

# From *Symbiosis* to *SYM*: Wider applications for biofeedback art

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## 1. INTRODUCTION

*SYM* is a development of *Symbiosis*, an interactive art installation that visualises breathing in LED lights, synthesizing technology and art to create a connecting experience through biofeedback. Visualising an internal state is the essence of artistic practice. The use of technology allows this to be extended beyond mental to physiological properties. Technology also creates the potential for an interactive dialogue between the audience and the artwork, making the artwork dependent on participation.

## 2. SYMBIOSIS JOURNEY

In 2014, a meeting between an artist (myself) and an engineer (Adrian Godwin) at ICT, London, initiated the beginning of actualising the concept of *Symbiosis*. From the engineering side this involved creation of custom breathing sensors, and software. Since 2014 we have iterated sensors from conductive yarn to piezo. In 2017 we began developing pressure sensors, with the aim to create a non-invasive measurement method.

Artistically, the installation was first showcased as a cocoon where two people sit looking at each other from opposite ends of the cocoon, with their breath visualised in multicolour spirals. When the spirals meet they merge into one white light. This version has been showcased in a number of exhibitions, most notably at Includu Festival for the Deaf, Breaking Convention and Symposium on New Technologies for Mindful Awareness and Wellbeing (BSC, London). These exhibitions and user reactions highlighted that *Symbiosis* creates an intimately connecting and calming experience that is beyond language or inhibitions.



*Figure 1: First Symbiosis tests with belt sensor*

One of the later versions of *Symbiosis* is an immersive dome for 8 users. Each participant had a cushion with embedded sensors and was assigned different colour LEDs. When participants synchronised breathing, the lights grew out together from the top as one flower. The installation was designed to guide participants to use slow diaphragm breathing, through the location of sensors and software. The correct light response is only achieved with slowly increasing pressure from the lower back, which occurs by breathing deeply through the diaphragm. A gentle soundscape guided the breathing rhythm to be of 4 count inhale 6 count exhale, which is basic pranayama (ancient yogic breathwork practice).

## 3. WIDER APPLICATIONS

8.2 million people in the UK suffer from anxiety (Fineberg 2013), and medical research over the years has proven that one of the most effective techniques to deal with anxiety is deep diaphragm breathing. Conscious deep diaphragm breathing engages the cerebral cortex stimulating evolved areas of the brain, rebalances the autonomic nervous system, reduces heart rate and stimulates parasympathetic nervous system inducing calm and relaxed state (Varvogli 2011).



Figure 2: Inside Symbiosis at Leeds LightNight, UK



Figure 3: SYM user



Figure 4: SYM light and sensor pillow

Showcasing *Symbiosis* has shown the need for the artwork to be experienced in a wider context beyond galleries, light and music festivals. In June 2019 we collaborated with Royal College of Music HEARTS study, which explores art, connectedness and mental health. We monitored the experience of the participants of *Symbiosis* at Great Exhibition Road Festival in Imperial College to a positive result of increased feeling of connectedness and mental wellbeing in 75% of the participants.

Participation in MedTech Supperconnector in 2019 resulted in collaboration with a gastroenterologist to apply *Symbiosis* concept to treat IBS patients through focus on deep diaphragm breathing to relieve symptomatic pain. This won the Best Pitch Award and resulted in creation of *SYM*, an art object that can be used in a home setting, creating ambience and calm through soothing lights that move with the user's breath, sensed through a custom pillow. A group of IBS patients were invited for a trial test. In the results of questionnaires 60% described the experience as excellent, and after 10min use found their anxiety and gut related pain relieved.

Since then we have conducted more user research within informal settings and within psychotherapy practices. According to the psychotherapist, it could even be a tool to develop awareness and bring deep psychological changes. The potential of the effect of this adaptation of *Symbiosis* are worth investigating further and we would like to conduct more controlled research with groups of people who may be suffering from ailments such as anxiety, depression, stress or even asthma, using further biometrics such as heart rate and EEG to measure the effect of the participation on the levels of stress and anxiety.

#### 4. REFERENCES

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