Song Kernel: Explorations in Intuitive Use of Harmony

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ABSTRACT

Song Kernel is a chord-and-note harmonizing musical input interface applicable to electronic instruments in both hardware and software format. It enables to play chords and melodies while visualizing harmonic functions of chords within a scale of western music in one single static pattern. It provides amateur musicians, as well as people with no experience in playing music, a graphic and intuitive way to play songs, manage harmonic structures and identify composition patterns.

Author Keywords

harmony, chord wheel, keyboard, information visualization, interactive learning environment

ACM Classification

H.5.2 [Information Interfaces and Presentation] User interfaces H.5.5 [Information Interfaces and Presentation] Sound and Music Computing K.8.0 [Personal Computing] Games

1. INTERFACE CONCEPT AND DESIGN

Many centuries ago, keyboard and frets allowed musicians to play several precisely-pitched notes at the same time with one hand. Today's technology could allow musicians to play chords according to their harmonic function with few buttons. More than thirty years ago, several music-instrument manufacturers implemented mechanisms such as Single Finger Accompaniment or Automatic Bass Chord System to harmonize sequences with one or two fingers using a piano-keyboard interface. However, such interface provides no clue about harmonic functions and relations between chords. There are apps that allow playing chords of a scale, such as Chordion or Navichord. They can be used to learn what the seven diatonic chords of a scale are, but they cannot be used as real-time instruments neither provide harmonic information about how some chords can be replaced by others with notes out of the scale.

Song Kernel's interface shows three concentric circles of buttons. An array of possible chords for any major or minor scale (chosen with the external circle representing the 12 notes of equal-tempered scale) is displayed, including not only the 7 diatonic triad chords (the internal circle of seven white buttons), but also and most importantly, those chords that are not part of the scale but can be used deriving mainly from modal interchange and melodic scale, represented in the middle circle of black buttons. Buttons can be pressed individually to play triads or combined to play tetrads or other less common combinations of notes. Thus, chords of almost any song can be played with one or two fingers on an interface that organizes harmonic functions by position and colors: green for tonic, yellow for sub-dominants and red for dominants, plus the circle of 5ths indicated by arrows.

Apart from the circle of chords it features two keyboards that control monophonic synthesizers, used to play melodies. They can be played by a different user that the one controlling the chords: One scale-based keyboard in the fashion of a traditional 7/5 layout, transposed as to assign the notes of the chosen scale to white keys and another chord-based keyboard in a 3/4/5 array that plays notes according to the chord being played at the moment.
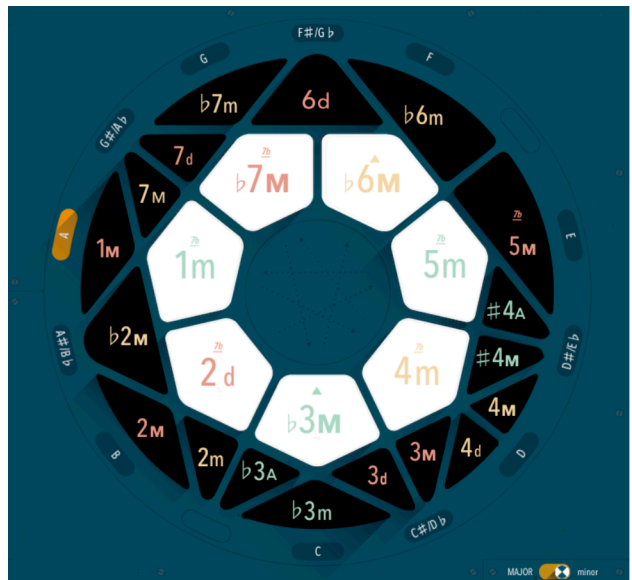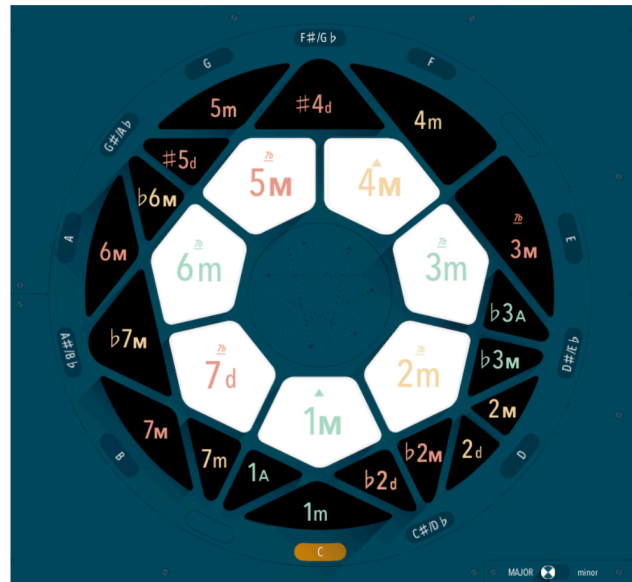
Figure 1. Interface for scales: major (top) and minor (bottom).

