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# The Voice Harvester: An Interactive Installation

**Nicholas True**

Interactive Institute Umeå  
Östra Strandgatan 26 A  
SE-90333, Umeå, Sweden  
nic@tii.se

**Nigel Papworth**

Interactive Institute Umeå  
Östra Strandgatan 26 A  
SE-90333, Umeå, Sweden  
nigel@tii.se

**Ru Zarin**

Interactive Institute Umeå  
Östra Strandgatan 26 A  
SE-90333, Umeå, Sweden  
rouien@tii.se

**Jeroen Peeters**

Interactive Institute Umeå  
Östra Strandgatan 26 A  
SE-90333, Umeå, Sweden  
jeroen@tii.se

**Fredrik Nilbrink**

Interactive Institute Umeå  
Östra Strandgatan 26 A  
SE-90333, Umeå, Sweden  
fnilbrnk@tii.se

**Kent Lindberg**

Interactive Institute Umeå  
Östra Strandgatan 26 A  
SE-90333, Umeå, Sweden  
kent.lindberg@tii.se

**Daniel Fällman**

Interactive Institute Umeå  
Östra Strandgatan 26 A  
SE-90333, Umeå, Sweden  
daniel.fallman@tii.se

**Anders Lind**

Umeå University  
SE-901 87 Umeå, Sweden  
anders.lind@estet.umu.se

**Abstract**

The Voice Harvester is an exploratory interactive installation that embodies human voice in physical materials. Sound input is processed, amplified and transmitted through audio drivers connected to a thin, flexible membrane that agitates the material on it. The title “Voice Harvester” is derived from the original design brief, which called for an object able to elicit non-linguistic, expressive, and naturalistic human vocal sounds to explore the full range of capability of the human voice through use of a novel, playful, and embodied interaction. This paper describes the intention, design process, construction, technical details, interaction, and planned/potential uses of this design exploration.

**Author Keywords**

Design; Interaction Design; Design Exploration

**ACM Classification Keywords**

H.5.m.

**General Terms**

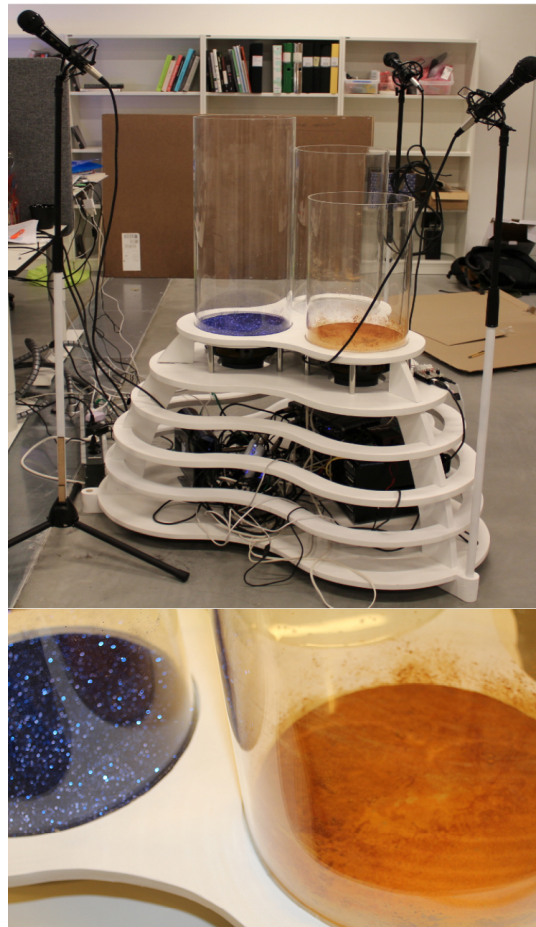
Design

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**Figure 1, 2.** The Voice Harvester in the lab and a close up of the materials on the membrane.

### Introduction

The concepts of human engagement, involvement, and embodiment as well as the creation of a physical tangible thing with physical, tangible feedback were

central to this interaction design exploration [1,2]. A multidisciplinary team consisting of musical composer, researchers, interaction designers, and engineers at Interactive Institute in Umeå, Sweden has carried out the project.

