The Purr-suit of Happiness: A Tale of Three Kittens

Robots, Humans, Cats, and AI

Eike Schneiders
University of Nottingham
Nottingham, UK
eike.schneiders@nottingham.ac.uk

Steve Benford
University of Nottingham
Nottingham, UK
steve.benford@nottingham.ac.uk

Ju Row Farr
Blast Theory
Brighton, United Kingdom
ju@blasttheory.co.uk

Nick Tandavanitj
Blast Theory
Brighton, United Kingdom
nick@blasttheory.co.uk

Matt Adams
Blast Theory
Brighton, United Kingdom
matt@blasttheory.co.uk

Figure 1: Pumpkin jumping for the robot manoeuvred bird toy while Ghostbuster and Clover observe the ongoing play.

ABSTRACT

This paper showcases Cat Royale, an exploration of the impact of artificial intelligence (AI) on animal happiness situated at the intersection of Art, Computer Science, and Animal Welfare. We argue for the inclusion of non-human actors when designing autonomous systems, as animals increasingly interact with them. In this endeavour, we emphasise multidisciplinarity when designing trustworthy autonomous systems. To design, implement, and deploy such systems, diverse voices must be heard. Finally, by highlighting parallels between Cat Royale's animal-robot interactions and human-AI interactions, this project invites reflections on the trustworthiness, risks, and the price we might pay for AI.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**; • **General and reference** → **Design**; • **Computer systems organization** → *Robotic autonomy*; • **Applied computing** → **Media arts**.

HRI '24 Companion, March 11–14, 2024, Boulder, CO, USA

ACM ISBN 979-8-4007-0323-2/24/03.
https://doi.org/10.1145/3610978.3640791

KEYWORDS

artist-led research, animal-computer interaction, trustworthy autonomous systems

ACM Reference Format:
Eike Schneiders, Steve Benford, Ju Row Farr, Nick Tandavanitj, and Matt Adams. 2024. The Purr-suit of Happiness: A Tale of Three Kittens: Robots, Humans, Cats, and AI. In *Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction (HRI '24 Companion), March 11–14, 2024, Boulder, CO, USA.* ACM, New York, NY, USA, 3 pages. https://doi.org/10.1145/3610978.3640791

1 INTRODUCTION

AI is already changing our world in profound, unforeseen, and ambiguous ways. In this paper, we showcase the artist-led Cat Royale project [3, 4]. This multidisciplinary project sits at the intersection between Art, Computer Science, and Animal Welfare. Experts in feline behaviour, robotics, and computer vision are just part of the team behind the investigation of questions related to autonomous systems. Ultimately, this artist-led research [1] project aims to interrogate timely societal questions related to trust and responsibility of autonomous systems.

Through this project, we strive to identify the potential positive influence that AI-infused autonomous systems might have when acting as care taker of companion animals, in particular with a better understanding of cats and their needs, and how a systems such as the one presented can accommodate these needs. Furthermore,

we hope to understand the limitations and challenges of these technologies in care and welfare settings.

The paper describes, and showcases in the accompanying video, the system as well as several of its integral components. These include i) the enclosure it self—which acts as a facilitator for the animal-robot interaction—ii) the robot and its underlying systems—which utilises camera vision and machine learning in order to adapt its behaviour based on the needs of each individual cat—, as well as iii) the cats themselves—being the main actors of Cat Royale, the cats play an integral role in the projects success (or failure).

As an artist-led project, Cat Royale surpasses the exploration of autonomous systems. The artists delve deeper, posing questions about the potential costs associated with AI designed for instant gratification. Cat Royale further aims to raise questions relating to the parallels between the cats' relationship and interaction with the robot and humans' relationship with AI.

We believe that the investigation of how animals interact with autonomous systems, such as robots, becomes increasingly important given the accelerating degree at which they already encounter them. Current examples include hedgehogs and lawn-mowing robots [2], dogs interacting with delivery robots[1], and—the all time YouTube favourite—cats riding robot vacuums[2]. With this in mind, we argue, that we need to understand the animals needs, and design robots able to account for this, as animals will encounter them, if we design for it or not.

2 SYSTEM DESCRIPTION

The System, which is Cat Royale, consists of a number of components and actors. These include—amongst others—the bespoke enclosure, the Kinova Gen3 lite robot in its centre, as well as the three recruited cats Clover, Pumpkin, and Ghostbuster.

