



UOA D32

ART AND DESIGN:
HISTORY, THEORY AND PRACTICE



RESEARCHER

Dave Murray-Rust

OUTPUT TITLE

Lichtsuchende

OUTPUT TYPE

Artefact

DATE

2014 – 2019

01 / STATEMENT

FIG. 1
Dave Murray-Rust and Rocio von
Jungenfeld, *Lichtsuchende. Hidden
Door* installation (2014). Photo
courtesy of Chris Scott.



Link to audio-visual available at:
https://media.ed.ac.uk/media/t/1_vy93w5v4

Lichtsuchende is an interactive installation that investigates relations between humans and robots. It consists of a group of robotic sunflowers that use light as a form of communication. It was created by Murray-Rust in collaboration with the design researcher Dr Rocio von Jungenfeld.

It has been exhibited at nine international venues, including Edinburgh's *Hidden Door Festival* (2014), the *New Technology Art Awards*, Ghent (2014) and *GLOBALE: ExoEvolution* (2015), curated by media theorist Peter Weibel, at the Center for Art and Media, Karlsruhe, Germany – an important international venue for technological art. The work has reached audiences in excess of 40,000.

Lichtsuchende was awarded the 2019 Lumen Prize, the British Computing Society Award for Artificial Intelligence and Art, which celebrates the best work created annually using art and technology from across the globe.

02 / RESEARCH DIMENSIONS



FIG. 2
Dave Murray-Rust and Rocio von Jungenfeld, *Lichtsuchende*. Zebrastraat installation (2014). Photo courtesy Rocio von Jungenfeld.

Lichtsuchende is an interactive installation, created by Murray-Rust in collaboration with the design researcher Dr Rocio von Jungenfeld.

The output is a practice-based research investigation into the relationship between humans and technological intelligent systems. It is situated at the interface between research through design and human-computer interaction, as well as theoretical frameworks such as thing ethnography and Actor Network theory. The research has served as a vehicle for bringing new knowledge to our understanding of the relationships between designers/ developers and the things they make, as we create increasingly complex intelligent systems.

The output consisted of an installation of 30 small-scale, light-sensitive robots, distributed across the floor of a darkened exhibition space. The installation was reconfigured in three different formats for its presentations at six exhibitions. As such, it was designed to be adaptable in scale and layout and is site-specific in its configurations.

To secure, weight and anchor the robots down, Murray-Rust used materials that were connected to the locality, such as stones from the beach in Edinburgh or leftover bricks from the construction of the Zebrastraat in Ghent. As well as securing the robots, these materials guided the movement of visitors through the installation space.

The installation encouraged 'playful communication' between audiences and a robotic 'society', through the medium of light. The movement of the robots was modelled on the way that sunflowers turn towards the sun. The robots continually exchange light with one another, and this interaction forms the basis of their 'society'. When the audience enters the darkened room with torches, the robots track the light, exhibiting a form of social interaction.

The research has been developed through Murray-Rust's theoretical writings, that draw on Actor Network Theory to explain human-robot interaction. These have been disseminated through peer reviewed published papers and lectures (see Appendix, page 22).

A video version of the installation was produced in 2017 and documents three of the key iterations of the installation: at the *Hidden Door Festival*, Edinburgh, UK (2014), the *New Technology Art Awards*, Zebrastraat, Ghent (2014) and at ZKM Karlsruhe as part of the *GLOBALE: ExoEvolution Exhibition* (2015).

As both installation and video form, *Lichtsuchende* was presented in nine curated and competitively selected exhibitions (see Appendix, page 22).

FIG. 3
Dave Murray-Rust and Rocio von Jungenfeld, *Lichtsuchende*.
Edinburgh Science Festival
installation (2017). Photo
courtesy of Rocio von Jungenfeld.



