

**[ALT]SOLAS | Embodied Media Environments
for the Future of Workplace Wellness**

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Introduction:

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In this paper, we discuss the conceptualization of current and future iteration(s) of the [ALT]SOLAS, a 'Future of Workplace Wellness' project created by Olivia Hernandez, Ri Lindegren, and Xavier Nokes. Developed over the course of the Fall 2020 semester, [ALT]SOLAS is a 'proof of concept' that presents three mediated responses to different work space environments and their effects on the wellbeing of workers. The piece's name is derived from the programming environment we are working within, TouchDesigner, which natively uses Python as its embedded language as well as hinting at an 'alternative' solution to aiding wellness. Additionally, the *solas* portion of the name was inspired by linguistic overlaps from our combined cultural heritage (Americans descended from Ireland, Scotland, Cuba, and Mexico). *Solas* in both Spanish and Gaelic means 'light', in which we found a twofold meaning through our primary use of light/projections and the positive outcomes we aim to produce in people's wellness. This project does not focus on one singular workplace environment, but instead reflects each of the three developers' relationships with different workspaces in their respective histories. The most catalysing element of this project is the potential for diverse immersive environments to affect both the social and mental wellbeing of individuals and improve the culture of workplace environments. We recognize that wellness in association with the workplace has a cascading effect, and we hope that in cultivating media-driven microcosms which address workers' needs, we will enhance possibilities for transforming physical space to support the improved mental and physical well-being of participants. Amplifying employee needs has the potential to improve employee satisfaction, focus, and overall productivity in workplace environments. In this way, we have chosen to focus on the nature of the worker's mental well being in conjunction with mediated spaces, designed to capitalize on both static and dynamic activity.

Our process began with the concept of positively engaging with the negative associations of wellness as related to the workplace. Specifically, we designed our projects around solutions-based workplace wellness research that addresses the sedentary nature and lack of emotional wellbeing in the workplace. According to this research, thirty minutes a day of reallocated sedentary behavior replaced with standing and/or low physical activity can result in improved cardiometabolic health and reduce the risk of all-cause mortality. This is exemplified particularly in individuals who do not regularly engage in sufficient moderate to vigorous physical activity. Our project designs offer new and engaging opportunities for increased physical activity through creative and somatic focuses on mindfulness, relaxation/recalibration, world-building, and more.

Wellness is closely linked to experience -- including the experience of a genuine connection to one's own body (embodiment), connection to other humans (community), and a connection to nature (biophilia). Emphasizing a healthy workplace culture can increase retention as well as employee engagement. With emerging technological tools, in interactive immersive media,

augmented reality, computer vision, machine learning, and more, we are able to create experiences that promote embodiment, interaction, and a sense of immersion in biophilic spaces. In this paper we investigate and present initial prototypes for how these tools can be deployed to room-scale wellness pods, home-based augmented pods, and mobile-based commuter experiences.

Conceptualization + Process:

The project began as a broadly defined investigation into ‘workplace wellness’, which we then synthesized into a more discrete distillation based on ongoing collaborative conversations with workplace wellness and health professionals. Before beginning any practical implementation of media or technology, we first defined two key elements for ourselves: what is an ‘environment’, and what is ‘wellness’, specifically in relation to the workplace. For the purposes of this proof of concept, we selected the Intelligent Stage (iStage) as our development platform and work space. The iStage serves as a research space at Arizona State University for the Arts and Media Engineering Department and its affiliates, and includes various (ideal) technological systems (projectors, monitors, a surround sound system, and a lighting grid), for facilitating the creation of immersive and responsive experiences. We recognize that this type of *incubator space* is located on the higher end of the technological and financial spectrum, and that we need to develop prototypes that can work across a wide range of technological devices and physical spaces to improve both accessibility and affordability. We specifically defined ‘workplace wellness’ as one’s mental and social health (or perhaps their lack of) typically related to one’s physical workspace, workplace culture, and social infrastructure.

These definitions helped format our development of [ALT]SOLAS, framed by three subcategories of participation: breath, flow and movement/playfulness. These curated subcategories formed as a result of each of our unique workplace experiences and subsequent needs from these workplace environments. As we were not catering to one specific environment, we are prospectively afforded a larger appeal in more uniformly engaging with different people and places, as well as designing in response to the physical and environmental constraints of participants. So while broad in scope, this strategic effort allowed us to consolidate the overarching project that is [ALT]SOLAS into a set of ‘micro’ projects as opposed to one singular event.

