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# Composing Ecosystemically in Responsive Environments with Gestural Media, Objects and Textures



**Figure 1:** Atmospheres: dense arrays of ultrasonic atomizers are used to create clouds as displays, which can be modulated from other instruments or the global state of the responsive environment.



**Figure 2:** Experiential Model of the Atmosphere: continuous state changes and parameterization of a steerable model of cloud physics provides immersive atmospheres and rich dynamics.

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## Abstract

In this workshop, participants will try their hand at a variety of tangible, embodied, and embedded sensing and feedback technologies including vibrotactile instruments, expressive mechatronics, gesturally modulated fields of light, sound, mist, and realtime steerable immersive atmospheres. Working through hands-on experience by theme, participants will be introduced to compositional and experimental methodologies. In the second half of the workshop, participants will compose together some simple “ecosystems” using the Synthesis Center’s hardware-software media choreography architecture (sc), in the iStage experimental theater-scale blackbox space.

## Author Keywords

Responsive environment; ensemble; ecosystemic design; new materialism; touch; haptics; gesture; ethico-aesthetic; play; realtime media; responsive media; gestural media; mixed reality; immersive environment; sensors; movement and computing; electronic music; performance.

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**Figure 3:** Skin Music (Hayes): Audio-haptic actuators and transducers provide vibrotactile feedback for a physical perception of music.



**Figure 4:** Rhythm: Coordinating multiple instruments produces complex rhythmic structures throughout an environment.



**Figure 5:** “Windowless” (Thorn) is a computational system for violin and alto.glove, a physical-digital interface for augmented violin performance.

## Introduction

This studio introduces the extensive set of research-creation expertise related to tangible, embodied, and, extended experience, at the School of Arts, Media + Engineering (AME) at Arizona State University, and is hosted at the Synthesis Center’s iStage, an experimental “blackbox” space. The iStage has hosted large scale experiments in movement-based arts, sensing, machine-perception, realtime media, gesture, rhythm, critical and speculative studies. In this workshop, participants will explore composing for whole environments with multiple instruments created by AME researchers.

## Studio Proposal

We introduce people to a suite of techniques for creating and exploring tangible, embodied, and extended experience in the iStage environment, a theater-scale blackbox at ASU. Studio leads will work with participants to try techniques at different scales: (0) objects: enchanted objects, puppetry (Lahey); (1) body: audio-haptics (Hayes, [1, 2]), virtual haptics (LiKamWa/Sagheb), “sense-organs” crossing vision and pressure (Rawls); augmented multichannel violin (Thorn, [6, 7]); (2) ensemble: thermal economies (Johnson, [4]); (3) texture: gesturally modulated mist and theatrical lightfields / soundfields; (4) ecosystem: steerable immersive atmosphere simulations (Mechtley, [5]).

## Studio Topics to Be Covered

This studio will cover performance, composition, and design practice considerations for vibrotactile feedback, mechatronic puppetry, enchanted objects and computational materials, virtual haptics, performer-centric augmented instruments, gesturally modulated mist and theatrical light- and soundfields, and steerable immersive complex system simulations.

In addition, the studio will cover how these techniques can be combined in ecosystemic and holistic ways to create coherent responsive environments.

## Studio Learning Goals / Discussion Objectives

1. Familiarization with techniques for body-, ensemble-, environment-scale technologies for experience modulated by realtime, responsive (not “interactive”) tangible media, materials, objects [8, 9].
2. Distinguishing body- or ego-centric, anthropocentric, vs. ecosystemic design approaches.
3. Thinking through material / analog vs. digital computation.
4. Introducing methodologies for research oriented by whole experience, embodied experience, felt meaning [3], and pre-individual subjectivity.

## Studio Supporting Web Documents

Please check the studio website for the latest information: [improvisationalenvironments.weebly.com](http://improvisationalenvironments.weebly.com)

- Steerable Weather: [vimeo.com/synthesiscenter/ema](https://vimeo.com/synthesiscenter/ema)
- Audio-Haptic Composition: <https://vimeo.com/77170690>
- Synthesis Atelier-based Research: <http://synthesiscenter.net/research>
- iStage timelapse: <http://vimeo.com/synthesiscenter/slsa2>
- Augmented violin: <https://vimeo.com/251840089>

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