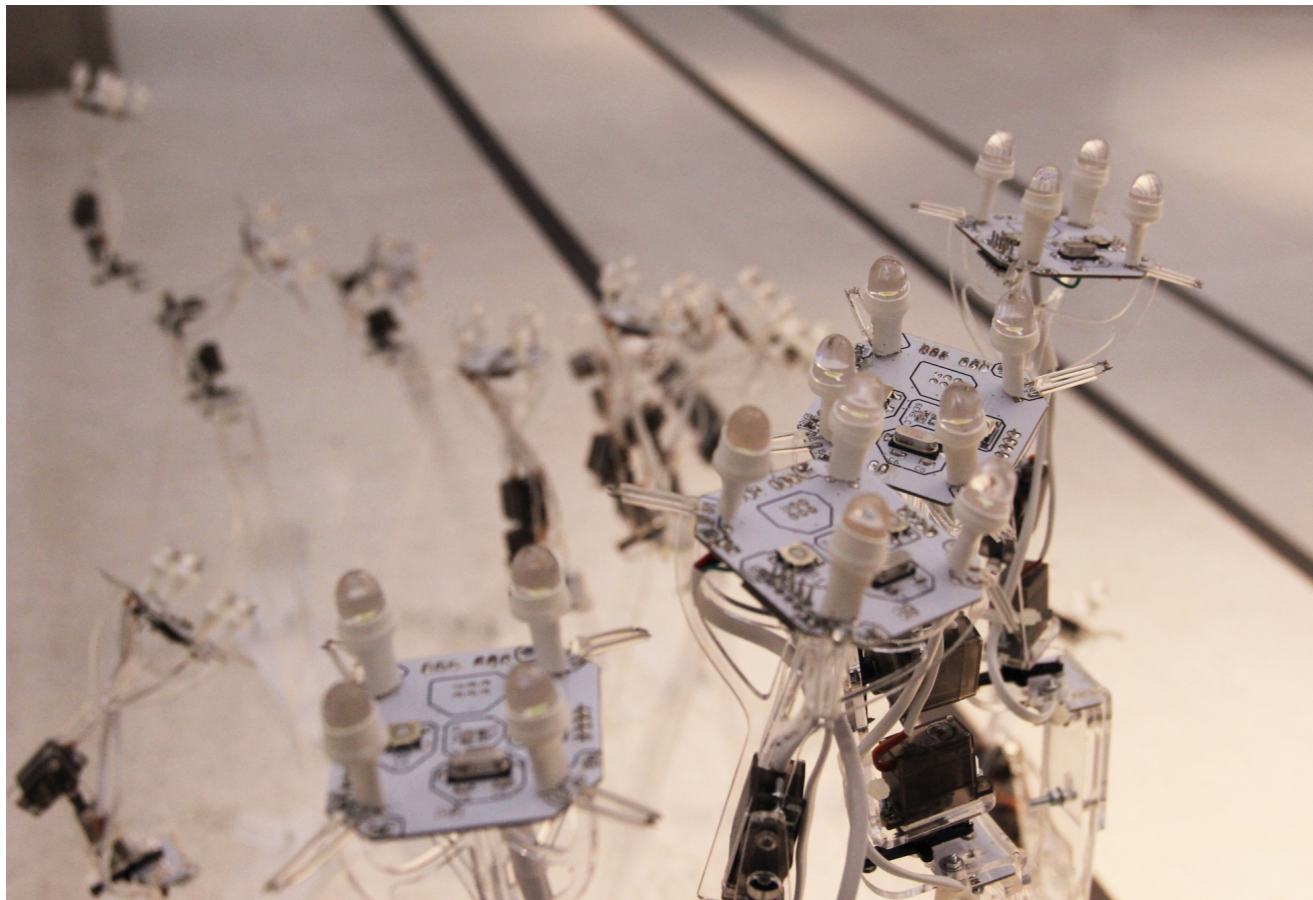
FIG. 4
Dave Murray-Rust and Rocio von Jungenfeld, *Lichtsuchende*.
ZKM, 2015. Photo courtesy
of Rocio von Jungenfeld.



FIG. 5
Dave Murray-Rust and Rocio von Jungenfeld, *Lichtsuchende*.
Zebrastraat installation (2014).
Photo courtesy of Rocio von
Jungenfeld.



FIG. 6
 Dave Murray-Rust and Rocio von Jungenfeld, *Lichtsuchende*.
 Project development (2014). Photo
 courtesy of Rocio von Jungenfeld.



03 / ORIGINALITY

Lichtsuchende uses creative practice to investigate how technology can become animate and what it means to live and play in a world of technological and digital ‘creatures’. The research contributes new knowledge to current thinking within human-computer interaction around emergent behaviours in intelligent systems.

