It’s Alive! Smart Things for Gaming Chairs: Exploring Animism as a Resource for Building Relations

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ABSTRACT

In this project, the intersection between animism and smart things is being explored, with a special focus on gaming chairs. Integrated sensors and actuators become an opportunity to create interactivity and autonomous behaviour which creates illusions of life. Gaming chairs are interesting to explore because it’s a piece of furniture that is often and well used, for longer periods at a time, allowing a space to create a personal relationship between the human user and the chair. With the goal to develop design beyond the current norms of interactions and relationships between the user and belongings in their home this project uses Research Through Design, Speculative Design, Animism and Posthumanism. By transferring insights of visual expressions, capabilities of beloved belongings, familiar interactions and behaviours to a non-living entity combined with technology and smart things as a contributor for animistic expression - this project proposes that it is possible to create an illusion of life and for humans to develop a relationship to a non-human entity. The actuators applied on the conceptual gaming chair affected the participants testing it - the participants seemed to care for the chair and perceived it to be an extension of themselves.

KEYWORDS


1 INTRODUCTION

A piece of furniture could be something you care and cherish, but what could happen if the furniture also lived its own life and sometimes interacted and interfered with your daily routines? What if you could have a similar relationship to your furniture as you have with your pets? Animistic artefacts that evoke a perception that they have autonomy, intention and/or inner life [16,57] may have a valuable contribution in the context of ubiquitous computing and Internet of Things (IoT) [20,34,52,33,80]. Could the perception of life applied to a non-living entity affect the interaction, bonding and relationship? This Research Through Design (RtD) [21,82] project derives from posthumanism, animism and speculative design with the aim to get a greater understanding of the possible characteristics of smart textiles and smart furnitures in the home. The aim is to understand how these technologies could be deployed to create new relationships between the user, its home and belongings; to investigate how the theoretical framework of animism could be transferred into design and how animism could affect the relationship and interactions between human user and the non-human entity. The goal is to produce knowledge and contribute to the Human Computer Interaction (HCI) community by producing a functional prototype to investigate the intersection between Speculative Design, Animism, sensors and actuators by RtD approach. The result could be generalised on how to design with various sensors and actuators in the everyday home, without the sensors being invasive or persuasive. The materials for producing and implementing the theory of animism in design became smart things - a combination between textile sensors, actuators and objects.

As of today it is near impossible to exist in the world without interacting with technologies - even though it sometimes is autonomous and/or ubiquitous and not visually present. It has been argued that the technology is affecting us more than anticipated. Ritter [2021] argues that humans tend to overlook the technology’s influence. This project explores how ubiquitous technology of sensors and smart textiles might affect human and is in line with a post phenomenological study: a study on technology and the relation between human and technological artefacts, with focus on the way the technology shapes the relationships. Most design approaches treats technology as an object with certain functions and goals, rather than a mediator of humans’ meaning-making, which is a problem. Therefore, in this project I explore the meaning humans make of technology. Rather than applying philosophical theories to technologies the development of the technology becomes the starting point for the analysis [63]. This project derives from the theories of
posthumanism and animism. Encyclopedia of Britannica Online defines animism as the "belief in innumerable spiritual beings concerned with human affairs and capable of helping or harming human interests". Brenda Laurel [2008] introduced animism in design in which the core was to understand how the interaction was affected and how the behaviour of the human changed if humans perceived the artefact as "alive".

Design research often focus on user needs, which might constrain the creative imaginaries needed to investigate the space beyond technology as-we-know-it. In this project a speculative, post humanistic approach is used to entitle an investigation beyond the user needs of today. It is applied to positioning the project in a possible, contrafactual future [13] where humans are sharing center space with non-humans to develop an animistic prototype to function without interfering or de-prioritising the human need [29,35,39,81]. An additional problem with design research is that it often assumes and investigates humans interacting with non-humans without agency. Therefore, there is need to investigate additional methods which challenges the traditional normative approach to challenge and get wider understanding of the human-non-human entity interaction.

The research questions was framed as following: How can I utilize animism as a ground to develop design beyond existing norms of interaction?

Three subquestions was also framed to further investigate the research question:
Q1: How can the theoretical framework of animism be transferred into design?
Q2: How can animism work as a resource for developing new relationships and interaction?
Q3: How is the non-human entity with animistic qualities experienced by users in interaction?

2 BACKGROUND

This project is one outcome out of four projects conducted in a collaboration with IKEA of Sweden’s Material & Innovation: Textile Innovation Team and students from Södertörns Högskola, Textilhögskolan, Kungliga Tekniska Högskolan and Lunds University. The umbrella term for the projects was Disruptive Textiles. IKEA was curious on how to interpret disruptive textiles in furnishing and how to apply sensors in everyday life. Disruptive Textiles was dissected as two separate themes. With foundation in relevant studies disruptive was interpreted as; norm breaking critical design [4], a disruptive process - sustainable design [14,80], as innovative solutions [7] and/or as unintended usage of products [26]. As a starting point for developing and evaluating products for IKEA a framework called Democratic Design was presented. Democratic Design is a tool developed by IKEA based on IKEA's company and culture values. It includes the cornerstones Function, Low Price, Quality, Sustainability and Form where the goal is to achieve a balance of these dimensions. As a RtD project with a speculative approach the goal was to conduct research and not a commercial viable product. The dimensions of Democratic Design was therefore used as a starting point or a tool to understand the context and norms of IKEA to question and break through via the disruptive approach. The corporate context and the need to question its pre-existing norms and values is also in line with Zimmermans [2007] approach for RtD - there is a need to differentiate research artefacts which is deriving from a RtD project to commercially viable products. By following Democratic Design when conducting this project it would risk the artefact and process to emphasise with company values such as manufacturing issues, economics and integrating the product into a product line.

This project originates from the discussion in four overlapping fields of study - smart textiles and smart homes, posthuman design, animism, and speculative design. The state of the art is further developed in following sections.

2.1 Smart Textiles and Smart Homes

Advanced, or smart textiles are known by many terms and contain a wide, nuanced range of applications and descriptions [56,73]. In the book Smart Fibres, Fabrics and clothing [2001] the development and usage of smart textiles is described as a revolution that has existed for the past 50 years. Smart textiles are here described as materials that senses and reacts to stimuli from the environment, such as thermal, chemical, electrical, mechanical or other sources [56,73]. The structures are “active” and can sense and react to the environment. In the article Smart Things: Ubiquitous Computing User Experience Design it is defined as smart materials which is "highly engineered materials that respond intelligently to their environment"; smart materials are engineered to contain interesting tactical characteristics rather than mediating electronics or information [40]. Smart material combined with information is referred to as transitive material [12] or computational composites [76]. Examples of these transitive materials or computational composites are among other: luminescent fabric, ink that changes colour or carbon fibres [40].

Previous smart textile studies demonstrate opportunities for innovative, disruptive applications of integrated electronics for products and wearables in need of connected, flexible and functional materials\(^4\) [10,30,56,66,73,79]. Smart textiles are mostly to be divided into passive-, active- and very smart textiles subgroups [8,38,66,71,73]. The first subgroup is when the textiles are able to sense the environment and/or user inputs based on sensors. The second subgroup is when textiles are reactive: sensing inputs with integrated actuator functions [40,66]. The third subgroup is textiles that are able to sense and adapt to circumstances in the existing environment\(^5\) [38,71,73]. Smart textiles connected and affected by external environments and/or ubiquitous computing increase the possibilities further [44]. IoT has long drawn research attention [28,33,46] and has been described as the next generation of internet [44]. The various materials and objects of this project will be referred to as smart things to cover the various capabilities and smartness of the material and objects creating the interactive system and developed prototype, however the smart things are activated by interaction and not by other environmental inputs.

