

Ghost in the Cell—Synthetic Heartbeats

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Abstract

The project *Ghost in the Cell—Synthetic Heartbeats* is a development, extension and re-imagining of the work *Ghost in the Cell*, where we collaboratively created synthetic DNA for the virtual idol Hatsune Miku, and introduced this digital, synthetic DNA into iPS-Cell derived, living cardiomyocytes, therefore giving the virtual, digital idol an actual, living and beating heart. *Synthetic Heartbeats* combines videos and images of the beating heart cells, combined with the digital synthetic DNA, to create fully synthetic, ongoing, observable heart beats by using Deep Learning and Generative Adversarial Networks (GANs).

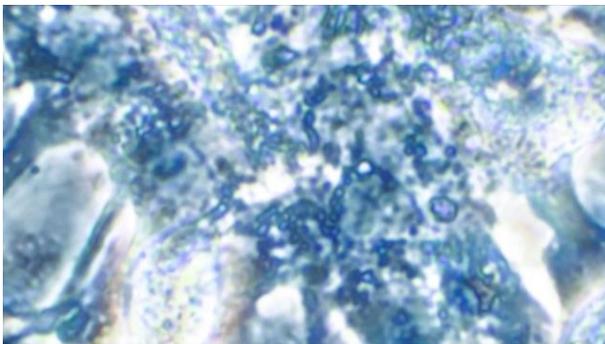


Fig. 1. *Ghost in the Cell - Synthetic Heartbeats*, 2021, BCL, Video Still, ©BCL 2021.

Synthetic Flesh

The virtual idol Hatsune Mike started life as Vocaloid software voice, developed by the company Crypton Future Media in 2007 (Miku 2007), amongst a range of other software voices. However, the manga-style cover illustration of the software package captured the imagination of the Japanese public, and, coupled with the decision by Crypton Future Media to encourage the production of derivative graphics,

animations and videos by the general public, the software transformed itself into a virtual pop idol, producing records and staging life shows. While the voice was given a collective image, we decided to give her a body and a heart. We asked Hatsune Miku fans to create digital synthetic DNA (BCL 2017) that could contain not only biological data, but also encrypted messages, images and music (Catts and Zurr 2002). This digital DNA was synthesized into actual DNA, and inserted in IPS cells, which then were differentiated in cardiomyocytes (heart cells), which started beating spontaneously. The work was shown in the 21st Century Museum (21C 2017) in Kanazawa, Japan, and the audience could see the living, beating heart of Hatsune Miku during the exhibition.

Between Code and Life

This project builds upon the universality of the DNA as an information carrier and questions the differences and similarities of silicon- and carbon-based life forms (Vaage 2016). Synthetic Media, or the possible creation of life-like images, video and sound data, is a challenge to society, by casting doubt and suspicion upon not only the truthfulness, but also the provenance of images and media (Catts and Zurr 2006). This work, *Synthetic Heartbeats* does not aim to create “fake” heart beats, but to synthesis heart beats, whose creation was not only informed by the visual data, but also by the digital DNA data, which is also present in biological images of the heart cells.

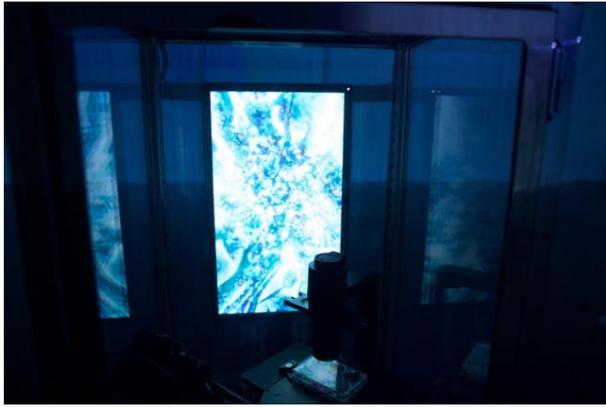


Fig. 2. *Ghost in the Cell - Installation View*, 2016, BCL, Beating Heart Cells of Hatsune Miku, ©BCL 2016.

DNA within the DNA of a tree for hybrid afterlife.

References

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Biography

BCL is an artistic research framework, founded by **Georg Tremmel** and **Shiho Fukuhara** in 2007 with the goal of exploring the artistic possibilities of the nano-bio-info-cogno convergence. Other works by BCL include *Common Flowers / Flower Commons* where GMO Blue Carnations are cultured, open-sourced and released, *White Out*, one of the first bio-art works that use CRISPR for artistic research, and *Biopresence*, which proposed, speculated and realized the encoding of human