Current discourses around AI systems, and robotics in particular, can suffer from the assumption that intelligent or complex systems possess human-like characteristics. Machines are ascribed agency and responsibility that instead lies with the systems designers that create them.

Lichtsuchende demonstrates an approach that helps designers of technological intelligent systems to think from the point of view of the system itself, exploring the qualities, behaviours and characters of intelligent systems whilst resisting anthropomorphism. By creating an environment inhabited by technological ‘creatures’, the research expands audience’s conceptions about the possibilities and meanings of things being alive.

The research contributes to the field of interactive system design, where increasing numbers of products are digitally ‘animate’, displaying capacity to sense and act in the world. *Lichtsuchende* presents a tangible manifestation of these complex systems, rendering them accessible to wide, non-specialist audiences.

Lichtsuchende enabled encounters between audience and robots using light. The use of light as the medium for animation, which produced an analogy to plant-life, constructed a hybrid register between human and machine.

When multiple robots were interacting, and particularly when humans engaged, behaviours emerged that had not been programmed or scripted. The complex emergent nature of the work results in new combinations of possibilities, not predicted by the designer, which the audience understand simply and directly through a sensory, responsive and relational experience. In this way, the physical interaction between audience and robots prompts re-consideration of our understanding of electronic devices, which increasingly form part of our lives, as things with agency and intelligence.

FIG. 7

Dave Murray-Rust and Rocio von Jungenfeld, *Lichtsuchende*.
Project development (2014). Photo
courtesy of Rocio von Jungenfeld.