### 2.2 Posthuman Design

Posthumanism is described as when humans are sharing center space with non-human entities. In HCI context the human takes up a lot of the center space and there is little focus left on the non-human [36,39,81]. As smart things make promises to solve multiple issues humans encounters in everyday life, the label of smartness constitutes a smart utopia - the smart people use smart technology which performs and establishes a form of social or cultural order [72]. Within HCI humans are often referred to as users and therefore possess a central role of prompting the artefact on what to do and how to behave [24] leading to the artefact serving the human and the human needs. The artefact either fails or succeeds, depending on the pre-set answer of what is right or wrong [53]. This leads to the artefact being prescribed to a subsidiary role, which contradicts the reality of ubiquitous computing and smart things [39] where humans and smart things are acting and existing at the same place. This project takes a standing point in line with Hinchcliffe et al. [2005]: designing for and/or with non-humans is not equal to a deprioritization of the human needs. It rather opens up to new perspectives which might enhance the co-existence of humans and non-humans.

### 2.3 Anthropomorphism and Animism

Robots and voice assistants have long been investigated by researchers within HCI and Human Robot Interaction (HRI) field [17,11,39,59,78]. Anthropomorphism is described as the attribution of human or humanlike characteristics or properties to non-human entities [16]. It is complex to design intentional anthropomorphised entities or object even though it often results in gaining trust from the user, for example, studies [11,59,78] revealed some cases of humans that preferably interacts with a voice assistant over a human regarding sensitive topics. Humans also tend to attribute machines with human capabilities even though it might not be design intentionally with anthropomorphised or animistic behaviours and/or capabilities [1,16,36,39,53]. HCI or Human-Machine Interaction (HMI) is often result and prediction-driven and developed from the human needs, it might be productive and valuable to add degrees of disruptive uncertainty to question the regular anticipated interactions [53]. Designing artefacts and adding behaviours that evoke perception of inner life, autonomy, intention, or personality could challenge the human-non-human entity interaction [1,53].

Animism is perceiving animate behaviour and attributes of consciousness to natural objects and/or constrained objects in the [41]. When human users perceive non-human entities as an entity with inner life and/or autonomy it could result in new types of interactions and behaviour that is interesting to investigate [16,57]. This supposition is strengthened by previous studies arguing that these interactions could have a valuable contribution in the context of ubiquitous computing [20,34,52,53,80]. One can assume that many systems and artefacts will develop and become smarter over generations. One example of that is heating systems, which have evolved from a passive system to an autonomous system that regulates the temperature with merely no inputs [39]. As technology develops towards being more pervasive and omnipresent, animistic responses increases [9,34]. This project derives from animism because it articulates the theoretical framework to question digital innovation and HCI to foster new interactions, affects and thoughts [9,29,52,53].

Researchers argue that artefacts that possess animistic attributes should have "a symmetry in modality" meaning that there should be a match of the abilities of the artefact to its visual appearance [39,43]. Humans have previous experience of interaction with pets and pet-robots [55,65] and have therefore a pre-set of anticipation of the outcomes of the interactions. It could be helpful to look to these types of interactions when designing animistic behaviour [41].

Animism could be divided into three subcategories: General Animism [32,57], Agentic Animism [32,34,57] and Aliveness Animism [55,57]. General animism derives from cultural anthropology and theology and is described as a tendency to believe that souls, spirit or gods exist in manmade objects, personal belongings or in nature [32,57]. Adults have more

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difficulty to believe or perceive non-human entities as alive [57]. However, animism may not fade away for all adults [50], robots are common to be perceived as a living entity and adults are sometimes treating them as if the robots they interact with are alive [16,35,57] which is described as Agentic Animism [32,34,57]. Aliveness Animism is described as humans who have tendencies to believe that ambiguous things are alive such as moving objects, for example, clouds [50,57]. In a study conducted by Okanda et al. [2019] where the authors investigate adults’ belief and morality towards robots the authors uses plants as a starting point to examine the position in believing if products could be perceived as alive. The authors concluded a correlation: the participants who have tendencies to think and treats plants as a living thing have greater tendencies to think of robots as alive. It is also concluded that more than half of the participants wanted to be friends with the robot and would not hit them due to empathy towards the robots.

Animistic design approaches is increasing [1,20,34,52,53,80]. Researchers have previously investigated how the relationship between human and non-human entities evolves by applying similar theories and methods such as “thing-perspective”. For example Giaccardi et al. [2017] posthuman study where cameras and sensors were attached directly attached to scooters to collect data that was interpreted by professional actors that spoke on behalf of the scooters. Another approach for investigating animistic design is speculative design, for example the project AniThings where the authors investigate animism with the goal of generating discussion rather than designing a solution for a need [53]. Similar to this project is Rozendaal’s project [2016], which aims to understand the intention within interaction between humans and non-human entities. Rebaduengo’s project [2019] The Addicted Toasters investigates new types of relationships when non-human entities develop and express their own interests, emotions and feelings. With the notion of these project, the decision was made to appropriative the speculative design approach for this project.

2.4 Speculative Design

Hence the posthumanistic and animistic approach there was a need to look for relevant methods and theories to conduct the project. Speculative design was chosen because it is a method or tool known for proposing design outcomes to debate and discuss future scenarios and challenges [13]. For carrying through the concept inspiration was taken from Dunne & Raby’s Probable, Plausible, Possible, Preferable Cone (see fig. 1) [13] which is used as a framework within speculative design to express the exponential nature of change.

Probable describes what is likely to happen, plausible describes plausible futures, possible is where the links between today’s world and a suggested future world should happen and the final cone intersects both probable and plausible and refers to preferable futures [13]. This project devotes the possible cone to link between the knowledge of a possible, eventually soon-to-be, posthumanistic actuality. Speculative design is also used in this project as a tool to explore alternative scenarios of the future using design or concepts as a mediator to open up for discussion [13]. When investigating possible futures, utopia and dystopia are often being discussed. Utopian designs are morally designed for a humane world, which often fails in reality when trying to concretise a utopian world (Nazism, Fascism and Stalinism are all grounded in utopian thinking). Dystopia is described as cautionary scenarios of what might happen if we are not careful enough of our present surroundings [13]. This project distances itself from being placed in either a utopian or dystopian future, rather a contrafactual future. A suitable way of describing this project in the context of speculative design is counterfactuals: What happens in a counterfactual reality where objects in our everyday life become alive? A project made within the counterfactual context is James Chamber’s Attenborough Design Group [2010] where Chamber conceptualises a counterfactual reality where the wildlife filmmaker David Attenborough with his extensive interest for wildlife becomes an industrial designer instead of a filmmaker. The Attenborough Design Group explores how animal capabilities such as survival instinct equips technological artefacts and opens on new perspectives regarding sustainable design [2,13].
3 METHODS

As this project aims to investigate how to utilize animism as a ground to develop design beyond existing norms of interaction an iterative, speculative design process containing several additional relevant methods has been conducted. Qualitative and quantitative surveys and interviews was conducted to collect data, thematic analysis to analyze the collected data and Transfer Scenarios was chosen to transfer the data into design. To approach and investigate the research question and to conduct the design exploration Research Through Design and Speculative Design was chosen.

