

DOCTORAL THESIS

Explorations in augmented reality for interactive gesture-based musical notation

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Abstract

With its capability of merging virtual and real worlds, Augmented Reality (AR) provides a new framework for professional practices in numerous disciplines: it can deliver interactive pieces of information in real-time and in space. In music, such capabilities can have an important role in music notation and interfaces for electronic music performance. Numerous experimental musical applications have been developed since the early 2000s both for education and performance. However, in most circumstances, AR has been seen more as an aide towards the understanding and/or realization of traditional repertoire rather than a game-changing technology able to foster new artistic practices. There are still many uses yet to be explored, especially concerning compositional practice

This dissertation also paves the way to a new repertoire in which the unprecedented possibilities offered by AR might be fully adopted and developed. This is an explorative work, structured mainly by a series of articles written solely by the author and published during his PhD studies (or accepted for publication at the time of writing). In these papers, a set of differentiated applications and compositions in the AR field are realized. The main thread that links all of the studies lies in the investigation of the relationship between AR and gesture-based musical practices (such as gesture-based control of spatialization and AR augmented instruments). A central role played by gesture-based music notation is the capability to notate a gesture in the space, with its exact coordinates and its exact velocity. Such a novel form of notation, enabled by AR technology and impossible in other domains, can also be enriched with interactive capabilities. As discussed in some studies included in this dissertation, virtual objects assigned to notational functions can also be assigned, simultaneously, to interface functions, thus creating interface-notation hybrids. Other studies of this dissertation address the capability of a virtual object changing its functions

over time: AR notation can also be transformed into a virtual performer or into a visual augmentation of gesture. Another hopeful contribution of this dissertation to the musical use of AR lies in providing technical explanations of implementation procedures that could serve as a background for the creation of best practices.

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