1.1 Goals

That amateur musicians (and also those with composition training) be able to visualize all the options of chords for their compositions, while learners be able to identify patterns of composition easily after playing some of their favorite songs on an interface that provides immediate visualization of harmonic analysis.

1.2 Musical Applications

This interface could be applied to any electronic instrument or midi controller. To be used both for real-time playing as well as for song sketches. It could easily synchronize the playing of several users.

Besides being a powerful tool for musicians of any level, it can have applications in gaming and music therapy.

1.3 Presentation History

Firstly, I made cardboard jigs to show students the use of scales and chords. In 2013, we made a prototype using Arduino. In 2015, we developed a basic version for iPad. It has been tested with people with no experience whatsoever with instruments who found joy in being able to play some of their favorite songs for the first time.

Despite receiving very good feedback, financing for educative projects is very scarce in Argentina.

1.4 Envisioned Interaction

An arduino-controlled button set, based on the 2013 prototype, featuring also the two keyboards for melodies, controlling a sequencer, a synthesizer or software via MIDI. Public will be able to interact either freely - only following simple instructions on a sign - or playing some well-known songs.
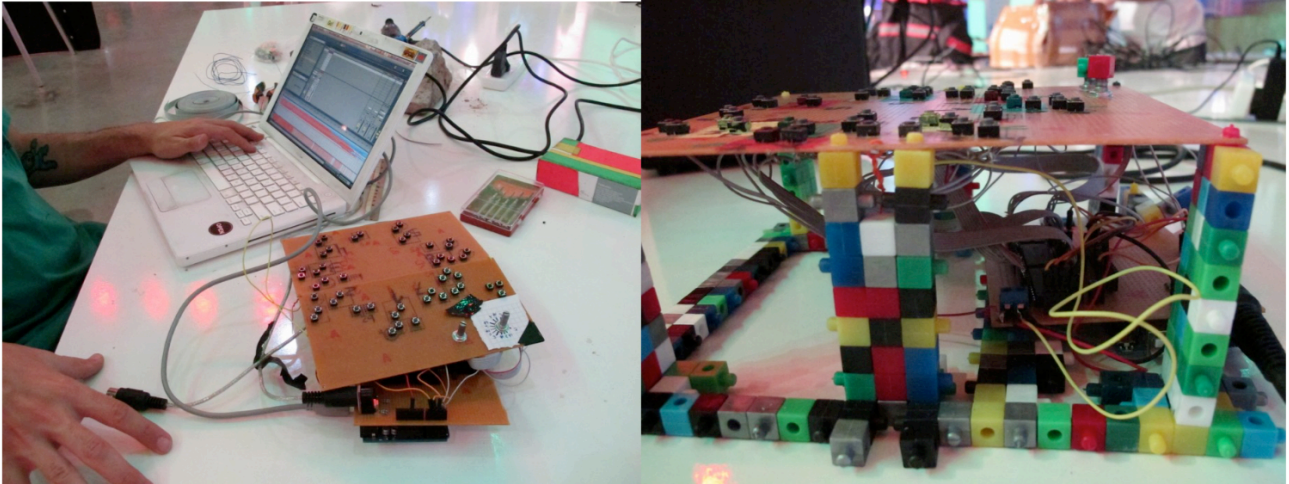

Figure 2. Prototype of Arduino-based midi controller (2013)

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