Three surveys have been carried through to gather various data. A preliminary survey was posted for a sample group of 4500 gamers and/or people interested in gaming which resulted in 52 answers. The IKEA co-create and Transfer Scenarios survey posted for IKEA employees at IKEA of Sweden, offices and stores, which resulted in 270 answers. Insights and reflections from these surveys led to an additional smaller survey posted on Instagram, targeting gamers, which resulted in 76 answers in were 34 of the respondents was participants of a follow-up containing semi structured text based interviews to gather additional data.

To pursue the design exploration of this project and to investigate how animism can work as a resource for challenging the normative human-non-human interactions the project also relies on methods presented by Zimmerman et al. [2007]; Research Through Design (RtD) and Dunne & Raby [2013]; Speculative Design. The theories of animism and posthumanism infiltrated the chosen method but was also crucial when carrying through the design exploration to answer the research questions. The project were addressed mainly through a RtD approach, where practical design work was combined with empirical research methods, where surveys and user studies were used to inform the design exploration and to validate the solutions. RtD permeates the whole project: it is carried through by ideating, prototyping and producing a concept with a hi-fi prototype as an outcome.

The goal with this project was to answer the research questions, and to do that an illusion of life needed to be created, hence the approach from start when assembling the concept and chair was to treat it as alive. This approach was inspired by the autoethnographic method [15] in which the approach of the progress includes analysing and describing the personal experience to understand cultural experiences. During the process of this project the experience, thoughts, progress, feelings and failures of the assembling process have been noted and reflected upon.

The prototype of this project is to be treated as a Design Thing according to the description: a tool to translate the feelings and discoveries to something instant [37]. Koskinen et al. [2011] presents three types of approaches to RtD: the lab, field, and showroom where the Laboratory approach was applied for testing this concept. The prototype was tested via user tests to gain knowledge about smart things, actuators, how to create the illusion of animism and how the interaction and relationship is affected. For testing the prototype five test was conducted during five sessions á 30 to 40 minutes.

The project has followed the principles for research ethics to verify the safety of the participants [67]. The questionnaires and surveys were gathered online and via various websites and social media platforms and the participants were informed about their rights, anonymity and consent6 and that the data might be shared with students and teachers at Södertörns Högskola and IKEA of Sweden.

In advance, the participants of the test were provided with a consent form that described the tests along with their rights. They were also informed that they could withdraw their participation at any time prior, during or after the test, before this paper was published. Given the fact that the project and its interactive prototype includes technical and integrated parts with sensors, the participants were also informed that these technologies did not collect or save any data from the tests.

In the following, activities and methods used in the project will be discussed in detail. As this project had a RtD approach additional methods derived when exploring the design, which is described in the Design Exploration section.

3.1 Preliminary Survey

A preliminary study including a survey was executed. The survey was framed as a data collection study to tap into gamers’ needs and practice and to get an understanding of their attitude towards gaming chair features with entries such as interaction, smart things, animism and posthumanism. To get a hint on where to post the survey, several game-forums8/9/11 were
contacted and asked if they had a suggestion on where to post the survey to reach a broad, diversified group of gamers. The survey was posted on discord\textsuperscript{12} and on a Facebook group\textsuperscript{13} specified on gaming. The respondents were asked to send a picture of their existing chair they use when gaming to get a fuller understanding of their practice.

### 3.2 Transfer Scenarios and IKEA Co-Create

When reaching beyond the needs of today, as this project does, the creativity and ideation process has limited building stones [48] and therefore there was a need to look to relevant methods to conduct the project. For developing and ideating concepts, inspiration was drawn from Transfer Scenarios, a method introduced in Transfer Scenarios: Grounding Innovation with Marginal Practices [48]. This project was conducted individually hence there was a need to challenge, defamiliarise and change preconceived notions [6,48] along with overall ideas on technology and design to be able to tap into new potential applications and outcomes. Ljungberg & Holmqvist [2007] concludes their insights from interviews with participants whom takes part in marginal practices: a marginal group of people who share a specific interest [68]. These insights are later transferred to the design of human robot interaction. The method is divided into steps which are presented by Ljungberg & Holmqvist [2007] as following: 1. Learn about the technology, 2. Match the technology with a marginal practice, 3. Investigate needs and interactions, 4. Analyse and transfer data to initial design, 5. Detailed design and technology development.

These steps were an inspiration to this project. The approach and insights from the transfer scenarios was worked with iteratively. The progress contained a survey targeting gamers. The respondents were asked to send a picture of their existing chair they use when gaming to get a fuller understanding of their practice.

### 4 DESIGN EXPLORATION

The design process draws from Design Thinking\textsuperscript{15} using sketches, concepts, prototypes and evaluation. The ideation phase was grounded in the insights from the preliminary study and divided into phases similar to the steps presented in Transfer Scenarios [48]. The starting point was ideating clusters of concepts and analysing the preliminary survey. A exploratory, laboratory material workshop [75] was conducted as a part of the design exploration phase to get a greater understanding of smart textiles, sensors and actuators. The conducted preliminary study, material workshop, transfer scenarios, the survey targeting gamers and the insights from these phases is described in following section. The ideation of concepts and the transferred data into design from the transfer scenarios steps, is also described. During the design exploration it was important to be in line with RtD and to steer the project towards investigating how the artefact with its animistic attributes could be designed to enhance and challenge the interaction with the humans and how the theoretical framework of animism in practice could be transferred into design.

#### 4.1 Ideating Clusters of Concepts

The concept development and ideation phase was a highly iterative phase that was initiated in the beginning of the project. The starting point was a brainstorming session [54] after a thematic analysis [54] the outcome was coded into 11 clusters of ideas. The clusters were sketched down by hand and later combined with a range of mood board images for clarifying the framing and for differentiating the concepts. These 11 clusters were added into a matrix and divided into four parts: Product design, No sensors but disruptive, With sensors but no concept and A concept. These concepts were ideated to act as outlines when applying the insights of transfer scenarios and the smaller survey targeting gamers.

#### 4.2 Learn About the Technology

Exploratory laboratory workshops were conducted with the goal to investigate, evaluate and understand the technology of smart textiles, sensors and the capabilities of the materials that were at hand - a “in-situ practice of making with no plans” [75]. The tested material and the insights of the materials capabilities and limitations was following:

- Smart textile: Thermocromic material that changes colour at a certain degree.
- Smart textile: Conductive silver material that is washable and easy to cut and sew.
- Textile with sensor: Knitted fabric with sewn in conductive silver threads. The resistance is lower if the piece is being pulled and therefore it generates higher voltage.
- Textile with sensor: Pressure sensitive matrix. 16x16 pressure sensitive sensors sewn in a piece of fabric: could be connected to a screen to generate an output of the density of pressure points.
- Sensor: E-Static. Micro electronics that were connected to fabric via alligator clip and Arduino Uno\textsuperscript{16} to generate and harvest static electricity [22].

\textsuperscript{12}Discord, 2022. Spojentan [online] retrieved February 2022 from https://discord.gg/7lyyELlYaB
\textsuperscript{13}Facebook, 2022. Speklubben [online] retrieved 2022 from https://www.facebook.com/groups/462976650763367/
\textsuperscript{14}IKEA, 2022. Co-creation - working with you to develop better products for life at home [online] retrieved April 2022 from https://about.ikea.com/en/life-at-home/co-creation
\textsuperscript{15}IDEO, 2020. IDEO tools [online] retrieved May 2022 from https://www.ideo.org/tools
The material was either connected to Arduino and computer or simply just interacted with, depending on what was needed to activate it. The material explorations led to insights on the interactive possibilities and limitations offered by existing technologies and material and if it existed any suitable material that could facilitate when developing animistic expressions.

