

**Co-  
constructing  
events in  
responsive  
environmen  
ts**

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**Figure 1:** Inhabitants jointly steer atmosphere model in realtime, articulating wind vector pressure, temperature, water content.

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## Co-constructing Events in Responsive Environments\*

**Sha Xin Wei**<sup>12</sup>  
xinwei.sha@asu.edu

**Jessica Rajko**<sup>23</sup>  
jessica.rajko@asu.edu

**Todd Ingalls**<sup>12</sup>  
Todd.Ingalls@asu.edu

**Lauren S. Hayes**<sup>2</sup>  
Lauren.S.Hayes@asu.edu

**Connor Rawls**<sup>12</sup>  
bmechtley@asu.edu

**Peter Weisman**<sup>2</sup>  
peter.weisman@asu.edu

**Assegid Kidane**<sup>2</sup>  
assegid.kidane@asu.edu

**John MacCallum**<sup>1</sup>  
john.m@ccallum.com

**Teoma Naccarato**<sup>1</sup>  
[teomajn@gmail.com](mailto:teomajn@gmail.com)

**Garrett L. Johnson**<sup>12</sup>  
garrett.l.johnson@asu.edu

**Emiddio Vasquez**<sup>12</sup>  
emiddiovasquez@asu.edu

**Chris Ziegler**<sup>21</sup>  
Chris.Ziegler@asu.edu

**Seth Thorn**<sup>21</sup>  
sdthorn@asu.edu

**Brandon Mechtley**<sup>12</sup>  
bmechtley@asu.edu

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<sup>1</sup> Synthesis@ASU

<sup>2</sup> School of Arts, Media + Engineering, ASU

<sup>3</sup> School of Film, Dance and Theatre, ASU



**Figure 2:** Reshaping constellation of motorized LEDs with movement and gesture, and recoloring by vocal imbre.

## ABSTRACT<sup>4</sup>

We present a suite of approaches to how ensembles of people, technical objects, and processes can co-construct events that make ethico-aesthetic sense to the participants. The intents and techniques range from creative uses of gesture-following, vibro-tactile feedback or whole body interaction in performance, to using wearables, and responsive environments to study the dynamics of rhythm, sense and affect.

## CCS CONCEPTS

• **Applied computing** → **Media arts**; *Performing Arts*; *Sound and music computing*

## KEYWORDS

Music and technology, movement-based research, somatic experience, embodiment, quantified self, vibrotactile feedback, rhythm, gesture-following, pattern-tracking, pattern recognition, sensor research, continuous sensing, responsive environments, William James, experience, Gilles Deleuze, sense, Felix Guattari, ethico-aesthetic experiment, Claire Petitmengin, phenomenological empirical method

## 1 INTRODUCTION

We present a suite of approaches to how ensembles of people, technical objects, and processes can co-construct events that make ethico-aesthetic sense to the participants. The intents and techniques range widely: from creative uses of gesture-following [9] or vibro-tactile feedback or whole-body interaction in performance works (e.g. Naccarato, MacCallum, Hayes, Rajko, Ziegler, Thorn), to using body-borne sensing, and camera / acoustic feature following and realtime media to study the dynamics of rhythm, sense and affect. (e.g. Sha, Ingalls, Johnson, MacCallum, Naccarato, Rajko).

We are interested in holistic approaches to the heightening of felt, movement-based experience that recognize (1) experience cannot be reduced to any finite schema or data, (2) qualities of experience, being relational, cannot be read from measurements taken at one point, one body, or one instant, (3)

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**Figure 3:** Three dancers varying degrees of correlation of orientation, interpreting a movement exercise in coordination and joint intention.

that distinctions like subjects and objects, signal and noise, intentional gesture and non-intentional movement may emerge in the course of an event. and do not exist as categories prior to that event, (4) the significance of a sign or movement may lie in its response, and thus cannot be determined solely by its features.

Methodologically we follow minimax design practice: maximum experiential impact for minimum engineering. At the same time, we avail ourselves of state of the art, original methods in signal processing, computational physics, and experimental experiential sciences, where and as appropriate (Mechtley, Sha, Vasquez). Some of the approaches prototype humane versions of non-anthropocentric, ecosystems design of responsive environments that evolve in concert with both contingent, improvised activity as well as design intent. [2, 3, 7]

## 2 SAMPLE INDIVIDUAL INTERVENTIONS

### 2.1 Palpability and Wearable Computing, Jessica Rajko

We engage small movement explorations to slow down and witness the rich information provided through our active, seeking senses. Movement explorations will transition directly into wearable technology play. Our movement explorations are grounded in dance improvisation and somatic practices, rapid prototyping of wearable sensor technology, and exploit the responsive environments including the responsive lighting and sound systems, available in the Synthesis iStage.

