no exception. By integrating video game elements into a music practising tool, the player is provided with a more motivating and entertaining environment. One such way to achieve this is to facilitate progressive learning of a song with a video game level structure, back story and characters.

## Virtual Demonstration

A player needs to be aware of what they should be doing, rather than just what they did. Virtual demonstrations, such as video and 3D computer animation, could be utilised to illustrate certain performance aspects, such as ideal fingering and strumming patterns. Rather than making a player watch the entire performance, they should be able to select a particular note, chord or small section of the song to see demonstrated. This gives more immediate feedback, allowing the player to quickly understand what they have done wrong and go back to performing. Unfortunately there are several limitations that make effective demonstration difficult. Videos offer no interactivity, in terms of the viewing angle and zoom, and 3D computer animation lacks realism of fine performance details.

## More Intelligent Feedback

The 'intelligence' of the software can be improved to provide more meaningful and intuitive information to the user, increasing the quality of the interaction. Providing encouragement, detecting repeated mistakes and adjusting the level of detail in feedback have been recognised as the most notable areas for improvement.

## Providing Encouragement

Several music teachers stressed the need for more positive feedback, such as encouraging messages after sections of correctly performed notes, or animations around notes played correctly. One teacher commented that the presence of red feedback outweighing green could be quite intimidating to a beginner, especially if they are insecure. This could be overcome by only showing the green accuracy feedback, or only showing the ticks and no crosses.

## Detecting Repeated Mistakes

During a lesson, a music teacher will notice if a student is continually making the same mistake over successive performances, and may suggest technical exercises for the student to undertake to correct the mistake. This capability could be added to the software practising tool. While the software could be given a set of rules to rank mistakes, several teachers noted that they would like to be able to configure the priority of mistakes.

## Level of Detail in Feedback

To make the feedback more relevant, the level of detail should be adjusted to match the ability level of the player, starting simple and then intuitively building up as the player practises more and develops their skills. There is a logical transition from the tick and cross feedback to the more detailed shading on the tablature. The accuracy feedback would also need to be adjusted to highlight more detailed issues as the player improves.

### Pitch Tracking Improvements

Pitch tracking presents a significant limitation to guitar practising tools. Current polyphonic pitch tracking does not provide results accurate enough to present the user with a reliable representation of their performance.

Certain instruments are widely available with a MIDI interface, such as keyboard and drums, due to the nature of the instrument. This can provide a very accurate software representation of a performance. While string instruments are not as well suited to a MIDI implementation, MIDI devices are available, such as divided pickups, which contain a short-range microphone for each string of the instrument. This allows for monophonic pitch tracking to be conducted on each string, resulting in an accurate transcription of a polyphonic performance. Presenting the player with a representation of their actual performance could provide a more meaningful look at mistakes, such as notes being played on the wrong string. Several music teachers commented that some students may think they have played something correctly, despite being told they have not. By giving a visual representation of their performance in tablature notation, these students may realise and understand what they have actually played.

## Conclusion

We have provided insight into how software can be effectively utilised to overcome the difficulties encountered by a learning guitarist. By providing intuitive feedback to a player, software can provide valuable assistance to a learning guitarist, most notably by:

- Motivating a player to practice, by providing accompaniment and giving positive feedback
- Development of listening skills, by making the player more aware of aspects of their performances

A software prototype has been designed and developed, which provides intuitive feedback to a player during and after their performance. This prototype served as the basis for usability testing, conducted with several users of a diverse range of guitar ability. The usability testing prompted a valuable discussion of the effectiveness of various feedback approaches and highlighted the ways in which software can be successfully harnessed to enhance the learning process. The prototype provides a framework from which a more advanced and feature-rich system can be developed.