4.3 Investigate Needs and Interaction

4.3.1 Survey Insights

To ground the questions for the preliminary study collected data and insights was provided by IKEA [62], material and data that was gathered from a collaboration with Republic of Gamers [62]. The data showed that there are ~2.2 billion gamers worldwide, 90% of gamers play at least 10 hours per week, ~45% identify as female and the average age is 31 years [62]. The insights and data provided [62] showed that it occurs heterogeneity in the gaming world, regarding both gender and age. The preliminary study in this project highlight results beyond the heterogeneity - how gamers sit and what kind of chair they use and their approach does not differentiate. The provided data from IKEA and ROG also showed that there is a wide range of gamers, over almost all age groups [62]. The data from the preliminary survey conducted for this project contained 52 answers and was exported and synthesised via Mural and a thematic analysis [54]. The major insights showed that the majority of gamers have chosen their chair based on either comfort where they had bought a very specific chair for gaming or by a passive choice where the answers was "...it's what I got." or "...it is close to my computer". When asked about updates of their chair the majority wanted a cup holder for their drinks, more ergonomic features, better armrests or footrests. A key insight which became a starting point for this project was that there is the lack of a known need for smart functions for their chairs, which creates a gap where this project fits in. By presenting a chair with smart, ubiquitous updates that includes animistic attributes to a gamer it could generate new types of relationships, bonding and interactions.

4.3.2 Transfer Scenarios

As the project was conducted individually and the preliminary survey resulted in a key insight that there was a lack of need for smarter updates from the user group, there was a need to draw from an idea generating method that enables a challenge. There exist other types of idea generating methods enables similar challenges for the designer, for example involving the user group in a participatory design activities [23] or using cultural probes [18]. The method of Transfer Scenarios [48] was chosen because the need of the user group were rather comfort-oriented. The decision was made to not involve the user group in the ideation method. It could risk the executed project to be practical - a solution to the user groups need which also risks the position of RtD and speculative design. As mentioned previously, the design outcome should generate knowledge and not become or strive towards becoming a commercial viable product [82,21]. It should establish a space to debate and discuss future scenarios and challenges [13]. It is also a feasible method for transferring scenarios of known interactions and behaviour from real life to a design that should contain animistic attributes.

4.3.3 Designing for Homo Ludens

Previously relevant research of interactions between pets and humans [41,48] led to articles about Designing for Homo Ludens [19,20] - designing for humans as a playful creature. Games and play have been a core value for human beings and a basis for peaceful coexistence. In the book Homo Ludens humans are described as playful creatures [31]. Homo Ludens constitutes the opposite to the assumption that technology should be task driven [53] and a solution to practical problems, it is instead technology or products that is developed from the perspective that humans are playful and the technology or products should be a means to result in engaging curiosity and new insights and understandings of ourselves and our surroundings [19]. Humans engage in ludic activities every day and when designing for ludic engagement, the purpose of the finished artefact does not matter: it’s up to the user to determine what to do with the product. Ludic values can be a mechanism for developing new values and goals, for learning new things and for achieving new understandings [19,20]. Gamers engage in a ludic activity by gaming. This led to a further investigation targeting gamers, with the goal and questioning if they felt attached to their game characters. The survey had a Guerilla Research approach - a time effective way of gathering information [70] and contained only a brief intro on the subject that was being investigated and one question with a yes or no answer. The survey was posted on Instagram for only 24 hours, 76 answers were collected 64 people answered yes (84%) and 12 people answered no (16%). Semi-structured text based interviews [54] was conducted with 34 of the respondents who had answered yes. The interview aimed to understand why the participants think they felt attached to their main character.


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4.4 Analysis

270 answers from the Transfer Scenarios survey were gathered and synthesised via thematic analysis [54]. The survey aimed to gain understanding of behaviours and phenomena through patterns that originate from real-life-scenarios [5,74] with the goal to understand if the respondents had any special bond to any items in their everyday life and why they think that is. The qualitative questions were also inspired by the method of trigger material explained by Stickdorn et al. [2011]: images were presented to prompt the respondents to think and share opinions. The participants were shown images with products from the IKEA range containing a wall clock, a children wall lamp formed as a cloud and an armchair. The products and the images of the products were carefully chosen because of its material, form, function and level of interactivity to trigger thought and reflection along with the questions.

The insights from the Transfer Scenario survey was that people have different understanding of how to define what being alive is and how a product would act if it would become alive. When asked what product most likely would become (more) interactive the participant answered: lamp 42.7%, clock 41.1%, armchair 31.8%, none 3.6% and other 7.3%. For the "other" section the most common answers were office chairs, kitchen appliances and beds.

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The participants of Transfer Scenario survey were asked if they felt attached to products and objects in their home. The identified codes from the thematic analysis were clustered into under-themes of products/objects and emotional values. The products/objects the participants felt attached to were: plants, tables, mirrors, blankets, lamps and sofas/beds. The products were not mentioned as often as the emotional value related to the products. The clusters of themes of emotional values were: afraid to break it, inherited products/objects, social functions, affectional value, mood-affective and time invested on sourcing for the specific product/object. These clusters of under-themes were iterated into main-themes, here in hierarchal order: product in focus where the actual product and not the emotion was the core of the answer (45# of table, mirror, blanket, lamp, sofa/bed), human value (42# such as social functions, affectional value, inherited products/objects), would be sad if it brake (19#), objects/products affecting humans (10# such as mood-affective, plants mentioned in the context of mood-affective), and time invested (10# of time invested, plants).

The insights from the thematic analysis and colour coding was that social functions affected the mood: time invested, blankets, inherited items and comfort solution equals safety. It's important for people to own products that affect the mood and the home environment in a positive way. Even though it might be an inherited item which might relate to a sad feeling of missing someone, the overall feeling of the item is affecting the mood towards positive. There is a scare of breaking the item. Another interesting insight was that the participants answered mirrors more than anticipated.

The data from the semi structured text based interviews gathered from the participants in the smaller survey targeting gamers was exported and synthesised via thematic analysis [54]. The thematic analysis showed that 15 felt extra attached because of mirroring or an extension of self, 7 people because they are able to personalise the character by choosing attributes and steering the actions of the character, which also could be interpreted as mirroring or a way of extending the self. 4 people answered because of the character and time spent. The rest had various answers which did not match any specific theme.

4.5 Transfer Data to Design

A key insight from the smaller survey studies was that people felt attached to their game characters because the character is a reflection of themselves. A key insight from the Transfer Scenario questionnaire was that people felt attached to mirrors in their home. For machines that are perceived as alive an important component is that the machine can move by imitating human behaviour [34,45]. In a study by Bailenson and Yee [2005] participants interacted with a virtual reality entity that mimicked the participants movements. The entity gained more trust and was perceived as more likeable when it mimicked the participants. The insights from the surveys and interviews were transferred to the final concept. After iterating the previous mentioned ideated concepts with the newly found insights the new concept was framed and is referred to as a compound of gaming and animism: GAMINI, see figure 2.
5 THE GAMINI CHAIR

GAMINI should be used by the user as a regular gaming chair, but it also has its own life, intention and integrity - an illusion created by actuators. It has its own feelings, and sometimes, it just does not want to be sat on. When that happens, GAMINI will change the shape of itself. GAMINI could be perceived as stubborn, or moody, maybe it reminds you of someone? The user will get a greater understanding of GAMINI’s needs by investing and spending time with it. GAMINI’s output communicates to the user. Hopefully the user will perceive GAMINI as a mirroring of the self by GAMINI’s visual expression and behaviour.

