

# INSIDE – Intuitive Sonic Interaction Design for Education and Entertainment

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## ABSTRACT

The objective of the project is to offer the possibility for children and adults without previous musical experience to create sounds, invent their own musical instruments and make music on a very intuitive and playful manner. To achieve this goal, the project will develop a concept of tangible interaction using pictograms printed on cards that can be placed on any conventional surface, like a table. In addition, the cards and the table will be sensitive to touch as well, allowing for extended interactive possibilities. The cards will have meaningful drawings, pictures and icons printed on them, representing various aspects and functions related to sound and music, such as sound sources (sounds of nature, animals, musical instruments, etc), sound modifiers (echo, reverb, time stretching, etc.), mixers, and so on. Thanks to multi-touch sensing, a card representing a sound source could be played simply by touching it. Or a larger card representing a keyboard could be used to play a melody or even chords by touching the printed keys. While building on existing musical concepts (ex. keyboard, drum kit, etc) the project will explore new and intuitive ways of playing sounds, for instance by dragging fingers on the table and using parameters such as speed, acceleration, height, and so on to control and shape the sounds.

**Keywords** Tangible interfaces, human computer interaction, computer vision, musical interfaces, interactive music systems, interaction design, sound synthesis, sound processing, pedagogy.

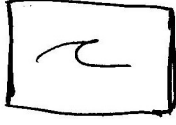
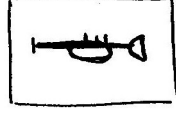




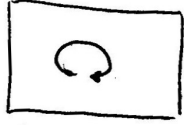
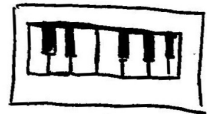
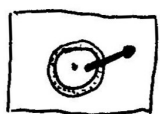
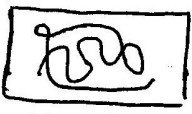
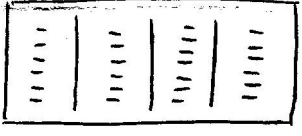
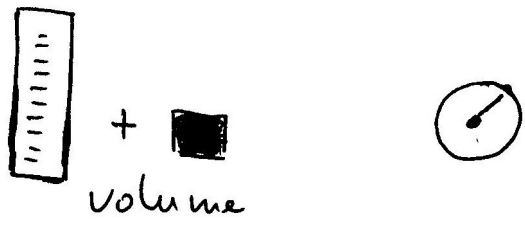
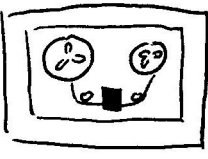
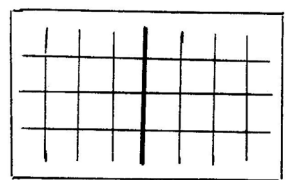
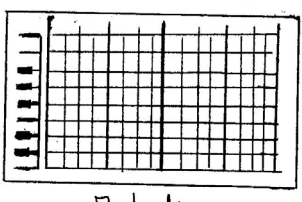
## INTRODUCTION

The project builds on existing achievements realized by applicants in the field of tangible interfaces technologies and new interfaces for musical expressions (see section 2.2.2 for details). The proposed concept of interaction, using pictograms printed on cards and touch sensing, will be realized by combining two technologies and further enhance them. The first one is a multi-touch technology under development at HEM-GE (in collaboration with HEIG-VD), that makes possible to transform any flat surface into a multi-touch input device. The second one is a technology under development at EPFL for identifying objects and tracking their position and orientation using visual markers. Those visual markers will be attached to the cards, so that they can be used to create sounds and music, via a dedicated sound engine running on a standard computer. Various kinds of cards will be used. The following table gives a preliminary overview of the various categories and their use:

Category	Description	Examples
Sound sources	Sound samples of all sorts. They can be triggered by touching them	Nature, animals, percussions, rhythmic loops, instruments
Modifiers	Effects applied to a sound (or two sounds in case of morphing)	Echo, reverb, time stretching, morphing, filtering, envelopes
Players	Bigger cards for playing sounds put inside them	Loop player, Keyboard, scratch pad, touch pad
Mixers	Mix several sounds	Mixers for 2, 4 or 8 sounds
Controllers	Some parameters of modifiers can be controlled live this way	Faders, 2D controllers, knobs
Recorders	Record sounds produced by user	One shot recorder, Loop recorder
Sequencers	A large grid in which cards can be put to be played sequentially	Rhythmic sequencer, melodic sequencer
Transmitters	A sound chain with one or more modifiers can be represented as a single card	A, B, C, etc

The project will be divided in six parts, the research and development related to the input interface technology, the design of playing rules determining the interactive behavior of the system, the development of a sound engine capable of producing a high quality sonic output according to the touch gestures and the way cards are dynamically disposed on the table, the design and realization of the cards, the evaluations with real users, and project management.

## Annex II: Examples of cards

Type of cards	Examples
Sound Sources	  
Modifiers	 <p>Echo</p>  <p>Reverb</p>  <p>Envelopes</p>
Players (larger cards)	 <p>loop</p>  <p>key board</p>  <p>scratch pad</p>  <p>Touch pad</p>
Mixers (larger cards)	
Controllers	 <p>volume</p>
Recorders	
Sequencers (larger cards)	 <p>Rhythmic</p>  <p>Melodic</p>
Transmitters	