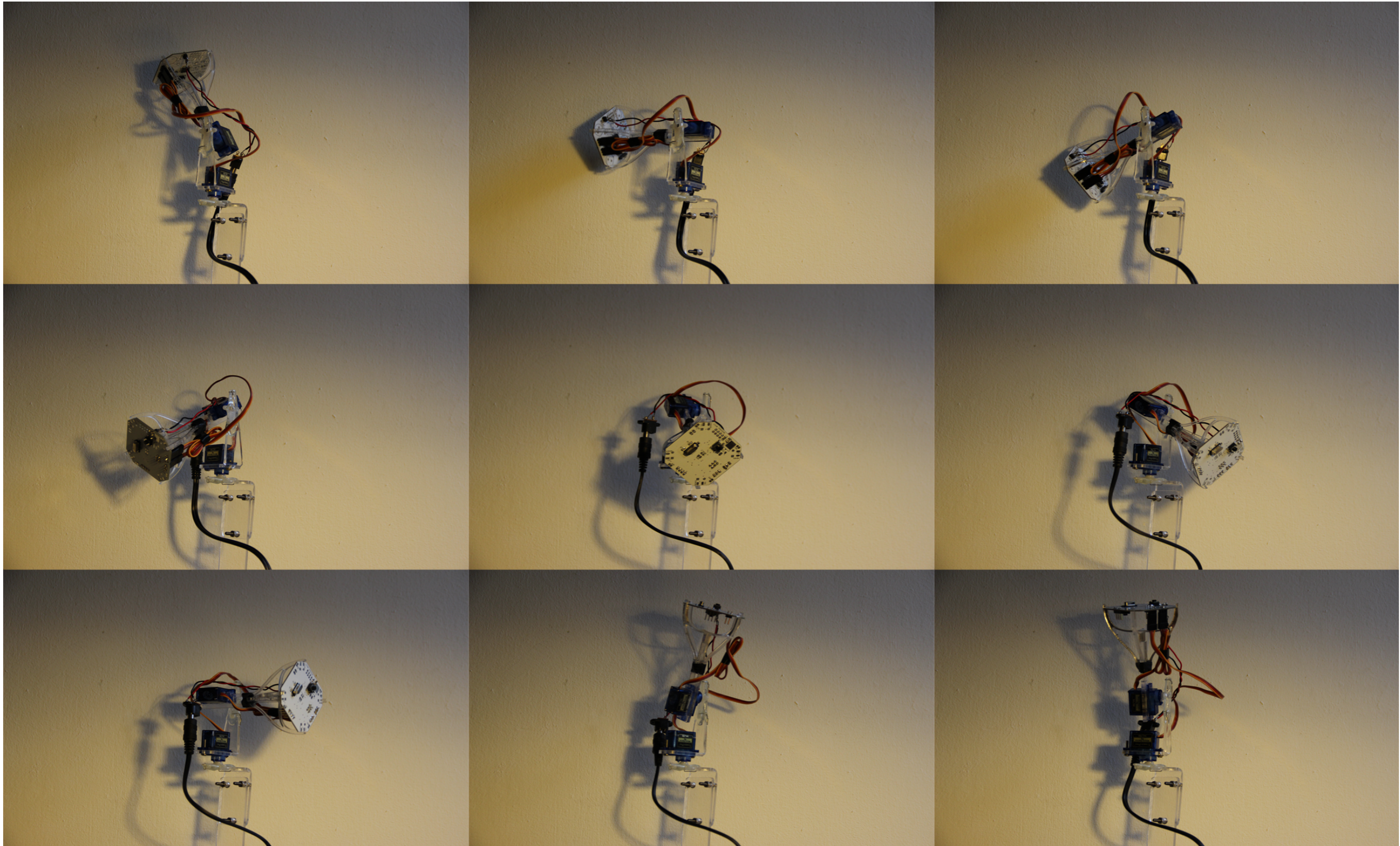
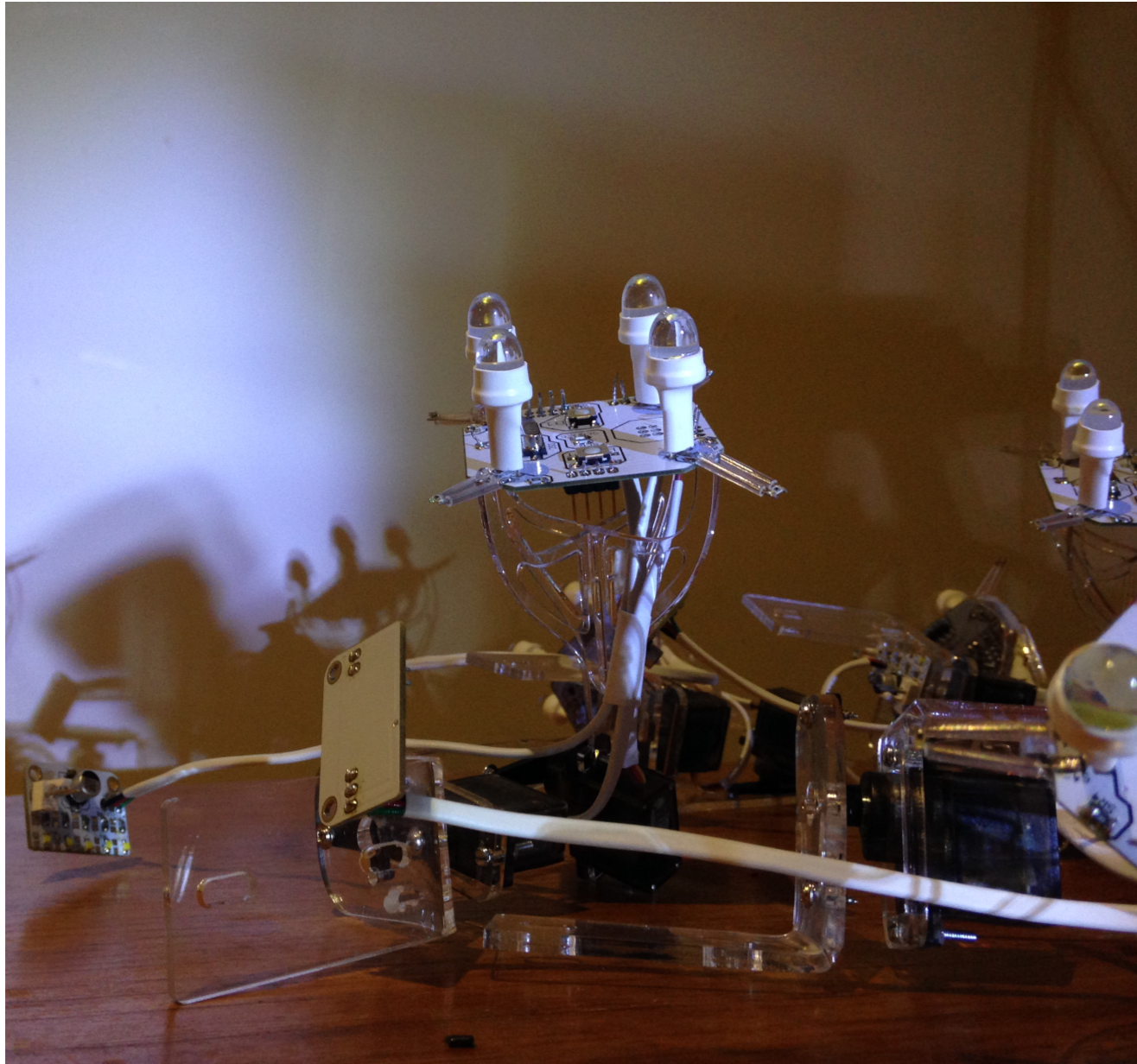