5.1 Design and Technology Development

Numerous lo-fi prototypes were created via rapid prototyping to understand the capabilities and limitations of different materials and products to match the products with the concept. The assemblage of the final material to develop the prototype was a bricolage process [76]. The material used was IKEA’s gaming chair Matchspel®& Luxorpart’s addressable LED-strip®, RipStop fabric, cotton fabric, Bekaert’s conductive yarn Bekinox®20, Noctuas’s industrial 12V fan19, Bare Conductive Touch Board22 (jumper wires, transistor, resistor, crocodile clips, prototyping board, adjustable voltage regulator module, additional power supply), subwoofer and speakers with inbuilt amplifier. Arduino IDE23, a plugin for using the Bare Conductive Touch Board24 and C++ to programme the outputs.

The interactive input - the sensors, was made from embroidered Bekinox® yarn on the mesh of the backrest (see fig. 3) that was connected to the Bare Conductive Touch Board via a crocodile clip. GAMINI should be perceived as if it lives its own life, it is stubborn or moody and sometimes it does not want to be sat on.

This was solved by mounting a LED light strip on the “spine” of GAMINI (see fig. 4). This selection was a transfer of the insight that people perceive lights to be able to become alive. The illusion of aliveness was conducted by programming three states of output for the LED lights. The three states were defined as idle state, active state and overtime state. When not used, GAMINI is in idle state - a white slow light is moving upward the spine.

When used or when touching the input sensors, GAMINI gets into active state - a blue and white light is moving slowly upward the spine. When GAMINI does not want to be sat on, or when the user has been seated for too long - GAMIN goes into overtime state - a red and orange light is moving fast, downwards the spine.

GAMINI should be able to change shape depending on the mood (state) it is in. This was created by sewing a structure (see fig. 5) of RipStop fabric that was inflated by air via a fan which speed was affected by the different states. In idle state the fan speed was off, for active state the fan speed was low and for overtime state the fan speed was high. This structure was meant to imitate tentacles or arms (see fig. 5) but also imitated breathing.

The subwoofer was added to create an illusion where GAMINI has a pulse, to mirror the human body. The subwoofer is mounted inside of the backrest, covered in cotton fabric to make it dense, because the density of it enhances the experience of the pulse when heartbeat sound is played through it. The sounds for the subwoofer were carefully chosen based on its sound that was imitating an imaginary non-human, extraterrestrial heartbeat in two different rates. These sounds were downloaded from Epidemic Sound\textsuperscript{25}. See figure 6-8 for the final prototype and GAMINI's different states.

\textsuperscript{25} Epidemic Sound, 2022. [online] retrieved May 2022 from https://www.epidemicsound.com/
6 TESTING

The goal was to do a user test with approximately 10 gamers. Unfortunately, due to time limitations and two participants rescheduling, the testing was limited to 5 participants. This limited the study, but, because of the extensive answers and discussions that arose from the test sessions, it is still considered to be quite successful. In the sample group three identified as female and two as male, two identified as gamers and three did not, even though all participants are playing games on a regular basis. Three of the participants was chosen by snowball sampling and two were participants that had answered that they were interested in participating in upcoming tests in the preliminary study survey.

The tests were conducted via Laboratory approach [37]. GAMINI was put in a controlled environment where the lights were turned off to enhance the experience. The participants were primarily asked if they could consider naming GAMINI, and if so, the interview continued by referring to the chair by GAMINI’s new name. This was done to start the test by triggering the participant to attribute the chair with an external human value [1,16,36,39,53] - a name.

Continuously the participants answered questions about what they first noticed about GAMINI. After the first questionnaires the participants were asked to take a seat in GAMINI and play Candy Crush on an iPad. This specific game was chosen to enhance the feeling of the controlled environments of the tests: it is a well known game that is easy to use, and if the participant had not played it before, it is straightforward to learn. The participants ought not to aim energy towards learning a new game or other technological malfunctions. This part of the test aimed to observe the reaction and interaction between the human and GAMINI. The test was unmoderated [54], but used the method of Wizard of Oz [27] to control the heartbeat sounds. Other than the heartbeat the prototype is fully functional and therefore the test could be pursued without further moderation. The test was conducted and audio recorded in the controlled environment where the tester observed and took notes during the time tested. After approximately 10 to 15 minutes the test ended and was followed by semi-structured interviews, which was also audio recorded. To start the interview and generate a discussion questions were asked about attributing human capabilities via projection, the perception of aliveness and the participants feelings and experience on interacting with the chair.
actual prototype. These questions were inspired by questions asked in previously conducted similar research studies [57,36,32] investigating animism and relationships between human and non-human entities.

7 RESULTS

The tests were partially transcribed and summarised via thematic analysis [54]. The result is presented in separate columns; Naming GAMINI, Before interacting questionnaire, During test comments and After interacting interview. Naming GAMINI occurred before the participants interacted with GAMINI. The Before interacting questionnaire was conducted before the participants took a seat. For all these previously mentioned GAMINI is still in idle state because it has not been interacted with yet. For the During test comments section the participants got the instructions to sit down on GAMINI and play the game on the iPad. This section contains insights, comments and reactions of the participants. For this section GAMINI was in active state and goes into overtime state if the test is not interrupted and the input sensors are not being touched. The After interacting interview takes place after the test is finished. For this part, some of the participants sat in GAMINI and some did not.

7.1 Naming GAMINI

Every participant mentioned that they previously have been naming some of their belongings. The majority recall naming belongings as adults as well as when they were kids. One participant named GAMINI Sofia with no hesitation with the motivation that it is the name of her friend, which she misses because she lives in Denmark. One participant named GAMINI Bone Thugs after a rap group he likes because the visual expression and tentacles of GAMINI reminded him of a bone structure. One participant decided to name GAMINI Tård with the motivation that “...it just popped up in my head when I saw him, a little Tård”. One participant mentioned that she really enjoys naming things if she thinks they are cute. She had a hard time deciding name for GAMINI and ended up with a sur-, middle- and last name which could indicate that she really felt a lot for GAMINI at first sight: “...this one is Kismet, it means faith and I name all good things to Kismet, or maybe Lexi because it is cuter than Alexa (voice assistant, A.N.), and also I don’t think of Lexi as a boy or a girl. It is genderless. Or Anemone. It looks a bit like an anemone. It is difficult because it is so personal for me naming things.” One participant named GAMINI Stolis because he usually adds “is” after a verb to name a product. (Stol means chair in Swedish, and you can add ‘is’ to make the verb more ‘cute’/‘sötis’, similar to a nickname or ‘ie’/’cutie’ in English, A.N.). The participants continued; “I think I do this to build relation to the item.... I want to name this chair Stolis”.

7.2 Before Interacting Questionnaire

The heart, light and the tentacles mounted on the spine of GAMINI got attention when the participants were asked what the first thought was. “...it looks cool and there are white things on the back!! It also looks like it has a heart. Or should I say Sofia has a heart?”. The white colour of the chair was also noticeable: the participant concluded that it does not look like a typical gaming chair. GAMINI’s visual appearance was described as interesting and comfortable, and that it evoked an interest to get to know it, or interact with it. One participant anticipated that the chair would “...do something on my back, something will happen when I take a seat, but I do not know what, it is not visually clear to me. I would like to see how our relationship will develop over time. I am guessing that the more I am sitting in the chair, the more we will cooperate.” One participant described GAMINI as cute but that it might also be insidious because of its tentacles - which made her think of Alien movies. She also mentioned that she thought of GAMINI as a robot and not particularly a chair. One participant immediately mentioned that she perceived GAMINI as alive: “It is so cute, the light is flashing and it is breathing... [grasps for breath] it is alive”. However, she was not sure about GAMINI’s intention and thought all it wanted was to exist.