The Enclosure. The design of the bespoke enclosure, was inspired by art from the 70s, e.g., Verner Panton Visiona II exhibit[3]. Cat Royale's vision was to create a luxurious environment which would be appropriate for the three cats inhabiting it. Furthermore, given that Cat Royale is an artistic installation, the enclosure had to be designed in a way to be of interest to the audience who would watch the cats in the space. The cat-centric design of the enclosure had to provide for their needs, including the presence of high perches, resting dens and viewing-platforms, suspended walkways, rolling floors providing hiding places, as well a soft—and claw-able—textures.

The Robotic System. Just as the cats recruitment, so was the robot 'recruitment' of utmost importance. Its morphology, range, movement speed, and lifting capacity provided, or stripped, the artists behind in the control room with affordances. The robot, as instantiation of a physically embodied autonomous system, had a potentially tangible impact on the cats' well being and safety. The robot 'recruited' for Cat Royale was the Kinova Gen3 lite robot arm[4]. A small cobot with 6 degrees of freedom, .76 meters reach, an integrated two-finger gripper providing it with a maximum payload of only .5 kg. The short range and low payload was vital in order to ensure the cat's safety and ability to freely withdraw from the robot. In addition to the hardware, three primary software components were developed to drive the robot: 1) the computer vision (CV) system, 2) the decision engine, and 3) the robot control system [4].

The Cats: Clover, Pumpkin, and Ghostbuster. As argued, non-human stakeholders are to a larger extent encountering and interacting with autonomous systems. It is therefore important to acknowledge the need to consider non-human actors during the design of autonomous systems. Cat Royale's primary priority was at all times the welfare of the three cats. To ensure this, we had animal-computer interaction specialists, feline behaviourists, and veterinarians on the team. A key cat recruitment criteria was the cats prior familiarity with each other, leading to higher comfort when sharing the enclosure. Furthermore, to ensure that the cats were not deprived of interaction with their owner, the cat owner moved to the art studio for 17 days (five cat habituation days and 12 days of deployment).

3 SHOWCASING CAT ROYALE

This video submission showcases several moments of the twelve day installation broken up into three larger divisions.

Prologue: Cat Royale. The video starts by highlighting the cat 'Utopia', as the artists like to refer to it. Following a brief introduction of the three key actors—Clover, Pumpkin, and Ghostbuster—the narrator presents the concept behind Cat Royale. In short: three Cats, one robot, twelve days, six hours a day. The artistic installation is supported by experts in e.g., cat behaviour, and brings the three cats in close encounter with a robot arm and its underlying CV and AI systems. All in an ongoing effort to teach the AI system what games each cat likes, ultimately fulfilling the primary goal of increasing their happiness. While this, at first glance, might seem like a fully autonomous system, the narrator proceeds to introduce the control centre with key roles such as the robot operator or the dedicated cat welfare officer ensuring animal well being.

Cat Royale: What did we learn? While the project resulted in numerous key learnings, this video highlights one specific element: **AI design must be multidisciplinary**. To ensure that the artistic installation, and the plethora of sub-systems, was considering elements beyond the optimisation of the AI model, Cat Royale included specialists and lay people alike. Specifically, the projected included veterinarians, computer scientists, experts in feline behaviour and robotics, artists, and computer vision specialists. Furthermore, in the months leading up to the project deployment (March 2023), frequent meetings with the audience advisory panel (AAP) were held. The AAP included 15 members of the general public, emphasising their diversity along multiple parameters including gender, background, AI/robotics experience, global location, or ethnicity.

Epilogue: We are the cats. Like art and artist-led research, which possess the unique capability to pose challenging and thought-provoking questions to a broad audience [1], Cat Royale is no exception. Naturally, Cat Royale was trying to create reflections on AI and the trustworthiness of automated systems. Are these system a blessing or a curse, or a little bit of both? While we do not provide an answer, we seek to engage spectators of Cat Royale in critical

[1] https://youtu.be/X4HYRBFrzGs?si=Xu84doV_TZExETwY&t=12
[2] https://www.youtube.com/watch?v=uGI8Od22WM4&t=119s
[3] https://www.verner-panton.com/en/collection/visiona-2/
[4] https://www.kinovarobotics.com/product/gen3-lite-robots

Figure 2: *Left:* Public installation as presented at Curiocity. *Right:* Installation currently at the Science Gallery London.

reflection on these, maybe foreign, topics. In the words of the lead artist behind Cat Royale:

> *'The Cats in Cat Royale are of course us. We are experimenting with a culture, that privileges choice and consumer power above all else. What does it mean when our every whim can be met by automated systems. When our desires can be met so quickly, the satisfaction that we seek, becomes more fleeting and insubstantial as a result. What costs might we pay for AI?'* - Matt, lead artist

4 SO WHERE CAN *I* SEE CAT ROYALE?

The deployment of Cat Royale happened in late March 2023 for six hours a day (two sessions of three hours), over the course of twelve days, in the art studio on site in Brighton. These, daily, six hours were recorded, and edited live—using the eight cameras angles in the environment—by the dedicated TV vision mixer. This daily video was presented 'live' (i.e., slightly shifted to account for time zones) at the Curiocity Science World Fair[5] in Brisbane, Australia (see Figure 2 left). To ensure further reach, a daily 2–5 minute highlight video was presented each day on social media, followed by thousands of viewers. Lastly, the entire 576 hour long collection of in-enclosure video material, was edited to a ~8 hour long video which is currently on display for six months (until January 2024) at the Science Gallery London[6] (see Figure 2 right). Following the installation at the Science Gallery London, further exhibits across Europe and Asia are planned.

5 CONCLUSION

This submission, and the accompanying video, presents Cat Royale, an artist-led project investigating AIs capability of providing life enriching experiences to a triad of cats, ultimately attempting to increase their happiness. The piece attempts to invite reflections in the general public on topics related to AI, its trustworthiness, as well as its potential downsides, risks, and the price we might pay with its adoption. Are we able to fully anticipate the impact AI-infused systems have on society and the actors—human and non-human—that are part of it? This paper further highlights the importance of AI development as a multidisciplinary endeavour. As we cannot anticipate every possible impact of these systems, it is imperative that a multitude of voices are heard when designing, implementing, and deploying these technologies.

[5] https://www.worldsciencefestival.com.au/news/cat-royale-twelve-days-three-cats-one-ai-trained-robot
[6] https://london.sciencegallery.com/ai-artworks/cat-royale

ACKNOWLEDGMENTS

This work has received ethical approval from three separate committees: the Animal Welfare and Ethical Review Body (AWERB), the University of Nottingham's Computer Science Ethics Review Committee (CSREC), and the University of Nottingham's School of Veterinary Medicine and Science Committee for Animals and Research Ethics (CARE). Furthermore, this work was supported by the Engineering and Physical Sciences Research Council [grant number EP/V00784X/1] UKRI Trustworthy Autonomous Systems Hub (TAS Hub) and Responsible AI UK (RAI UK) [grant number EP/Y009800/1].

REFERENCES

[1] Steve Benford, Chris Greenhalgh, Andy Crabtree, Martin Flintham, Brendan Walker, Joe Marshall, Boriana Koleva, Stefan Rennick Egglestone, Gabriella Giannachi, Matt Adams, Nick Tandavanitj, and Ju Row Farr. 2013. Performance-Led Research in the Wild. *ACM Trans. Comput.-Hum. Interact.* 20, 3, Article 14 (jul 2013), 22 pages. https://doi.org/10.1145/2491500.2491502

[2] Sophie Lund Rasmussen, Ane Elise Schrøder, Ronja Mathiesen, Jeppe Lund Nielsen, Cino Pertoldi, and David W. Macdonald. 2021. Wildlife Conservation at a Garden Level: The Effect of Robotic Lawn Mowers on European Hedgehogs (Erinaceus europaeus). *Animals* 11, 5 (2021). https://doi.org/10.3390/ani11051191

[3] Eike Schneiders, Steve Benford, Nick Tandavanitj, Matt Adams, and Ju Row Farr. 2024. Cat Royale. *Interactions* 31, 1 (jan 2024), 64. https://doi.org/10.1145/3636499

[4] Eike Schneiders, Alan Chamberlain, Joel E. Fischer, Steve Benford, Simon Castle-Green, Victor Ngo, Ayse Kucukyilmaz, Pepita Barnard, Ju Row Farr, Matt Adams, Nick Tandavanitj, Kate Devlin, Clara Mancini, and Daniel Mills. 2023. TAS for Cats: An Artist-Led Exploration of Trustworthy Autonomous Systems for Companion Animals. In *Proceedings of the First International Symposium on Trustworthy Autonomous Systems* (Edinburgh, United Kingdom) *(TAS '23)*. Association for Computing Machinery, New York, NY, USA, Article 36, 5 pages. https://doi.org/10.1145/3597512.3597517