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# SOUND : SPACE
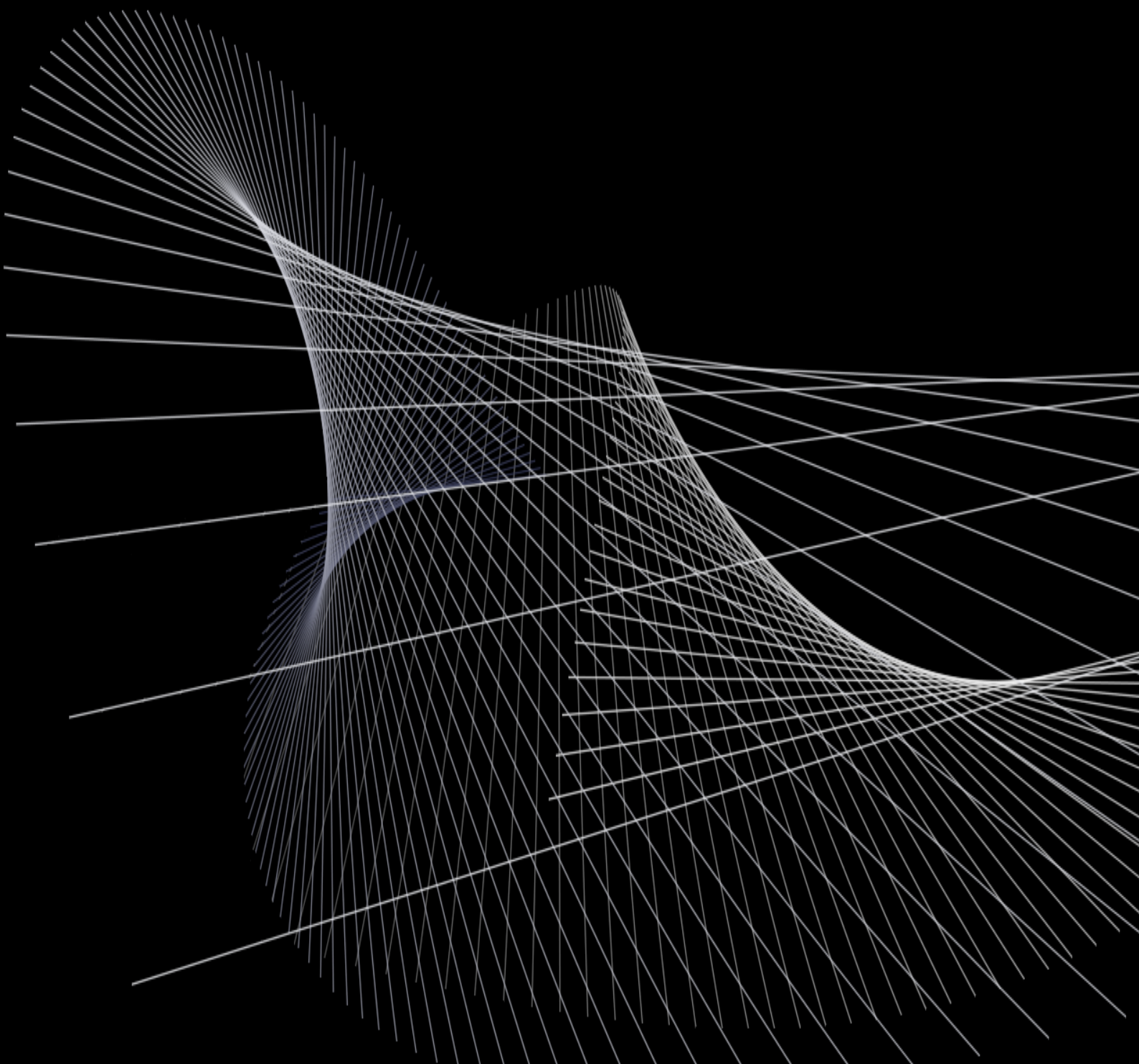
## Conference Proceedings

**Australasian Computer Music Conference**

**10 - 12 July 2008**

# SOUND : SPACE

Proceedings of the

Australasian Computer Music Conference

2008

The Sydney Conservatorium of Music

The University of Sydney

Sydney, Australia

10th -12th July 2008

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# Keynote Speakers

# Papers

# Artist Talks

# Posters

# Workshops

# Keynote Speaker

## Professor Roger Dean

The University of Western Sydney
MARCS Auditory Laboratories
AustraLYSIS
Sydney, Australia
roger.dean@uws.edu.au
www.australysis.com

## Biography

Roger Dean is an Australian composer/ improviser, sound and multi-media artist. He has performed in more than 30 countries, as bassist, keyboardist, and lap-top computer artist. His compositions include computer and chamber music, to commissions from the Australian Chamber Orchestra, Sydney Alpha Ensemble, Wallace Collection and Chaconne Brass (UK) and others. His works are published by Open University (UK/USA), Red House, La Trobe University, and Sounds Australian, on cd-rom with the International Computer Music Association, and on the web (multimedia commissions from the Australian Film Commission, How2, and others).

