

# Interactive Cat Furniture Design

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## ABSTRACT

With the development of urbanization, young people are under high pressure, which means that they don't have much time to company with family members. Keeping pets can be a useful solution to address these problems and offer emotional support. More and more people regard pets as family members. The increase in the number of pets has led to the boom of pets industries. However, the pet product market is still in its initial stage and needs more attention and research. According to the demand, the interactive cat furniture which meets the needs of cats and cat owners has been designed in this paper. First, through the literature review, the advantages and disadvantages of human-animal-interaction have been explored. After analyzing related case studies, it summarizes the principles of the interactive pet furniture design. Second, based on the observation and questionnaire about habits and interactive activities between human and cats in Nottingham, the United Kingdom, this study proposes a cheap, practical, and interactive cat furniture. The feasibility and applicability of the design is proved and applied through practice. Finally, it concludes with a reflection on the research focus, design process, and outcome.

**Keywords:** Human, Cats, Human-animal-interaction, Interactive cat furniture, design.

## 1. INTRODUCTION

In modern cities, the residents are not easy to be close with the nature. Therefore, out of the desire for emotional needs, more and more people begin to keep pets. Human-animal interaction is beneficial to human's well-being [1]. According to the report from Statista in 2018, there were around 470 million dogs and 370 million cats worldwide that occupied the majority of world's household pets [2]. Especially in Europe, cats were one of the most popular pets [2]. Another report published by Grand View Research in 2018 showed that, cats held a significant market share in 2016 and is expected to grow at a CAGR of around 4.7% from 2016 to 2025[3]. In 2018, the market size of pet furniture was at 0.89 billion and is forecast to continue to add at a speed of 6.36%[3]. Therefore, the desire to keep pets has led to the growing expansion of the pet industry. Interactive design is an emerging trend these years that described as the interaction between two or more objects to achieve a goal. For pet furniture design, it should consider both pets and pet owners' needs. This study takes the cats and cat owners as main research objects, aims to explore the relationship between them, produce human-animal-interactive furniture and evaluate its property.

## 2. LITERATURE REVIEW

Human Animal Interaction (HAI) is one of the interactions that happens between humans and living creatures, which can affect human well-being (McCardle, et al. 2011, cited in Vitztum, et al, 2012)[4]. For well-being, Beaumont states that it is not only for individuals but also for the nation[5], while Dodge et.al define it as the individual's ability to deal with psychological, physical and social issues [5]. In this study, well-belling refers to the second interpretation.

The chapter will first analyze the effects of human-pet interaction to human well-being. Then, it will explore the factors of HAI pet furniture design, and use two cases to further illustrate the importance of pet furniture that considers both pets and humans needs.

### 2.1. Disadvantages of Human Animal Interaction

Although there is little evidence that pets contribute to human disease, the public still fears for it[6]. Mueller et al. reported that keeping pets sometimes could aggravate the condition of depressed people [7]. Besides, the negative effects of companion pets have been linked to higher rates of heart disease and other illness [8].

Other study conducted by Wilson et al. further found that the death of pets, Zoonotic disease, and anaphylactogen which all may influence human well-being [9]. Herzog summarizes some common reasons for scholars who support these drawbacks, such as the research is not rigorous, self-knowledge is biased, and it tends to ignore something important in the differences between pet keepers and non-pets people [10]. Due to the lack of studies on the drawbacks of the human-animal-interaction, more proof should be examined in the future studies.

## 2.2. Advantages of Human Animal Interaction

A mass of benefits for human animal interaction were gradually emerging in previous studies. For the mental health, keeping pets can help reduce the anxiety and depression [11]. For instance, Allen et al. claimed that women who kept a dog would have lower stress and often considered their pets as their best friend [12]. Francis et al proved that in the nursing home, the hosts were less depressed if they had a companion animal [13]. Besides, patients' anxiety level had been significantly reduced compared with different conditions: one with animal one was in the normal therapy condition [11]. Interactive activities like petting and hugging with dogs can also help to reduce mental and physical stress.

For human physical health, the risks of the cardiovascular disease (CVD), especially for dog keepers, can be reduced after walking the dog frequently [7]. In early year's study, with the controlling of other factors, Friedmann et al. found that one year later after suffering from myocardial infarction, the survival rates of non-pet was lower than pet owners, and this was regarded as the first study to show that animal companionship was beneficial to cure humans cardiovascular issues[14]. In another study, Friedmann et al. found that when dogs played with children who

were under pressure, the blood pressure of children would be reduced [15]. In line with the researches from Friedmann et al, Anderson conducted a large study among 5700 participants on their cardiovascular health. The result proving that non-pet-humans had higher triglyceride, blood pressure and cholesterol levels than pet owners [16]. Similarly, Wilson and Barker found that pets could decrease their owners' heart rate and blood pressure for all age groups through sensory stimulation [17]. In addition, keeping pets could help owners decrease some minor health problems, such as XXX.