Subcategories + Further Detailing

As mentioned above, [ALT]SOLAS developed into three distinct ‘emphasis’ types, each correlating to the different response types and the backgrounds of the developers (technically, somatically, and artistically). Our embodied experiences became the foundation to explore three different installation experiences across the spectrum of static to dynamic. The next categories will explore each section more deeply and will succinctly outline the technical, inspirational, and artistic aspects of the individual ‘emphases’.

Breathe - DiaSpectra



DiaSpectra from [ALT]SOLAS, created by [Ri Lindegren](#)

DiaSpectra, designed by Ri Lindegren, invited participants to relax their parasympathetic nervous system by connecting to their breath beneath a canopy of white fabric that acted as a projection surface. Participants were encouraged to lay or sit in a position that enabled their spine to be extended and their hip flexors released for maximum relaxation and lung expansion capacity. A pillow below the knee joint and a cushion underneath the head was offered to participants lying on the floor, or a chair to sit on for participants who preferred to be upright. In the experience, Ri led participants through a live audio version of what will become a guided audio recording. This multimedia installation was designed to be responsive to participants' movement of the breath, creating a feedback loop between the sound of the participant's breath and the visual patterns in front or overhead of them. *DiaSpectra* relies upon sound cues

from the human body to synchronize participants' rhythm of breathing. Through this facilitated experience, participants will discover that diaphragmatic breathing creates the most spacious breath capacity in the body. When they inhale through their nose, the diaphragm contracts and moves down the length of the spine, opening up additional space for the lungs to expand in the ribcage. When they exhale, the lungs contract and the diaphragm relaxes to move back up into the ribcage. Studies of diaphragmatic breathing on stress and focus have shown that deep breathing increases maximum oxygen exchange, stabilizing levels of oxygen going in and CO₂ going out, which slows down heart rate and decreases or levels blood pressure. This beneficial stabilization of oxygen flow has the potential to increase productivity and cortisol levels [1].

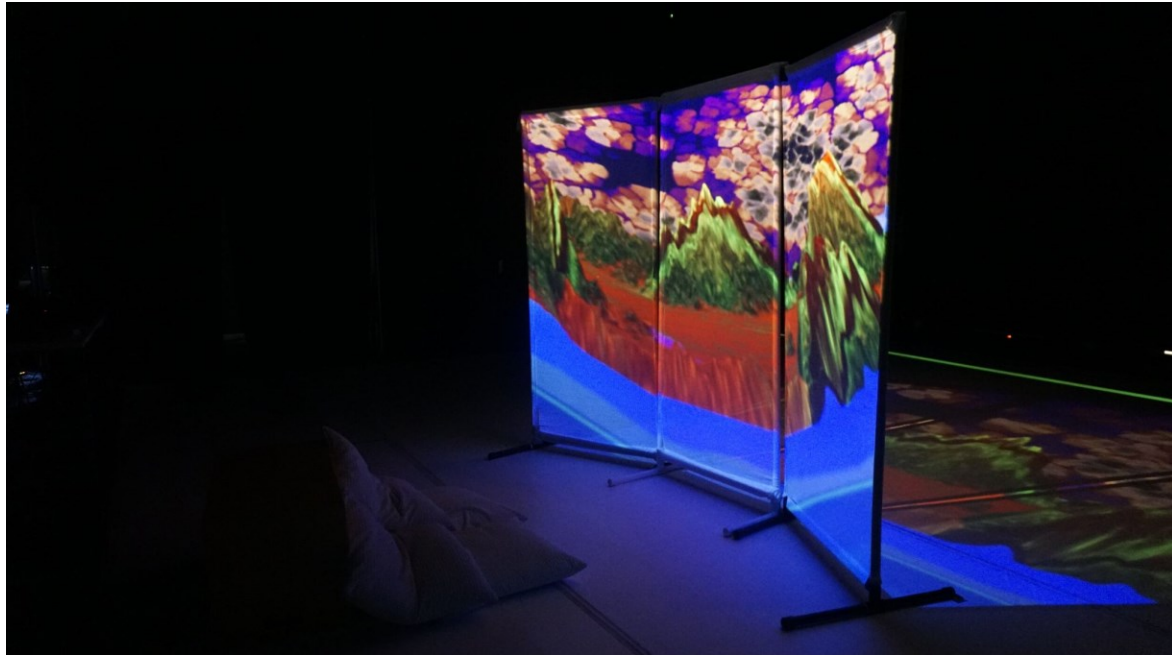
⁶*DiaSpectra* offers a meditative visual feedback loop designed to synchronize with participants' breathing patterns, and enhance deeper levels of oxygen flow through the body.