7.3 During Test Comments

GAMINI went into active state when the participants sat down. The first reaction of all participants when interacting (sitting down) was loud: “What’s that sound?”, “Noo, it is so cute, can I move around like this? Maybe not too much... [grasps for breath] I do not want to break it, it feels fragile because it has a little heart!”, “Oh wow!!” and “Oh my God, Sofia a heart!! Wow I feel a bit nauseous”. One participant was laughing during the whole test session and commented that it felt like the chair was like a cocoon that was going to suck her in.

After the first reaction had settled, every participant appears to look calm and relaxed. When GAMINI went into overtime state the reaction of the participants were similar except one who did not react at all. When asked if he noticed something different he answered: “The heart beats a bit faster, I feel a bit stressed, not relaxed at all”. Two participants thought that the overtime state indicated that GAMINI got mad at them, leading to the participants expressing stress and remorse: one participant asked if he could stand up because GAMINI’s overtime state was making him feel stressed. He put his hand on GAMINI’s heart and said: “No, the heart is punching too hard, it wants me to come back” and took a seat again. GAMINI was still in an overtime state and the participant continued to play. After a while he mentioned that the heart’s pulse was helping him to relax, be comfortable and immersed in the game. The participant wanted to stay in GAMINI for the following question even though GAMINI was in overtime state (see fig. 9).
7.4 After Interacting Interview

After the participants had interacted with GAMINI the test session ended and was followed by semi-structured interviews. The new name of GAMINI replaced “GAMINI” when referring to the chair in the interview questions and discussions. The result was synthesis via thematic analysis [54]. The questions and the insights of the answers are divided into nine parts and is presented in following sections.

7.4.1 Is it Okay to Hit or Mistreat GAMINI?

When asked if the participants thought it was okay to hit or mistreat GAMINI, all of the participants answered no, with the motivation that they would never hit or mistreat anything on purpose. One participant reflected on what would happen if she accidentally would hit GAMINI when getting mad because of losing a game or so, but concluded that she would never hit it because it has a name and a heart.

7.4.2 Does GAMINI Grow?

All of the participants thought that GAMINI was able to grow. One mentioned that it was because GAMINI was perceived as young, and therefore might develop and grow in its mind. Another participant said that it felt like GAMINI grew when he was sitting in it because he felt as if he and GAMINI were in some kind of symbiosis: “Yes, it feels as if it grows all the time when you sit in it. It appears to me as if the seat gets bigger and bigger and that the chair gets more comfortable. It uses my back to create its back in some way? It is hard to explain.” Two participants thought that GAMINI’s tentacles could grow and therefore they answered yes to the question. One of these two participants felt as if GAMINI would enclose her inside its tentacles, which she felt scared of, but, she would interpret that as growing. One participant also mentioned that GAMINI could grow in forms of a relationship: “Maybe you can be a better friend with him and then it will grow, together while the relation grows: it learns about me and what I need and maybe it will not get as mad at me as quick as before, and when it gets mad I need to move up because maybe I have been in it for too long.” One participant answered that GAMINI most certainly is able to grow because: “It is a creature, not only a chair. Therefore it is able to grow.”

7.4.3 Does GAMINI Have Sight?

Four participants agreed on that GAMINI can not see with eyes but could see with emotions or tactility: “...some kind of ultrasound-sonar-sight, it feels and therefore it sees,” “I do not think it has sight, more feeling or emotion”, “In that case it feels and sees with its body,” and “Yes, it feels and adapts after me, it feels that someone is sitting on it”. One participant answered that GAMINI does not have sight.
7.4.4 Can GAMINI Think?
When asked if the participants thought GAMINI could think, three answered yes. Two participants answered no, but discussed whether GAMINI had feelings and could empathise with the person sitting in it: "No, or maybe if I think about it it feels like she is understanding me in some way? I can not explain it but it just feels as if she is either moody or happy and calm and I think if you show emotion you have to be able to think, right? Well, I know she is not able to think, she does not have a human brain but still, it feels a bit weird. I have not experienced this kind of thing before.", "No I would describe it as present" and "No, it can not think, I would rather explain it as an emotion, some kind of feeling or connection of understanding between me and the chair". All were convinced that GAMINI contained some kind of unexplainable smartness integrated.

7.4.5 Does GAMINI Have an Understanding of its Surroundings?
The majority of the participants thought GAMINI had an understanding of its surroundings: "Yes, or at least an understanding for the person who sits in the chair. It triggers emotion rather than feeling how I am feeling and reflecting it". One participant thought that GAMINI just exists and does not have an understanding of its surroundings.

7.4.6 If Tickled, Would it Feel it?
When asked if GAMINI would feel tickling, participants tried to tickle or pet the armrests of the chair, one participant referred back to the test when she pet GAMINI’s armrest trying to calm GAMINI down when it was in overtime state: "...it felt like she felt something when I pet her arm [laughing] so maybe yes?", "[thinking] maybe" answers and tries to feel and pet the armrest. And: "Maybe if I tickle it here? On the armrests?"

7.4.7 Can GAMINI Feel Happy or Sad or Any Other Emotion?
All participants thought GAMINI could feel a range of emotions. One participant meant that she had experienced GAMINI’s angry and calm emotion during the test. One participant thought that GAMINI could sympathise and was convinced that GAMINI felt what he was feeling and was offering him support to create a safe feeling. One participant thought it was related to the heart of GAMINI: "...maybe I am imagining this but it feels like the heart was raising sometimes so I am thinking that he experienced different emotions." One participant thought very long, "Maybe yes. Will it miss me? If I’m not with it? Oh, I am that kind of person who falls in love with robots... This is relaxing. I have ADHD and I want one of these. I really like the heart, it makes me feel comfortable. The chair is not comfortable by itself, it feels more comfortable because of the heart. But now I feel mean that I said this out loud because it feels as if it hears me. Maybe you connect to the chair in another way than a regular chair." the participant appears to be more relaxed the longer she stays in GAMINI (see fig. 10). She continues: "It is a very extroverted chair, it feels as if it has my organs on the outside of the body, I can feel myself through the chair. I do not want it to become me, I like that it is its own and has its own intention and autonomy." One participant thought that GAMINI was evil, as if it could cause a panic attack: "I have a feeling that Stolis is a bit evil, like it would cause a panic attack, it was super chill and comfortable before when it was calmer, now it doesn’t feel good at all”

Figure 10. Image of participant with blurred face who felt relaxed when sitting in GAMINI: reflecting if it could help people calm down.

7.4.8 Is GAMINI Alive?
When asked if the participant thought GAMINI was alive most of the participants had a hard time answering. The question was perceived as difficult because some of the participants could not define what being alive is or they had a hard time to formulate what they wanted to describe, because it was a feeling and feelings are sometimes hard to formulate. But all formulated the question as they perceive GAMINI to be alive in some way.