## 2.3. Pet Furniture Design

Norman states that human-centered design is to consider consumers' needs first and then searches for a way to solve the issues [18]. Based on a different focus, this design process can be divided into three types: experience, industrial and interactive design. It includes four phases: define the accurate problems, seek material source, making the model, and determine whether the concept meets consumers' needs. In the pet furniture design, however, it should consider both pets and human needs, so understanding the basic biological and behavioral characteristics of pet cats is compulsory at first. As shown in the figure 1, cats have more than 250 bones which protect their soft parts from injury. Their long tails can help with keeping balance; claws can help with climbing trees and gripping [19]. For the cats' behaviors, they like to scratch, and always use their tongue to clean fur, and claws to clean face. Also, they prefer a clean and comfortable space, spend lots of time sleeping [19], and are also always curious about new things, such as opening boxes. For pet owners, they regard pets as their friends, family members and playmates, which can satisfy their emotional needs and also they have the responsibility to look after pets well [20]. These factors should be taken into account when designing pet furniture.

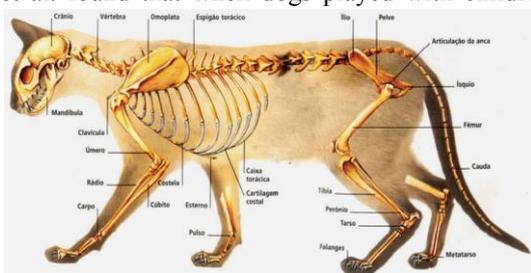


Figure 1 The biological character of cats



Figure 2 Geometric Cat Bed



Figure 3 The CAT-Table 2.0

Nowadays in the market, there are varieties of pet furniture. Some are for basic needs while some are developed to meet the need for human-pet interaction [21]. Taking the above two cases (Figure1, Figure2) as samples, which are designed in accordance with the habits and sizes of cats. For the materials, they both use environmental materials such as wood and fabric. For interaction, however, the CAT-Table 2.0 provides the

space for not only one cat but also meets the interaction needs of human-cats and cats-cats [21]. Compared with the Geometric Cat Bed, the Cat-Table 2.0 emphasizes more on the importance of interaction needs in the pet-furniture design, which gives guidance for the furniture design in the future.

### 3. METHODOLOGY

#### 3.1. Research Design

This study is conducted in Nottingham, the United Kingdom, with two stages: observation and online questionnaire, to examine the interaction between cats and human. After analyzing data, it provides a cheap interactive and practical cat furniture design.



Figure 4-7 Kitty Cafe

Firstly, as shown in Figure4-7, the author can observe the interaction between cats and furniture in this café. For the chair prepared for consumers, the cats will sleep on it without permission. Actually, as they are the restaurant's biggest attraction, customers will allow cats to use their chairs. However, the problem is that the cats like to scratch, and especially sofa's leather can be easily destroyed by cats' claws. Another condition is that the cat will jump onto the top of the table, and if the customers don't pay attention to their food, it will be eaten by the cats. There are lots of cat trees in the Kitty café, and the cats like to sleep on high spaces, or they will find a small cat house, the size of which is same as their body. There are also some interaction modes between cats and human. People in the Kitty café prefer to touch the cats, as their fur is comfortable, and children like to play with the cats since doing so may feel like a hide and seek game. Sometimes, photographers will come to the store to take photos of the cats. Some people just take a rest and look at the cats playing or sleeping. Additionally, it can be observed that the pets and customers will use the furniture together, such as the chair and the table. Cats prefer the comfortable and soft cushions and people like to play with cute cats, resulting in a harmonious interaction.

In conclusion, there are interactions happening among the furniture, pets as well as customers. Considering cats habits, there are enough holes, cat trees and small cat houses for them. Also, the materials, including wood and fabric, are suitable for cats, although some sofas made with leather are easy to be destroyed because of cat's claws.

#### 3.2. Data Collection

##### Observation

In order to have the better understanding of cats' behavior, in March, 2020, the author went to the Kitty Café to observe the human-cats interaction. Kitty café is located in Nottingham, providing a space for people to get closed to cats when they are eating and drinking.