Participants engage in embodied explorations that prioritize palpable, pre-rational ways of knowing and experiencing the world, contextualized by research in felt experience, kinesthetic learning, and embodied agency, and a diverse field of somatic practices, including pioneers: FM Alexander (Alexander Technique), Irmgard Bartenieff (Bartenieff Fundamentals of Movement), Gerda Alexander (Gerda Alexander Eutony), Moshe Feldenkrais (Feldenkrais Method), Mabel Ellsworth Todd (Ideokinesis), Charlotte Selver (Sensory Awareness), Ida Rolf (Structural Integration, Rolfing, and Rolf Movement), and Milton Trager (Trager Method).[1]

### 2.2 Vibrotactile Interfaces, Lauren Hayes

We introduce approaches to exploring haptic experiences grounded in knowledge and practices from digital musical instrument design (DMI) and computer music performance. Themes include: background of prior DMI and haptic research; exploring mapping strategies using vibrotactile feedback and sound, e.g. using amplitude, spectral spread, noisiness vs brightness; exploring movement possibilities using tactile transducers; introduces research on audio-haptic experiences and what we might learn through the use of tactile transducers and wearable actuators. In this workshop, we demonstrate novel approaches for exploring audio-haptic composition. Participants will explore haptic design possibilities, considering parameter mapping and actuator placement on bodies, or within objects.[7]

### 2.3 Heat and Rhythm Games, Garrett L Johnson

We introduce different ways to mediate temporal patterns (rhythmic textures) via hybrid fields of tangible media meshed with light and sound. Our motivating question is: How do value-producing socio-technical processes synchronize, blend, diverge, interfere with one another? Borrowing from Lefebvre, we use rhythm as the hinge. For our purposes, rhythm can be described as the variation of material = energy + matter + media through different biosocial and physical states. Understood this way, rhythm is not sonic, it does not have to be regular periodic, indeed it does not have to be unidimensional but textural.

### 2.4 Steerable Atmospheres Responsive Environments, Brandon Mechtley, Sha Xin Wei

We introduce a steerable atmosphere [4, 5] modeled from living ecosystems to condition the experience of richly mediated responsive environments for enactive experiments: improvisation over artfully prepared conditions. We work with dense media (e.g. via pressure / sound, or optical sensing of deformable materials) and dense interaction with gesture and corporeal movement. We can use everyday objects as improvised tools, instruments for steering simulation and analog materials within responsive digital media systems. The steerable atmosphere enables improvised, non-preschematized interaction between people and independently-designed gestural “instruments”. Built in the SC environment, the steerable atmosphere exemplifies alternatives to boolean / procedural and stochastic logics thinking ecosystemically in terms of continuous, multivalent state, and tangible Interaction with continuous media rather than with objects. [6, 7]

### 2.5 Steerable Atmospheres Responsive Environments, Brandon Mechtley, Sha Xin Wei

*III: Respire* is a 10-minute, poly-temporal breath composition for 3 performers. In this piece, each performer wears headphones and breathes with the tempo of their own click track as it arcs gradually from slow deep breathing, to hyperventilation, to a minute-long breath hold, and so on. The arc of each click track is subtly different, producing a dynamic rhythm and texture between the three parts. As the breath composition progresses, the audience may see, hear, and sense the effort involved in the breathing for each performer, especially in moments where they begin to struggle to maintain speed and amplitude of breath. *III: Respire* may be performed on its own, or in the context of other performances and installations from *III*. It is often shared with *III: Coeur de cochon*, and with the use of transducers to give tactile feedback from electrocardiogram (heart rate) sensors worn by the breathers.

## CONCLUSIONS

In an extensive and thoughtful review from MOCO 2017 of the spectrum of movement and computing research, Jan Schacher advocated a “non-dualistic, integrative approach ...[to] the primary experience of movement through its performance and processes” “[u]nifying research about the inside perspective and the outside manifestation of bodily expressions, be it as movement, action, and gesture, or as intention, effort, and affective impact.” [11] We offer our suite of performances, installations, and research-creation experiments as a practical continuation of this field formation.

## ACKNOWLEDGMENTS

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## Technical Requirements for MOCO 201

### Artwork, Performance, or Workshop Title:

Please give a brief description of the artwork, performance, or workshop, including duration and number of participants (if relevant):

How long does it take to set up your artwork, performance, or workshop?

How long does it take to take-down your artwork, performance, or workshop?

Please list each piece of equipment that **YOU** will provide:

How many power sockets/plug points do you require in total? Please remember to bring adaptors for IT or EU (Schuko) power sockets, and that IT power is 240V.

Has your electrical equipment been tested for safety according to your regional standards?

What equipment and support do you **expect the organisers to provide**? Do you have any other technical requirements?

**Please complete the list below outlining any potential hazards during setup, take**

Key Steps:	Equipment Required:
e.g. hanging wires, soldering components	e.g. ladder, soldering iron, solder
Localize iStage to this event	iStage
Calibrate	iStage
Mock sessions	iStage
Full rehearsal	iStage
Run performances, installations, workshops	iStage

Other Requirements (Please mark each that applies):	
<input checked="" type="checkbox"/> Internet Accessibility	
<input checked="" type="checkbox"/> Microphones (Please indicate how many)	

Projector

Projection screen

CD Player

DVD Player

Tables (Please indicate how many)

Stereo Speaker System

## 8 WORKSHOPS AND PRACTICE WORK

### Co-constructing Events in Responsive Environments

There will be 9 or 10 distinct demonstration / performances (Rajko, Hayes, Naccarato + MacCallum, Thorn, Vasquez, Johnson), or demonstration / installations (Sha, Mechtley, Ingalls, Ziegler, Vasquez)

If in the iStage, 1-2 hours. If not, two days.

If in the iStage, 3-4 hours.

Small electronics, e.g. wearables made by Rajko, Hayes...

ok

yes

iStage blackbox with installed complement of lighs, cameras, projectors, speakers, microphones; custom sensing; SC media choreography software kit.

**down, and duration to yourself or others, and the actions taken to ensure safety:**

<b>Possible Risk:</b>	<b>Safety Controls/Action taken:</b>
e.g. falls, burning, inhalation of fumes	e.g. supervision, good lighting, ventilation

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