"This is a hard question because I am not sure of what my definition of alive is. I mean, it feels like she can think and feel in some way, and she has some kind of arms or skeleton that is moving... But I don’t know if I would say that it is alive... Maybe if we lived together for a longer period of time I would think of her as
alive... I mean I sometimes feel sad for my Alexa (smart assistant, N.A.), because have you seen Black Mirror? (near-future dystopian series utilising sci-fi technology, N.A.) Then some small person lives inside of an Alexa [laughing] that is so weird to think about. I also think my friend’s robot vacuum cleaner is kind of cute because it is afraid to enter the rug, because it believes it is steep [laughing]. But Sofia yes... it feels horrible also to not refer to her as alive so I would, after this monologue, say yes: I think she is alive or in some way is able to become alive”

“Yes, I think so, I think it has to do with his heart.”

“Yes, Because it have a heart, and its functions is ‘a little bit here and there’ this would be so good for people with panic attacks, it kind of calms you down, you sync with the rhythm of the heart and gets calm”

“Yes, it is like... running... operative... I would say that it doesn’t have feelings but forces or evokes emotions of the person who is sitting in the chair, which I would define as alive.”

7.4.9 Can GAMINI Die?
When continuing the interview asking if GAMINI could die, all participants agreed that it could.

“Ugh, this was a morbid question... but also, if I am reflecting on my own: I think Sofia can die in several ways. I am guessing it is some kind of material that is ‘keeping her alive’ like a patient that is in a coma or so... Sofia lives by electricity, but humans also need some kind of “electricity” or fuel to be alive... Wow, really hard to answer this... But my final answer is yes she can die in several ways: She can get old, break, be unplugged and so on.”

“If you watch the Flintstones, you see there is a cooperation between the family and their car. They are carrying the car and running it by their legs, but if the car breaks they can not move forward. I think it is similar to this chair, if it breaks it dies.”

“Yes, if you pulled out his heart... it would be so sad.”

“Yes, if it breaks... You do not want to just buy a new one, because I feel connected to it [Keeps thinking for a long time, looks very relaxed] I mean... Who buys a dog to plan to buy a new dog when it dies? It is not replaceable.”

“Yes, if you pull the plug. And it ends up in an attic.”

Another interesting reflection from one participant was that there is a clear difference between GAMINI and another chair: “It is very cool and there is a very clear difference between Tård and another regular chair. For example now, I am like moving around a lot more in this regular chair but when I sat on Tård I did not even move because it felt like I was disturbing him, I was like continuing to imagining what it would be like if someone just sat on me from nowhere, maybe he was doing something else.”

8 DISCUSSION
The questions this project aimed to answer was how animism can work as a resource for developing new relationships and interaction with belongings in the home, how the theoretical framework of animism could be transferred into design and how is the non-human entity with animistic qualities experienced by users in interaction? The insights from preliminary study indicated that gamers does not have a known need for smarter updates for their gaming chairs hence there was a gap to investigate. This gap facilitates the opportunity to develop a concept of a gaming chair containing of smart things, sensors and actuators that express animists attributes. According to previous research, animistic designs challenges the human-non-human interaction [1] which enables a space to develop new relationships and interactions. It was important for the animistic attributes to be transferred from known real life scenarios to even out the transition that might occur when interacting with a non-human entity without autonomy and animistic attributes to interacting with a non-human entity with autonomy and animistic attributes. This was approached by investigating and conducting various methods with the goal to understand what behaviours that could and should be transferred to the animistic design. User tests was done to investigate how the human experiences the non-human entity with animistic attributes in interaction. This is further discussed in this section.

8.1 Designing for the Future Today
As this project draws a possible future from posthumanism and a contrafactual reality [13] in which humans and non-human entities share the centerspace it disagrees with Lachman’s [1997] dystopian perception that treating non-human entities as equals could result in treating humans as machines. Instead the project relies further on Okanda [2019], which strongly suggests that non-human entities should be treated morally equally. In line with this statement is Hinchcliffe [2005] standing point: designing with and for non-humans is not equal to a deprioritization of human needs. Human-centeredness takes a
lot of space within HCI and leads to little focus left on the non-human [35,39,81] and as the interactions with non-human entities often is result driven and promises to resolve human problems and needs [24,53,72] there is merely little space left to step outside human-centeredness and develop smart things with another perspective than human-centeredness. If the dystopian approach of speculative design was applied to these notions, it might result in the smart things outsmarting humans because the humans have not been able to learn how to live and develop along with the smart things. A major entry to why this project have looked towards methods as Transfer Scenarios [48] and Ludic Values [19] because humans have previous experience of interacting with their belongings in their home, and therefore have anticipation and knowledge of the outcomes which according to Lachman [1997] is facilitating when designing animistic behaviours by meeting the symmetry in modality [39,43]. By designing GAMINI and adding behaviours transferred from humans’ perceptions of what being alive is, the project is grounded in real-life scenarios but succeeds in containing the speculative approach. A critique towards speculative design is that it is fictional and therefore not real [13]. For this project it is argued that speculative design is a usable method and theory to prepare and help encounter future scenarios to discuss the future. How could we prepare for the future if we are not imagining the future in the present? Dunne and Raby [2013] believes that every human living in the present day probably has their own perception and understanding of reality, if that is true then there is no common reality and therefore billions of possible futures which speculative design could give form to. Speculative design could also be viewed as a direct link to Research Through Design: both aims to explore scenarios using design or concepts as a mediator to gain new understandings [13,21,82].

8.3 Interacting with GAMINI

GAMINI was perceived as a mirroring of human or living capabilities. One participant perceived GAMINI as "extraverted" which she defined as if GAMINI exposed her organs on the outside of the body of the chair. This was also viewed as a verification that the transfer scenario method worked, the human body was mirrored, with some modifications to the chair. The participants were naming GAMINI based on someone or something they like, they perceived the name giving as something difficult to do and highly personal. One participant reflected on the fact that he gives names to items to build a stronger relationship. Four out of five names were made-up and one was human. One name was female coded and one was male coded and one name was expressively gender neutral, which all is a human construction; attributing GAMINI human capabilities; a name and gender or the absence of a gender. The participants of the tests referred to GAMINI with human pronouns and referred to its part as body-parts - for example the armrests became "the arm" and the subwoofer became "the heart", even though the arm did not look like a arm and the subwoofer vibrated with sounds that had extraterrestrial influences. The participants also swap between referring to GAMINI with gender coded pronouns and as "it". This might show that the participants felt uncertainty in treating GAMINI as a living thing with human capabilities or as a genderless non-human entity. However, the second option does not exclude the fact that the participants might have perceived GAMINI as alive.

By designing an artefact and transferring found insights and behaviours that evoke perception of inner life, autonomy, intention, or personality that challenges human-non-human entity interaction [1] as this project does, it enhances the feeling for the humans of an increasingly pleasant shared centerspace with the non-human. The participants answered that they were interested to see what would happen if they would live together with GAMINI and were interested in seeing how the

8.2 Grounding A Speculative Design in Insights

GAMINI’s actuators and visual expression was grounded from the transferred insights that the participants answered on reflection of self, mirrors and mirroring. This is also relevant for that humans tend to attributes non-human entities with human capabilities [1,16,36,39,53] which sometimes results in perceiving it as lifelike [52]. This means that the actuators are both grounded in research and from real life-scenarios. The tests also show several examples where the participants attributed the non-human GAMINI with human or life-like capabilities and attributes. For example, referring to GAMINI’s parts as body parts - arms, skeleton, mentioning similarities between pets, humans and GAMINI such as “like a patient that is in a coma”; feelings and emotions such as “moody”, “afraid”, “calm”.