The benefits of mindfulness in connection to breath and stress reduction have been studied across many disciplines over the past two decades. More recently virtual reality (VR) and biofeedback systems have both become technological fields of inquiry in relationship to diaphragmatic breathing, and there has been some evidence of effective programming to alleviate stress and anxiety [2,3,4]. The effective potential of connecting diaphragmatic breathing to other types of media, such as the prototypes of immersive media environments and portable media applications that we are exploring in this project, have not been widely studied. We hope to continue to engage in research studies to examine the potential of portable media environments in relationship to diaphragmatic breathing for workplace wellness in the future.

Future iterations of the *DiaSpectra* portion of the project aims to sense or detect participants' diaphragmatic breathing patterns, while images of celestial-like shapes and sunset color palettes swirl upon the projected surface above the participant, complimenting their breath in audio-visual response. When the system detects irregularities or quickening of breath leading the user away from a state of calm, activity within the composition increases and the color palette becomes muted. In this way, the system acts as a helpful aid to the participant, illustrating the rhythms of their own breath and its effects on their peace of mind.

Flow State - World Builder

World Builder, designed by Olivia Hernandez, explores how mediated environments activated by the discrete movements of participants' may enable a 'flow state' (explored below) in a user, and aims to engender a sense of wellness and calm for the participants. *World Builder* affords participants the opportunity to visually "build" worlds by controlling landscape height maps,



atmospheric visual representations, as well as fading between accompanying audio tracks to create a customized environment to one's liking, all crafted and composed in TouchDesigner. Participants are

Worldbuilder from [ALT]SOLAS, made by Olivia Hernandez

invited to sit or stand before a front-projected triptych fabricated out of muslin and PVC, operating custom wireless controllers designed by Xavier Nokes (Companion No. 2.0). These Companion devices are capable of absolute orientation sensing, gesture sensing, as well as light and color detection, communicating this data to TouchDesigner via Open Sound Control (OSC). A user's discreet micromovements, detected by the controlled in their hands, are translated into dynamic representations of the natural world: linear accelerations result in height map (landscape); Euler angle data results in color value shifts (atmosphere); and quaternion data controlled the live audio mixing.

Each of these elements are layer-composited together in TouchDesigner to produce a certain primordial and digital representation of a visual world that is sensitive to our input, and in turn nurtures a sense of well-being in the active user. In this manner, both participant and the system are engaged in a symbiosis of responsivity wherein human input gives form to the mediated world, which in turn situates the user in that world through a process of escapism primed by flow states.

Popularized in 1975 by positive psychologists Mihaly Csikszentmihalyi and Jeanne Nakamura, flow states result from an individual's full immersion in an activity resulting in an energized

focus and process of enjoyment. According to Csikszentmihalyi, there are eight characteristics of flow:

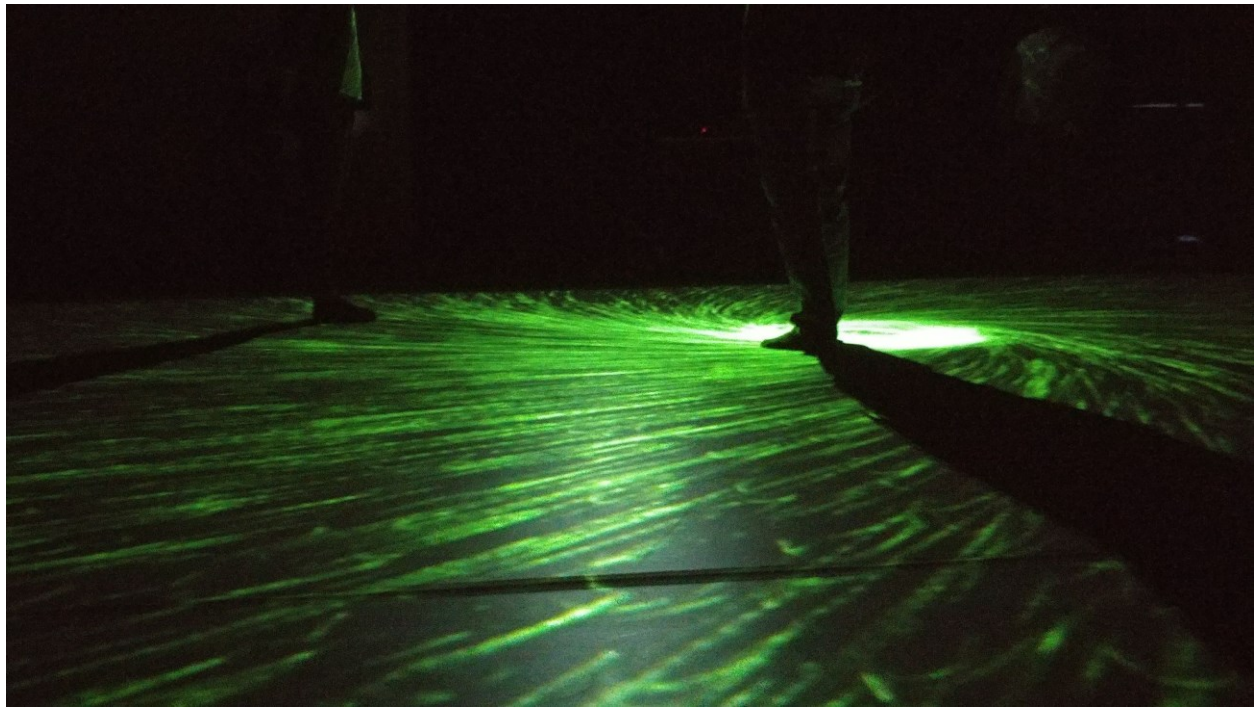
- Complete concentration on the task
- Immediate feedback
- Transformation of time
- Effortlessness and ease of use
- A sense of an intrinsic reward resulting from the process
- A balance between skill and use
- Most importantly, a loss of self-conscious rumination and a feeling of control over the task at hand

Some popular examples of activities that invite a flow state include knitting, meditation, and painting. As an experience, *World Builder* requires many of these characteristics to function: complete concentration; immediate sensory feedback; and the feeling of timeless union with the task at hand in lieu of self-conscious rumination. By building on these principles of positive psychology, *World Builder* incites a flow state in its participants through a series of discrete gestures, consequently resulting in a highly scaled and ultimately immersive, customized environment.

While escapist and sublime in aesthetics, *World Builder* is not without its drawbacks. Currently, this iteration requires near total darkness in order for our projection system to work properly, which is not in line with the average office workspace. *World Builder* could be conceived of as an online platform, but this defeats the purpose of relinquishing the screen from the laboring human eye.

Movement and Playfulness- Shifting Stars

Shifting Stars, designed by Xavier Nokes, arose from the cohabitating desires for freedom of movement and maintaining access to full body actuation. Each of us had previously worked in spaces that varied in terms of physical setting, and what breaks or moments of respite actually looked like; in this case, 'Shifting Stars' was in response to the stereotypical 'desk job'. In conversation, we realized that this may drive individuals to want to move, run, walk, lift, sit, stretch, and more. To capitalize on this, the system was designed to be playful and responsive to people in the space.



Shifting Stars from [ALT]SOLAS, created by Xavier Nokes

Using a process called ‘instancing’, a particular capability of TouchDesigner that allows one to create multiples of geometry and effect their attributes (think color, XYZ rotation, etc) individually, the system created a swirling ring of instances (i.e. particles/stars) that moved and flowed autonomously until one or more participants moved into the space. These particle instances would in turn begin to “play” and move at the participant's feet, widening with the spread of one's arms, and shrinking with the retracting of one's arms. This simple human-computer interface mimics organic and lively playful exchanges (such as running through fireflies), encapsulating a sense of magic in the process.



