Wisper: Reviving Magic with Technology

Matteo Lever
Université Paris-Sud
91400 Orsay, France
matteo.lever@u-psud.fr

Verena Lindner
Université Paris-Sud
91400 Orsay, France
verena.lindner@u-psud.fr

Midas Nouwens
Université Paris-Sud
91400 Orsay, France
midas.nouwens@u-psud.fr

Abstract
Today's pervasive technology brings efficiency, control, and knowledge at our fingertips. But our sense of wonder comes from surprise, uncertainty, and revelation. To compensate for the lack of magic and evaluate suggested guidelines for enchantment, we propose 'Wisper', an interactive art installation that endeavours to revive a fairy-tale atmosphere through ambiguously echoing sounds and atmospheric ghost lights. Using Raspberry Pis, speakers, and LEDs, we create a network of connected minicomputers that broadcast an audio stream and augment it with sound effects and lights mapped to the sound's frequency.

Author Keywords
Installation; interactive art; magic; immersive.

ACM Classification Keywords
Sound-based input / output; user-centered design; interaction design; presence; availability; awareness, expressive display; ambient display.

Introduction
Science killed God [8], and magic was collateral damage. Technology gleefully supplies us with ever increasing levels of control over our 'quantified self', our experience of reality, and even the forces of nature [15], while positivism continuously tries to demystify the unknown and unpredictable. In response, the

search for and study of authenticity has surged in recent years [2,3,4,5,11,12]. While no terminological consensus has been reached, authenticity is generally described as some 'true' Platonist core of a phenomena which is constantly fighting against corruption by external forces [5]. Our desire for authenticity and the simultaneous trend towards wanting to be safely in control is fascinating in its contradiction. Perhaps equally dichotomous is the attempt to bring back the magic we lost using arguably the very thing that killed it in the first place: technology. However, there is poetry in the parallel and poetry has its own kind of magic.

This project is an attempt to bring back our fear and wonder of the unknown and support the creative narratives that spring from being a slave to our environment rather than its master. Following Clarke's third law [1] that any sufficiently advanced technology is indistinguishable from magic, we attempt to revive the spirits of the forest (a classical site of the supernatural) using a collection of speakers and LED lights taped to minicomputers.

Related work

This project is firmly rooted in the pragmatist approach to aesthetics. We speculate that the value of 'Wisper' is derived mainly from its particular location in the time and place described above. Following Dewey's assertion that "art and the aesthetics cannot be understood without full appreciation of their socio-historical dimensions" [9], the allure of 'Wisper' comes not from the artefact itself but from what the spectator or "immersant" [7] brings to the experience as a human socialized in the technologically saturated 21st century. In other words, the very scarcity of magic has carved out an interesting space for this project to occupy and the depth of the experience will come from the interplay between our immersant, context, culture, and history [14].

To design for magic, Wright has proposed various 'sensibilities' to take into account [14]. Interactive systems that attempt to enchant should "offer the potential for the unexpected, giving the chance of new discoveries and news [sic] ways of being and seeing" [14]. He further elaborates and suggests that enchantment should include playfulness (which can be achieved through juxtaposing familiar values), paradox (forcing complex interpretation), and crossings between mutually exclusive categories. This perspective on the ontology of enchantment is in line with Gaver's characterisation of ambiguity [6]. He states that a sense of intrigue, mystery and delight can be created by requiring people to interpret the phenomenon. According to Gaver, this allows for a deeper engagement with the meanings and narratives that flow from the user's interpretation. Reeves et al. [10] expand on how this user interpretation impacts the experience of an interactive system depending on which element requires interpretation. For example, in order to create a suspenseful interface the system should reveal its manipulations but hide the effects. Conversely, magical interfaces should reveal the effects but hide the preceding manipulations.

'Constellaction' and 'Bioluminescent Forest' are two art pieces that have successfully employed these suggestions to create a sense of wonder and magic. 'Constellaction' [13] is an interactive system composed of a large number of small tetrahedrons. Each tetrahedron lights up when the photoresistors inside

detect another light nearby. Thus, individual tetrahedrons can be placed next to each other and create a light wave effect: When the first node detects light, and lights up, it actives the same process in other nearby nodes. This encourages emergent behaviour to develop as the users take control over the nodes' distribution and utilises Wright's concept of playfulness.

'Bioluminescent Forest' [16] is a video art piece which uses projection mapping onto trees, mushrooms, and spiders to give these land organisms the luminescent properties more often found in sea-creatures. By combining these juxtaposed properties and crossing between categories they turn the ordinary into the extraordinary and succeed in creating an authentic-looking magical hybrid.