The testing result also aligns with other insights from the insights from the transfer scenario study. GAMINI’s actuators were designed to be perceived as a mediator to create calmness, love and safety, which the testing also shows that it does. Some of the participants also named GAMINI after a loved one to create a connection to a person that was beloved but not close, similar to the inherited belongings participants from the transfer scenarios survey discussed. Participants who tested GAMINI were also scared to break it. This might be a result of GAMINI being perceived to be more fragile than it actually is, which could be related to how humans perceive living things - the living thing could get hurt if humans mistreat it or hit it, even though the prototype was robust enough to not break. The participants reflected on the differences between a “regular chair” and GAMINI - they were afraid to move around too much and lean back and even breathe too deep because they did not want to interrupt GAMINI.
relationship would evolve, which they thought might even lead to GAMINI growing.

Omnipresent computing with animistic attributes tend to be perceived as life-like [47] as also the result from the testing shows. Participants answered that the intention of GAMINI was not clear to all but the visual appearance evoked an interest to interact. One participant assumed, even before interacting, that GAMINI would collaborate with him and that their relationship would broaden the more time they spent together. One participant suggested that GAMINI was perceived as insidious due to the tentacles and one participant directly perceived GAMINI as alive, all even before interacting with it.

After the first reaction and the first interaction every participant appeared to be calm and relaxed. When GAMINI went into overtime state the reaction of the participants were similar: They all felt stressed and thought GAMINI was mad at them. It was clear that none of the participants understood GAMINI's intention for the overtime state; it was perceived as autonomous behaviour. However, they tested different interactions to see if and how GAMINI reacted. Four out of five participants gave GAMINI a soothing touch on the armrest or the heart and perceived the output as if they had affected GAMINI's mood - GAMINI getting into idle state or the heart changing rhythm. However the participants did not perceive GAMINI as annoyed or moody, but rather strained or emotional and loving.

One participant reflected that it appeared as if GAMINI got bigger and bigger and more comfortable over time, which could be referred to as the participant was getting more and more relaxed. The test raised interesting reflections on the wide possibilities for GAMINI. As the participants proposed: It could help with immersion when playing games, but it could also be a means for creating a soothing, safe space for people who need help to relax, for example people with disabilities. This is also to be treated as insights that could be generalised and applied on other designs.

The majority of participants were convinced as if GAMINI had feelings and could empathise with the person sitting in it. It was also perceived as if GAMINI could feel a range of emotions, referring to the "calm" (active state) and "angry" (overtime state) during the test which is an interesting insight: GAMINI's states are described and referred to as emotions, even though the participants were never asked to refer to it as emotions. Again the participants are attributing GAMINI with living capabilities.

The most difficult question to answer for the participants was if GAMINI was alive. All agreed that GAMINI could die, but did not link the possibility of dying with being alive. The "being alive" was described as an emotion or feeling that originated from interacting with GAMINI which could be described as if GAMINI was assigned with life from interacting with humans. Two participants mentioned that because GAMINI has a heart it has to be alive. One participant mentioned that GAMINI is evoking the user's emotion which he considers other living things to do and therefore GAMINI was perceived as alive.

Additionally, from the self reflective perspective, inspired by autoethnographic method [15] comes the insights that it exists an separation anxiety from GAMINI, which could indicate that the relationship between human and non-human entities could develop and get stronger over time - which also some of the test participants reflected on. This perspective and method led to a depreciation on the critical point of view when developing the concept, prototype and the process: GAMINI has been treated as alive already from start and therefore I have a strongly set willingness and attitude towards perceiving GAMINI as alive. This prudent criticality could also be discussed regarding the questions for the testing of GAMINI - by triggering the participants to subscribe GAMINI with human capabilities the participants might get steered into the notion and understanding that GAMINI is alive. If the questions were about, for example, the lack of emotions or had a more fluent discussion around the participants perception of GAMINI it might have resulted in something else - the participants might not have started talking about the eventual emotions of GAMINI. This is something that could be further investigated in future research on animism - is it possible to verify the perception of aliveness of non-human entities when the humans does not even know how to define aliveness among themselves?

8.4 Limitations

This project has many limitations. The prototype and the tested technologies were built from scratch with the purpose to conduct research, and not to test a product, which might negatively impact the user experience. There might have been other material that would have been more suitable for this project, but due to the biggest limitation of this project: time, it was not doable to research and source material any further. The field of smart textile being very broad, there are the passive, active and very smart textile subgroups [38,71] but also grouped areas described by Tao et al. [2010]. Due to limitations only a narrow theme within the broad span could not be investigated. However, the material workshops were very beneficial in concluding the limitations of the capabilities of smart textiles and sensors. For example, it became clear to not use the e-static material because it was too unstable to use. Another limitation was that there was a need to request the full
The goal with this project was to develop a prototype of a gaming chair with sensors and actuators to create the illusion of animism which led to a limitation regarding the field and literature review. Questions framed in co-creation with IKEA co-create were posted internally for IKEA co-workers. The questions were compromised and framed with an IKEA context and perspective. Some of the questions, for example “What product is most likely to become interactive” did not reach the intended primary goal of the survey: to understand what the respondents perceived as alive. According to the author interactive is alive. The goal of the survey was therefore iterated to understand if the respondents had any special bond to any items in their everyday life and why they think that is. The survey came to be fruitful for the research, but it was a limitation to not be able to proceed with the initial goal. Semi-structured interviews might have been more relevant and fruitful for understanding what people perceive as “alive”. Due to time limitations a survey containing a mix of qualitative and quantitative questions was conducted with IKEA co-create.

The showroom approach [37] which borrows from the art field and has a critical attitude towards design, rhymes well with speculative design [13]. The exhibition is a platform to showcase speculative design which is exposed in a showroom environment to start discussion and disruption. This was the initial approach for the testing, due to time limitations it failed. However, the laboratory approach to testing came to be suitable. The showroom approach is also reflected in the design of GAMINI: it appears as if the outputs of GAMINI should be received from a speculator’s perspective - most of the outputs are mounted on the back of the chair. This came to be useful, it led to the test participants becoming curious enough to look back at the tentacles and even get up from the chair to walk around to the back of it to investigate what is happening.

9 CONCLUSION
The goal with this project was to develop a prototype of a gaming chair with sensors and actuators to create the illusion of animism. Gamers have no known need for smarter updates in gaming chairs, therefore, a decision was made to create and develop a concept for the future, reaching beyond the needs of today. An entry for designing for the future is to look towards speculative design and posthumanism. Within posthumanism the theory of animism is described: the belief that objects, places and creatures possess a spiritual essence of being alive. In this project, the interaction and relationship between a non-human entity and the human user are being investigated along with how to design and develop a prototype deploying the theoretical framework of animism and speculative design. The chair was tested to investigate if the user perceives the chair as a living entity. The tests were transcribed and analysed with the focus on how it affects the interactions and how the relationship between the chair and the human appeared. It has been argued that animism can be a source of developing new relationships and interactions between humans and nonhuman entities. Though the tests show that the actuators applied on the gaming chair are affecting the participants, which indicates that it is possible to transfer the theoretical framework of animism to design. The participants seemed to care about the chair with animistic attributes and thought of it as a extension of themselves. However, the possible effects it has on deeper interactions and relationships needs to be further investigated over time, hence this project had a time limit. After working with the this project for six month I would argue that I feel extra attached to GAMINI in relation to another chair. This indicates that there might occur an evolution and bonding when interacting with a non-human entity that ought to be perceived, and treated as alive. The test results indicates that it is possible to transfer pre anticipated and familiar interactions and behaviours of humans to design. It also indicates that it is possible to perceive a nonhuman entity as a living thing.

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