FIG. 8

Dave Murray-Rust and Rocio von Jungenfeld, *Lichtsuchende*. Robot in development, 2014. Photo courtesy of Rocio von Jungenfeld.



04 / RIGOUR

Lichtsuchende was developed over five years of interdisciplinary development, beginning with an investigation into how electronics could embody ideas from human and animal psychology.

Through an iterative process of discussion, prototyping, analysis and design, informed by recent theory drawing on Tim Ingold's work on animacy, Martin Heidegger's concepts of 'thingness', and Christopher Frayling's work on research through design, the underpinning concepts were distilled into code and physical designs.

These designs were driven by investigation into digital material properties, and research into Abraham Maslow's 'Hierarchy of Needs', which provided a formal template for developing robot psychology in a manner that relates to human behaviour, as well as Rodney Brook's subsumption architecture for robots which explores the design of robotic systems that can respond to external stimuli. Research into fixed action patterns in behaviour theory were used as a blueprint for making sense of movement based displays.

From its premiere at the *Hidden Door Festival* in Edinburgh (2014), the different iterations of the work, across its 9 installations, were used as a rich source of observations from which to collate data and analyse how the robot 'society' functioned – both its experiential and artistic qualities, and how audiences interacted with it. These findings were subsequently fed back into future adaptations of the installation.

FIG. 9
Dave Murray-Rust and Rocio von
Jungenfeld, *Lichtsuchende*. First
robot head prototype, 2014. Photo
courtesy of Rocio von Jungenfeld.