His work is also available on more than 30 commercial recordings, including LPs/CDs on Audio Research Editions, Discus, Mosaic, Soma, Future Music Records (FMR) (UK); Jade, Rufus and Tall Poppies (Australia); and Crayon, Cuneiform, and Frog Peak (USA). He is developing computer-interactive networked improvisation, sound and intermedia work. He has published five books and many articles on improvisation, particularly in music, and on music cognition. With Hazel Smith he wrote Improvisation, Hypermedia and the Arts Since 1945 (Harwood, 1997). A subsequent book was on computer-interactive sound improvisation: Hyperimprovisation, published by A-R Editions (USA; with cd-rom, 2003). In 2005 he published Sounds from the Corner: Australian Jazz on CD (Australian Music Centre). His current research focuses on music cognition and computation.

He is the founder and director of austraLYSIS, the international sound and intermedia arts group (commenced as LYSIS, UK in 1970); and also founded the Sonic Communications Research Group at the University of Canberra. Roger has the unusual distinction of being a subject in both the new Grove Dictionary of Music and that of Jazz. He appears in an international group led by British jazz composer Graham Collier, and first recorded with him in 1975; a 2007 release is on Rune (USA). austraLYSIS regularly presents new work in Sydney and elsewhere, and its most recent CD is Sonic Stones (Tall Poppies, 2006). Dean was until early 2002 the founda-tion director of the Heart Research Institute, Sydney, and has more than 300 substantive scientific publications. From 2002-2007 he was the Vice-Chancellor and President of the University of Canberra. He is now a full time research professor in Sonic Communication at the MARCS Auditory Laboratories, University of Western Sydney. See www.australysis.com for information about his artistic work.

# Keynote Speaker

## Professor Robert Normandeau

Université de Montréal
Montréal, Canada
robert.normandeau@umontreal.ca

## Biography

After a BMus in Composition (Electroacoustics) from the Université Laval (Québec City, 1984) he moved to Montréal and completed an MMus in Composition (1988) and the first Ph.D.Mus in Electroacoustic Composition (1992), under Marcelle Deschênes and Francis Dhomont. He is a founding member of the Canadian Electroacoustic Community (CEC, 1987). From 1986 to 1993, he was an active member of the Association pour la création et la recherche électroacoustiques du Québec (ACREQ), where he produced the Clair de terre concert series at the Montréal Planetarium. In 1991, he co-founded Réseaux, an organization for the production of media arts events, notably the acousmatic concert series Rien à voir.

After a certain interest in instrumental and mixed works, his current endeavours are focused on acousmatic music. More specifically, his compositions employ esthetical criteria whereby he creates a 'cinema for the ear' in which 'meaning' as well as 'sound' become the elements that elaborate his works. Along with concert music he now writes incidental music, especially for the theatre.

Robert Normandeau is an award winner of numerous international competitions, including Ars Electronica, Linz (Austria, 1993, Golden Nica in 1996), Bourges (France, 1986, 1988, 1993), Fribourg (Switzerland, 2002), Luigi-Russolo, Varese (Italy, 1989, 1990), Métamorphoses, Bruxelles (Belgium, 2002, 2004), Musica Nova, Prague (Czech Republic, 1994, 1995, 1998), Noroit-Léonce Petitot, Arras (France, 1991, 1994), Phonurgia-Nova, Arles (France, 1988, 1987), and Stockholm (Sweden, 1992).

He is Professor in electroacoustic music composition at Université de Montréal since 1999. He received two Opus Awards from the Conseil québécois de la musique in 1999: "Composer of the Year" and "Record of the Year-Contemporary Music" for "Figures". The Académie québécoise du théâtre (AQT) has given him a Masque Award: "Best Music for Theatre" for "Malina" in 2002

He received commissions from The Banff Centre for the Arts, CKUT-FM, Codes d'Accès/Musiques et Recherches, Groupe de recherches musicales de Paris, Groupe de musique expérimentale de Marseille, Jacques Drouin, événements du neuf, Claire Marchand, Arturo Parra, Musée d'art contemporain de Montréal, Open Space Gallery, Radio-Canada, Réseaux, Sonorities Festival, Vancouver New Music and ZKM (Zentrum für Kunst und Medientechnologie). He was composer in residence at the studios of Banff (Canada, 1989, 1992, 1993), Belfast (Northern Ireland, 1997), Bourges (France, 1988, 1999, 2005), Mons (Belgium, 1996), the GRM in Paris (France, 1990, 1994), Ohain (Belgium, 1987) and ZKM (Karlsruhe, Germany, 2004)..