System Design

'Wisper' is an amalgamation of these ideas. Concretely, it is an interactive art installation consisting of a collection of nodes placed throughout the forest which echo sound and light. The sound picked up by the microphone of one node is broadcasted to the others and the amplitude of the detected sound triggers an additional sound and light response. This design attempts to emulate fickle forest spirits that graciously allow the immersant to visit their hallowed habitat: if the visitor is respectful they might get a glimpse of the spirits' natural behaviour, but arrogance will cause the spirits to scream and turn hostile. By augmenting the forest environment thusly, 'Wisper' endeavours to change the relationship between the immersant and their surroundings (Figure 1).

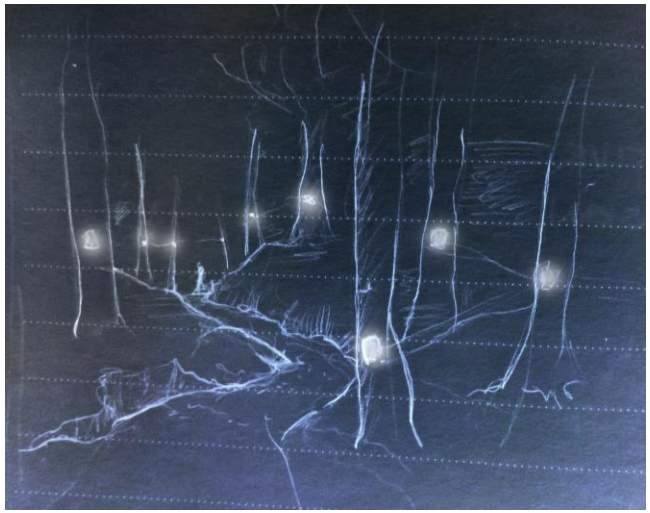

Figure 1. Initial concept design of the installation.

Technical design

The system is built using the single-board Raspberry Pi computers in combination with peripherals such as a speaker, Wi-Fi dongles, and LED lights connected to the integrated GPIO pinboard. The Raspberry Pis can be separated into Primary and Secondary. The singular Primary Pi is equipped with a microphone and functions as the control centre of the system. This Raspberry Pi is configured as a router that creates a local network to which all the Secondary Pis are connected. Using the DarkIce and Icecast2 packages, the audio detected by the microphone is streamed to the Secondary Pis. Simultaneously, a script on the Primary Pi is processing 1 second segments of the audio stream and calculating an amplitude value between 0 and 1. This value can be broken into four categories: silence (0 - 0.1), low (0.1 - 0.4), medium (0.4 - 0.7) or high (0.7 - 1). Each category triggers a different pre-recorded sound on the

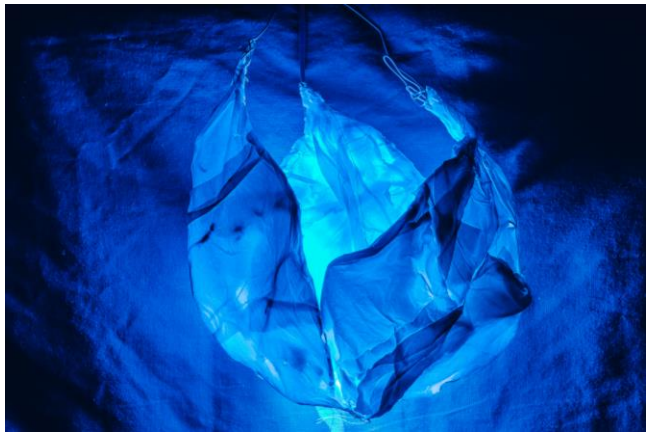

Figure 2. The four designs reflect the variability that can be found in nature. While each is identifiably unique they share common characteristics.

Secondary Pis. Additionally, LED lights will be activated using the lightshowpi package. Lightshowpi detects the frequency of the sound and regulates the current flowing through the LEDs connected to the GPIO pinboard. The higher the frequency, the brighter the lights, and vice versa.

A level of ambiguity is introduced by virtue of the technical limitations. The audio echo experiences random amounts of delay and the poor quality of the microphone makes the detected amplitude unreliable. This forces the immersant to interpret the interaction and it resists the comfort of predictability. Additionally, the system has both a suspenseful and magical interface because of the distribution of the nodes: the manipulations and effects are spatially separated. When interacting with the primary node, the auditory and visual feedback is only observable from a distance. As a spectator of a secondary node, the source of the audio stream and the manipulations that create the sound and light are unknown.

Aesthetic Design

FORM

An integral part of our system lies in the design of the Raspberry Pis their aesthetic serves to support the vision of *magic* in spite of technology's decidedly unmagical appearance. The designs were inspired by the forest itself, neo-gothic and elvish architecture of The Lord of the Rings, the flowing lines of art nouveau, the geometric style of Islamic art, and Hayao Miyazaki's anime. The forms are intended to organically blend into the forest and evoke a feeling of otherworldliness. From a practical perspective we required the forms to be affordable and scalable. Moreover, the varying size of the technology dictated the minimum size of each spirit's shape.