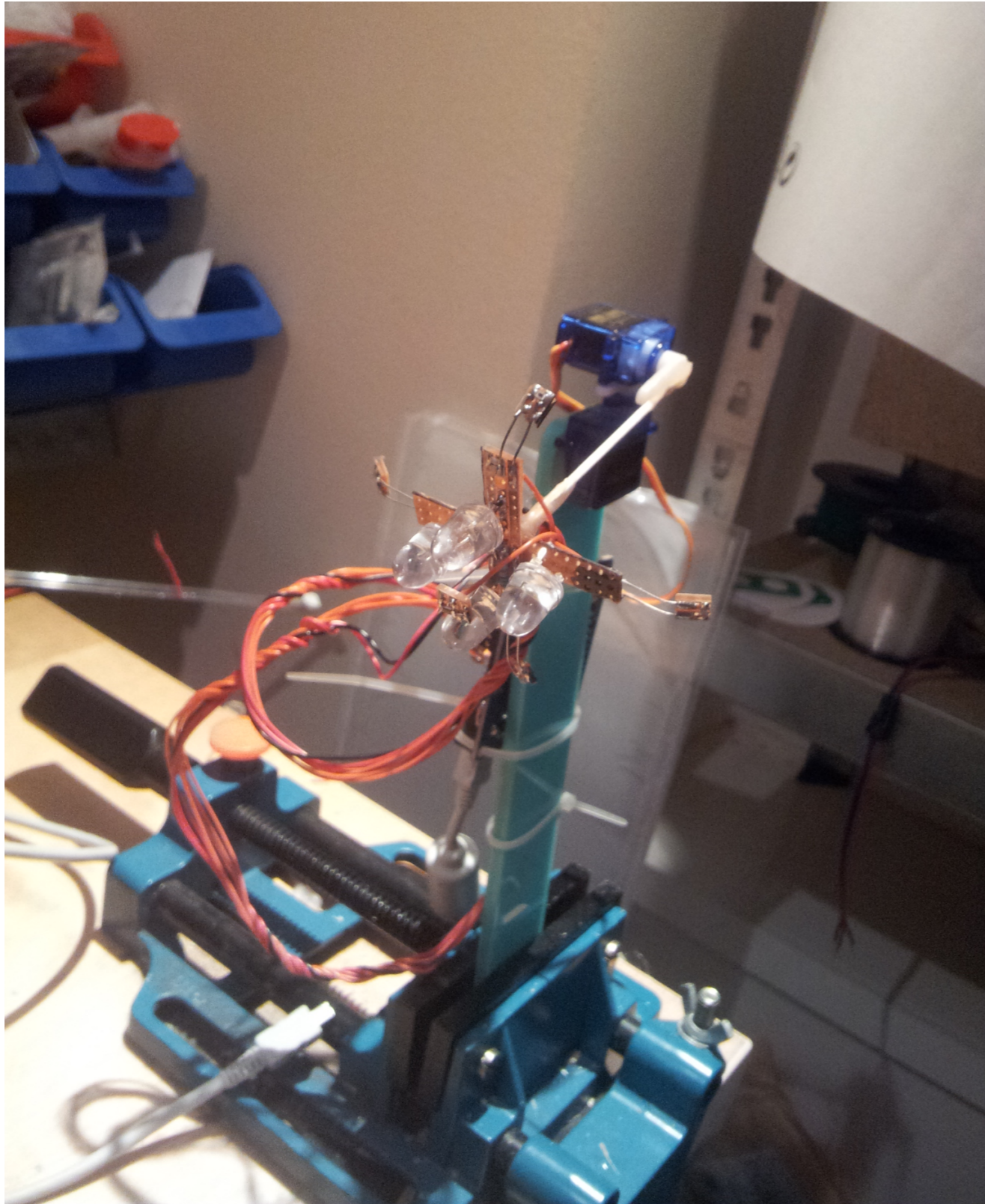


FIG. 10
Dave Murray-Rust and Rocio von
Jungenfeld, *Lichtsuchende*. Robots
in development, 2014. Photo
courtesy of Rocio von Jungenfeld.



FIG. 11

Dave Murray-Rust and Rocio von Jungendorf, *Lichtsuchende*. Video version exhibited at *Machine Gods*, Scottish National Gallery of Modern Art, 2019. Photo courtesy of Kirstie Meehan.



FIG. 12

ZKM catalogue, *GLOBALE: ExoEvolution* (2015). Photo courtesy of Rocio von Jungendorf.



05 / SIGNIFICANCE

The significance of *Lichtsuchende* lies in its contribution to current thinking within human-computer interaction concerning emergent behaviours in intelligent systems. The output was supported by the innovative initiative fund at the University of Edinburgh. It was widely disseminated through its multiple presentations, nationally and internationally.

Through its inclusion in exhibitions at venues and events across a variety of sectors, the research has reached wide audiences in excess of 40k, that have included media art professionals, the contemporary art world, academics and the general public.

In 2014 the work was competitively selected for the New Technology Art Awards, at the Zebrastraat, Ghent, Belgium, where in the public vote for the best works, it came 3rd. As a result, the work was selected by Austrian curator and renowned new media theorist Peter Weibel, for inclusion in the *GLOBALE: Exo-Evolution* exhibition at ZKM, Karlsruhe, Germany, a world leading institution for media art. The exhibition was attended by audiences in excess of 34,500. The exhibitions at ZKM and Zebrastraat were accompanied by full colour catalogues.

In 2019, the work was awarded the Lumen Prize for Art and Technology: British Computing Society Award for AI and Art, which celebrates the best work created annually using art and technology from across the globe.

Lectures and writing by Murray-Rust on *Lichtsuchende* have been presented within international peer reviewed events, talks and publications (see Appendix, page 22).

FIG. 13
Dave Murray-Rust and Rocio von Jungenfeld, *Lichtsuchende*.
Project development (2014). Photo
courtesy of Rocio von Jungenfeld.