Worldbuilder test run

Current Status, Future Potential, & Ideation

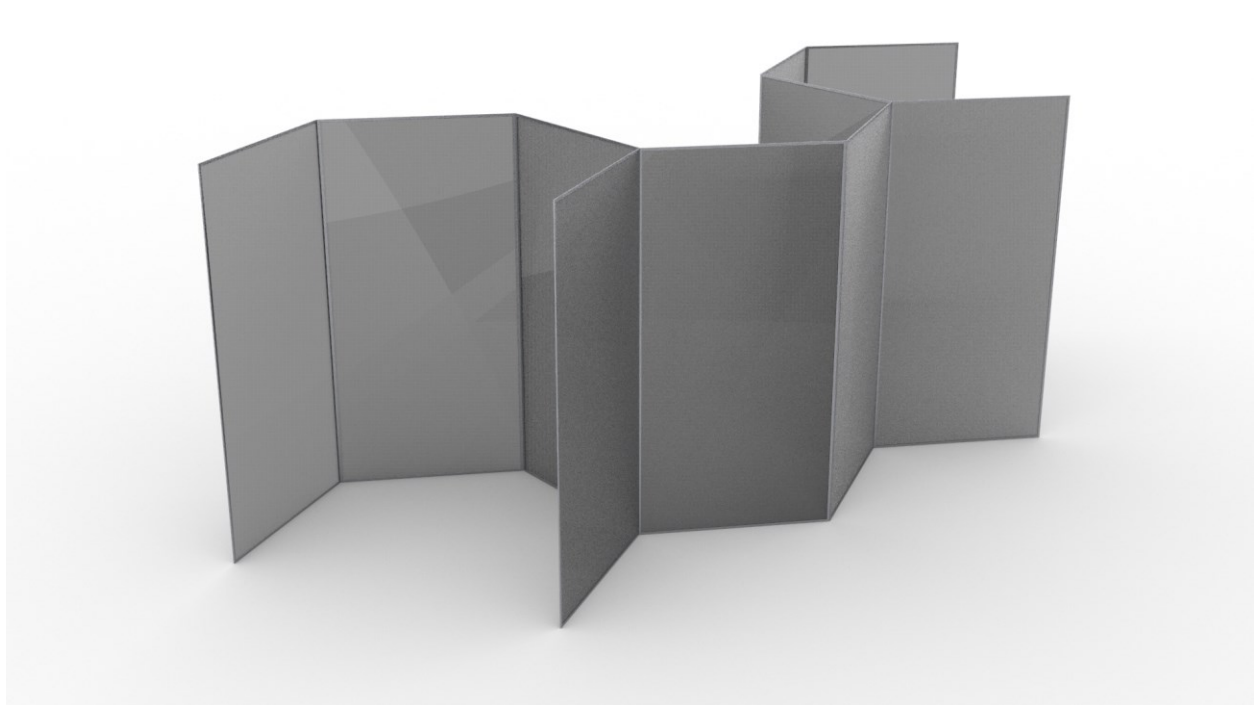
[ALT]SOLAS has recently been awarded IRB approval for a research study into the efficacy of each of the subsystems on participants. With this approval, the study for efficacy and quantitative feedback hopes to begin sometime in the Summer or Fall of 2021. Efforts are underway to secure a collective of subjects with varying degrees of exposure to workplace environments, but open in regards to

accessibility in other capacities. Engaging with participants will allow us to hone in on the successful elements of the piece, refining both the technical, somatic, and artistic aspects of the collective effort and the individual emphases discussed in this paper.

To speak to the *physical* nature of workspaces, it is important to again recognize that our initial demonstration is simply not manageable for most; that is to say that the equipment, setup and maintenance to even remotely mimic the iStage environment is generally inaccessible whether that is financially, technically, architecturally, or otherwise. In response to this, discussions on how best to engage with a variety of workspaces through different modalities of installation are in progress, and current examples include;

- A deskside portable monitor (should one work at home)
- A series of large wall-mounted televisions with a discrete camera and computer for processing (say, in a shared office space)

- IoT and wearable tech (potential for current and future iterations of the Companion project)
- AR/VR/MR/XR applications



Model for potential 'hive' structure of wellness pods. This design was created in hopes of providing participants with the chance to have moments of solitude while aiming to avoid a feeling of constriction or tightness of one's physical space

This stage of ideation generates various levels of potential implementation of the project, inviting not only further understanding of how people work with and interact with the elements of the project, but also further technological inspirations with additional hardware and software solutions.

References

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