

# Interfaces for Musical Creativity for Non-Experts

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## ABSTRACT

Current systems aiming at facilitating and extending musical expression typically rely on concepts that non-musicians can hardly comprehend. To attract such users, different interaction metaphors laying outside of the musical domain need to be considered. This study is a step towards the definition of a new class of interfaces for musical expression that targets non-musicians and is centered on experience and performance of the users; we analyze the design requirements and present the current development state of our proposed system.

## Author Keywords

Musical interfaces, user experience, creativity

## ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

In the last few years, creativity support tools have become an important application area for computational interfaces. Novel systems, such as ubiquitous computers, touchscreen devices and body movement sensors, are indeed filling the technological gap needed to replace (or complement) traditional instruments with more intuitive devices. The novel interaction possibilities provided by technological advancements arise a new set of design issues, opening a challenging task to HCI practitioners: finding new methods to ease the arts of creating music and thus open this creative area to a larger and untrained audience.

Digital musical interfaces (DMI) try to achieve this goal by delegating some of the performance and composition difficulties to computers. However, they rely on traditional sonic and musical paradigms such as scales, notes, sequencers and filters, elements that are unlikely to be meaningful to non-musicians. There is a clear need to mediate the complexity of playing and composition at the interaction level in order to allow a larger user base to express and enjoy their musical creativity. Such motivation

drove the need for defining a subcategory of musical interfaces that targets non-musicians that we named MINE (Musical Interfaces for Non-Experts). In the following two sections basic design requirement for MINE are analyzed; in the last section we introduce our interface, from the specific of the musical engine to the interaction metaphors.

## REQUIREMENTS

The requirements and the expectations on musical interfaces of inexperienced users may differ from the ones of intermediate and expert given the different ways they perceive and describe music. We are currently running a series of contextual interviews to identify and analyze such distinctions and to understand the expectations of non-musicians and their requirements for a system that lets them create musical pieces. Preliminary results show that they are not requiring to be able to compose masterpiece songs or to have a total control on every note. Conversely, during the performance they do wish to be capable to control more abstract features such as the emotional connotation and the style of the song. They seem to be more interested on the experience of the music creation process rather than on the generated music itself. These distinctions in the user requirements leads to the definition of some novel principles to be taken into account when designing and evaluating MINEs.

## DIFFERENCES WITH TRADITIONAL DIS

A few studies have attempted to lay the foundations for the design and evaluation of DMIs. In particular, we draw a parallel between our analysis for MINEs and the studies by O'Modhrain [1] and Jordà [2,3] on the evaluation of DMIs.

## Interaction paradigm

The design of interactive systems for non-musicians introduces a novel conceptual issue: the language in which an inexperienced user communicates their artistic intents cannot rely on musical paradigms. The avoidance of musical input has two main effects on the design process. First, the musical device, where the input and the generative components are traditionally merged (guitar, piano, synth), is in fact split. A high-level module takes care of gathering input information, which is then fed to a lower-level module represented by the actual music engine. An intermediate layer between the user's input and the music engine represents the core of our proposed framework. The input has to be built upon a language that the user can speak and that can convey information about their artistic intents.

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The languages that better fit these requisites are visual, textual, gestural and emotional, since these communications channels are naturally used by humans in their everyday life and allow conveying rich information.

#### **Amount of commitment**

A central issue when creating a new DMI is to delegate some of the complexity and understanding of playing and composition to the machine. The design must allow a switch from a note-to-note control to a higher level of direction [2] supporting some pre-composed musical events that the users can manipulate to fit their own objective, thus giving illusion of control [1]. This manipulation occurs through sliders, knobs, grids and similar artifacts that directly operate on some musical and sonic element such as tempo, modes and metric. In MINE, the paradigm of pushing away the user from difficult-to-deal-with musical notations is taken to the extreme. The interaction happens at higher levels, for the user has no more direct control on elements they are not confident with such as scales, filters and sound sources. A successful MINE would allow users to purely focus on the performance and the musical experience itself, without being annoyed by alien objects.

#### **Computer-aided music composition**

In traditional DMIs the direction of music is mainly by means of synth and sequencers, where single notes and silences, or groups of, are placed one after another. However, either the user intervention is reduced to an ordinary selection of notes on a sequencer (Yamaha Tenorion) or required to have solid musical knowledge to produce interesting sounds (The Reactable, GarageBand for iPad). To overcome this issue, MINEs adopt, to a higher extent, automatic music composition techniques. If, on the one hand, this may look like an undesirable limitation as it apparently reduces user creative expression, on the other hand it is actually necessary to enhance the quality of the musical outcome and the overall user experience. Designers of MINEs would then have to deal with designing of novel algorithmic compositional systems or with adopting existing ones. A robust musical engine is crucial because the ultimate quality of the music is directly associated with the quality of the automatic composer.

#### **Creativity support**

In DMIs, users can control the output almost note by note or via pre-composed loops of a bunch of notes. In MINEs the direction of the musical flow rely on higher-level paradigms. The automated composition process, although required by the very nature of these systems, can negatively impact on the user experience. This limitation, if not considered during the design process, may lead to an unappealing experience because the user may not feel the musical outcome as personal, but rather like a music played by somebody else. MINEs should support a personal contribution to the music creation by providing users with the possibility to interact with the system for editing the

musical structure. Thus, MINEs need to provide access to some low-level controls, while still hiding the difficulty of music composition by setting a series of constraints.

#### **OUR CONTRIBUTION**

Most of our efforts have been devoted to understand user requirements and to prototype a musical engine for automated music composition. At this time we have a good quality system that automatically composes tonal music. We instructed the program with basic and advanced compositional techniques and it is able to generate musical pieces with different emotional connotation (examples at [goo.gl/3z7hQ](http://goo.gl/3z7hQ)). The mapping between emotions and musical parameters is taken from the literature [4] and from our works in progress. The program is written in SuperCollider language and it outputs MIDI streams to be played by external clients (in the example excerpts we used GarageBand). For the interface module, we are exploring new approaches that allow users to intuitively express their musical intent through gestural and visual communication. We are reviewing literature on gesture-driven music composition [5] and on visual representation of emotions [6] alongside a number of user studies to unveil intuitive ways to describe music.

#### **DISCUSSION**

This paper highlights a novel research direction on musical interface design by identifying a sub-category that targets mainly non-musicians. We presented some principles defined by drawing parallels with traditional rules for DMIs and by investigating user requirements with contextual interviews. Further, we introduced our approach to a novel musical instrument. Future works will shape the design perspective and will focus on the evaluation strategies of MINEs.

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