06 / APPENDIX

Exhibitions

2019: Neural Information Processing Systems, online gallery (video version).

<http://www.aiartonline.com/>

2018: Scottish National Gallery of Modern Art, *Machine Gods* (video version).

2017: Summerhall, Edinburgh, *Edinburgh Science Festival* (installation).

2015: Glasgow School of Art, *ACM Creativity and Cognition* (installation).

2015: ZKM, Karlsruhe, Germany, *GLOBALE: Exo-Evolution* (installation).

2014: Zebrastraat, Ghent, Belgium, *New Technology Art Awards* (installation).

2014: Life Sciences Centre, Newcastle, *Maker Faire* (installation).

2014: Goldsmiths College, London A-EYE Exhibition, *AISB50*, as part of *Artificial Intelligence and Simulating Behaviour Conference* (video).

2014: Waverley Arches, *Hidden Door Festival*, Edinburgh, (installation).

Publications

2017: Murray-Rust, D., & von Jungefeld, R. Proceedings of the 3rd Biennial Research Through Design Conference, Edinburgh College of Art, *Thinking Through Robotic Imaginaries*.

https://figshare.com/articles/Thinking_through_robotic_imaginaries/4746973

2016: Murray-Rust, D., & von Jungefeld, R. Interactions, ACM Digital Library. *Lichtsuchende*, e. 23(1), 14–15.

<https://doi.org/10.1145/2853201>

2015: Murray-Rust, D., & von Jungefeld, R. Proceedings of the 4th International Conference, EvoMUSART 2015, Copenhagen, Denmark. *Lichtsuchende: Exploring the Emergence of a Cybernetic Society*, (Vol. 1, pp. 161–174).

<http://doi.org/10.1007/978-3-319-16498-4>

2015: Murray-Rust, D., & von Jungefeld, R. C&C '15: Proceedings of the 2015 ACM SIGCHI Conference on Creativity and Cognition, ACM Digital Library. *Lichtsuchende: A Society of Cybernetic, Phototropic Sunflowers*.

<http://doi.org/10.1145/2757226.2757381>

2014: Murray-Rust, D., & von Jungefeld, R. AISB A-EYE Exhibition Catalogue (ISBN: 978-1-908187-41-3). *Lichtsuchende – Cybernetic Sunflowers with Maslovian Behaviours*.

Lectures by Murray-Rust

2020: *Human Machine Inter-Agencies*, Sensilab Seminar, Monash University, Melbourne, Australia.

2020: *Human Machine Inter-Agencies*, MIT HCI Seminar, MIT, Boston, USA.

2019: *Things that Push Back (Lumen Artists on Art and Technology)*, IBM South Bank, London.

2019: *Experiential AI / Inter-Agencies Beyond Symposium*, Experimenta Science Centre, Heilbronn, Germany.

2019: *Experiential AI: Entanglements – Fair, Moral and Transparent AI*, Ars Electronica, Linz.

2019: *Human Machine Inter-Agencies*, Ars Electronica, Linz Prototyping With Emerging Technologies, IoT India Congress, Bangalore.

2019: *Prototyping With Emerging Technologies*, Srishti Institute of Art, Design and Technology, India.

2019: *Prototyping With Emerging Technologies*, PES University, Bangalore.

2019: *AI Summit*, SRM University, Chennai.

2019: *Experiential AI / Inter-Agencies*, ZKM Karlsruhe, Germany.

2019: *Messy Stuff Design: The Frontiers of Art and Science*, Edinburgh Science Festival.

2019: *Human Machine Inter-Agencies*, Sony, Lund, Sweden.

2017: *Thinking Through Robotic Imaginaries*, Research Through Design, Edinburgh College of Art (presented by Murray-Rust and von Jungefeld).

2015: *Talking with Light*, Creative Mornings, Basic Mountain, Edinburgh.

2015: *Lichtsuchende: Exploring the Emergence of a Cybernetic Society*, EvoMUSART 2015, Copenhagen, Denmark.

FIG. 14
Dave Murray-Rust and Rocio von Jungefeld, *Lichtsuchende*. ZKM, 2015. Photo courtesy of Rocio von Jungefeld.





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