In the end, we created five different designs, one for each of our nodes. They all belong to varying parts of the forest and represent different characters: they hang near the roots, or hidden among the foliage. Materials include 3mm wood, cut with a laser cutter, white fabric, wire and tissues (Figure 2).

SOUND

In addition to echoing the sounds people produce themselves, the spirits have a voice of their own. Overall they have four mood stages: in the first one, a quiet scene, the spirits will behave naturally. They are at ease and communicate among themselves. When people start talking they become curious; their talk a little louder and more spirited. In the third stage their previous apathy and benevolence turns into agitation. Growling sounds make the immersant aware she is overstepping her boundaries. In the very last stage the spirits get truly angry and protest in a chirping storm.

Limitations and Future Work

On the technical side the communication of the nodes proved to be the biggest challenge. We investigated using ultrasound with the speakers and microphones, but the precision required by this setup proved to be too rigid. While Bluetooth connections were explored, our knowledge in distributed networks led to the decision to create a local area network using one of the Raspberry Pis as a router.

Our initial plan involved a larger quantity of nodes so the system could wind its way through the forest. The immersant would be able to hear and see her voice "travel" through the trees akin to the ripples created by a drop in still water with her in the centre. As our idea of the technical requirements matured, however, it became apparent that this was unfeasible because of monetary constraints. Each node needed its own Raspberry Pi, speaker, Wi-Fi dongle and (due to the fact that we chose the forest as the setting of the installation), its own power source. The cost factor also entailed that only one node would be equipped with a microphone, reducing our interaction points to one.

The next iteration of the system would allow for the speaker's voice to have more visibly varying effects. An angry loud voice would travel faster from node to node and cause the lights to flicker faster. A whisper, on the other hand, would cause the nodes to slowly pulsate in a lower light. We also considered pitch, rhythm and distortion of the voice as vocal qualities as input variables.

Even though we were not able to implement our system on the grand scale we imagined, the initial reactions to our proof of concept were positive. The installation was set up during an exhibition of interactive designs at the Université Paris-Sud. Especially praised was the echo effect. We could see people flocking around the main interaction point and playfully trying out the effects of different sounds and words. The ambiguously delayed feedback created both surprise and unease: immersants could hear their friend’s voices calling despite their physical absence. People also liked the look and feel of the installation and inspected each spirit individually. Our next step will see ‘Wisper’ employed in its intended setting of the forest.

References

1. Clarke, A.C. Hazards of prophecy: the failure of imagination. From collection “profiles of the future:

an inquiry into the limits of the possible." 1962, rev. 1973.

2. Erickson, R.J. When emotion is the product: Self, society, and (in) authenticity in a postmodern world (Dissertation Abstract). *Dissertation Abstracts International, 52 (10-A) 3730*, (1992).
3. Erickson, R.J. The Importance of Authenticity for Self and Society. *Symbolic Interaction 18*, 2 (1995), 121–144.
4. Franzese, A.T. To thine own self be true? An exploration of authenticity. 2007. http://dukespace.lib.duke.edu/dspace/handle/10161/431.
5. Franzese, A.T. Authenticity: Perspectives and experiences. *Authenticity in culture, self, and society*, (2009), 87–101.
6. Gaver, W.W., Beaver, J., and Benford, S. Ambiguity As a Resource for Design. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ACM (2003), 233–240.
7. Nelson, C. From Sfumato to Transarchitectures and Osmose: Leonardo da Vinci's Virtual Reality. *Leonardo 42*, 3 (2009), 259–264.
8. [Nietzsche, F. *The gay science: With a prelude in rhymes and an appendix of songs*. Vintage, 2010.
9. Petersen, M.G., Iversen, O.S., Krogh, P.G., and Ludvigsen, M. Aesthetic Interaction: A Pragmatist's Aesthetics of Interactive Systems. *Proceedings of the 5th Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques*, ACM (2004), 269–276.
10. Reeves, S., Benford, S., O'Malley, C., and Fraser, M. Designing the Spectator Experience. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ACM (2005), 741–750.
11. Vannini, P. Dead Poets' Society: Teaching, Publish-or-Perish, and Professors' Experiences of Authenticity. *Symbolic Interaction 29*, 2 (2006), 235–257.
12. Vannini, P. and Williams, J.P. *Authenticity in culture, self, and society*. Ashgate Publishing, Ltd., 2009.
13. Visnjic, F. Constellaction – Intricate emergent behaviour using autonomous building blocks. *CreativeApplications.Net*. http://www.creativeapplications.net/arduino-2/constellaction-intricate-emergent-behaviour-using-autonomous-building-blocks/.
14. Wright, P., Wallace, J., and McCarthy, J. Aesthetics and Experience-centered Design. *ACM Trans. Comput. -Hum. Interact. 15*, 4 (2008), 18:1–18:21.
15. Meet the People Who Literally Make It Rain. *Bloomberg.com*. http://www.bloomberg.com/features/2015-cloud-seeding-india/.
16. *Projections in the Forest*. Vimeo.