### Design Brief

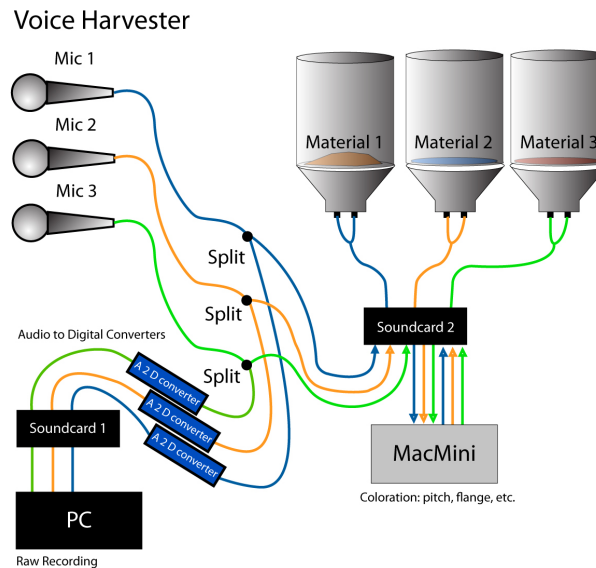
This project saw genesis with the composer Anders Lind who wished to collect vocal material from the general public for use in "Voices of Umeå" a contemporary music project, initiated by Lind at the Department of creative studies, Umeå university, Sweden.

The desired collection of sounds would ideally be non-linguistic, abstract, organic, and expressive. At the foundation of this project lies the idea that such voice material is quite difficult to gather by just putting a microphone in front of people. Then they are generally reluctant to break out of certain social norms, i.e. to not 'make a scene', and certain kinds of voice qualities are thus difficult to capture. The participating composer also wished to find a way to prompt people to explore the depths of capacity contained in the human voice. With this in mind, we came up with the idea of a physical, interactive installation that would provide direct feedback in a physical, tangible form to whatever sounds the user fed into it. By altering their voices in terms of pitch, volume, and rhythm, the installation would respond by immediate feedback, resulting in a playful, exploratory, and interactive experience for the user.

After we designed and implemented the installation in a lab setting, it has been installed in a variety of public venues and used to harvest voices of a large number of participants.

### Physical Design and Aesthetics

The final iteration of the Voice Harvester took shape as a free-standing, interactive installation. With the exception of a 220 volt mains power line, the object is completely self-sufficient (see figure 1). When in use, it is a self-contained device that operates on its own and requires no or very little overseeing. The physical appearance of the Voice Harvester is intended to be different and unexpected and to vaguely mimic the appearance of sound waves, with its acrylic tubes subtly reminiscent of a pipe organ that one might for instance see in a church. The overall aesthetic is meant to imply musical connotation while maintaining uniqueness and novelty intended to provoke a desire to interact. The installation is also designed to inspire



**Figure 3** Technical diagram of the Voice Harvester

users' expressiveness, so that they might forget their physical and social surroundings and really engage in a high level of vocal acrobatics in defiance of their instinctive social reservedness.

### Design and Construction

The Voice Harvester is constructed from a frame of medium density fiberboard (MDF), with microphone stands, three subwoofers, acrylic tubes, microphones, two sound cards, a Mac Mini, a PC, and three analog-to-digital converters. Also employed are amplifiers and other miscellaneous sound modulation devices.

After trying out a large quantity of different materials in our lab, the materials that generated the most interesting effects, and those that we thus chose to use to provide feedback to the user, are paprika powder, blue glitter, and paraffin oil colored with red cochineal, with water as a temporary placeholder (see Figure 2).

These three materials are placed on a flexible membrane inside an acrylic tube above a subwoofer driver. The driver reproduces in real time an amplified and modulated version of the input from the user into the microphone, which causes the membrane to flex and the respective materials to move. The input from the microphones is split, one raw signal going to a hard disk to be saved for later use by the composer, the other signal is sent to processing and coloration devices to provide maximum animation and effect in the feedback materials inside the tubes (see Figure 3).

### Implementation Details

[fig 3]

**Interaction Design Issues**

The object combines unusual physical shape and aesthetics combined with direct, tangible, and physical feedback that elicits curiosity and engagement among the users. When a user speaks, sings, or shouts (or makes any other kind of sound) into the microphone, the materials in the acrylic tubes animate in real time with the physical embodiment of their voice.

The interaction design intent was that once the user starts to interact, they would continue to be engaged with the Voice Harvester in order to see and experiment with the different ways in which they are able to manipulate the materials into action. To some extent, this can be seen as a manifestation of what Gaver et al. discussed in their writing on ambiguity. Employing ambiguity to create curiosity allowed us as "...designers to engage users with issues without constraining how they respond." [3]

Playfulness and engagement thus play a central role in interacting with the Voice Harvester, which is fully in line with the primary goal of the original brief of the project, i.e. to provide a mechanism to harvest voices for the general public, especially those kinds of voices and sounds that are difficult to gather otherwise due to social norms and conventions, including expressive voices, shouting, singing, primal non-language based sounds, etc. We argue that the Voice Harvester has been designed to successfully elicit such a response organically by playing on and with the users' curiosity but without "...preaching to users or ironically bypassing them." [4]

**Planned Use**

The installation will be placed in various public places

as an installation and used to harvest raw and unmodified voice input for use in the contemporary music project Voices of Umeå. The collected voices will later be processed and used as main components in the making of three major music compositions, with the final composition presented when Umeå becomes the European capital of culture in 2014.

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