##### Questionnaire

In order to better understand cats and hosts needs, after completing the ethical approval form, the author published the questionnaire online due to the unexpected explosion of COVID 19. Regarding the spare time accompanying with cats, 37% of people spend half or one hour playing with cats, while 55% of people spend more than 3 hours per day sleeping with pets, which means that the hosts do not mind spending time to interact with their pet cats. 57% of people hope that the price of cat furniture can be reduced to 10-50 pounds. For the design of cat furniture with human-animal-interaction, 67% of people are happy with this idea, while 30% of people are not. For the size of the space that the cat furniture may occupy, 57% of people indicate that they are more likely to choose the medium size, which can be visible in the living space, while 33% prefer the small size, which is easier to be hidden from view. Similarly, 83% of people prefer to place the cat product in the living room. For the problem of the existing cat products in the market, 45% of people think that there are few styles, and 40% think that they take up too much space.

From the online survey, there are multiples activities that happen among cat keepers and their cats: they may play, chat and watch TV programs together. The host will also take the responsibility of feeding and cleaning the cats and sometimes the host will take them out for a walk. Normally, nearly every cat keeper likes to cuddle and stroke cats slightly. Also, cats like to play with different toys, including fish, feathers and butterflies. Cats are active as they always run and jump: chase bird

or leaves; climb trees or windows. During the day, the cat will sleep for a long time, and the sleeping spaces are different: the bed, the small box, the cat tree or the cardboard. When they are hungry, it is healthy to prepare both wet and dry food, and sometimes the cat will steal food.

### 3.3 Design Specification

After the analysis of two cases and this empirical study, the design specification can be concluded. In terms of cats owners, the product should be safe and comfortable, comfort to the pets' habits and promote the interaction between them. It is expected to be placed in the living room, bedroom or garden. For the material sand price, it would be better if the material is easy to clean and environmental with the price below 50 pounds. Finally, the product is designed to serve young people aged between 25 to 35 years old.

## 4. FINAL INTERACTIVE CAT FURNITURE DESIGN

According to the design specification, the author started to conceive and hoped to find the most creative and proper design. At first, considering eating, playing



Figure 8-11 The development of prototype

According to the research, the author determined the model's dimension-- the length is 510mm, the width is 410mm, and the height is 630mm, which meets the furniture size for small and medium-sized cats. And then the author used the 3DMAX to create the model in the computer. In order to quickly take test, the author used cardboard that was easy to cut to make the model (Figure8-11). The materials that the author used were the 18mm/12mm/6mm/2mm MDF Board. Firstly, two pieces of one centimeter thick wood were pressed together to produce a two centimeter thick board. Then, the author shaped sponge into semi-cylinders and used the glue to connect them. After one night, the bent board was able to maintain its shape. After making two curved planks, sponges were used to determine the height of each layer, and then covered them together. Each layer was secured with nails. For the hole outside, the author drew the circle on the paper, and stuck the paper to the board surface, then using an electrical knife to cut. Finally, sandpaper was used to make the surface smooth and flat. As the electrical knife made the contacted

and sleeping interactions between human and cats, the author thought about 50 ideas and then narrowed them down to 10 ideas. The specific pictures of these rough ideas were collected in the development pack. Finally, the author determined the final idea and used pieces of cardboards to make the prototype.

In the living room, there are some furniture including the sofa, side tables, and stools. When the hosts go home, firstly they will choose the sofa to rest and perhaps put a cup of coffee on the table and enjoy the resting time. From observation, cats also like to sleep on the sofa or jump to the table, and sometimes hide under tables to get away from people and the light of the daytime. It can be considered to combine the sofa or table with a cat product. However, considering the expected price is 10 to 50 pounds, the author choose to combine the side table with the cat product. The pictures below show the development of car furniture prototype (Figure 8-11).As cat like holes, clean, small, and quiet place, the author leave three holes in the product layer for it to play. Cat is expected to interact not only with the product, but also with human. Therefore, in this product, cat can sleep on any floor it likes, and the owner can also leave his/her books or food on the top floor.



wood surface black, these stains should be removed. The skin of the prototype was affixed with customized stickers.

The prototype is stubborn and not easy to be taken apart. However, there are also some disadvantages. Firstly, the lines are straight, which means that it would be better if there are some filleted corners, as cats are as vulnerable to sharp corners as the children. Secondly, the lid is not good enough as it occupies too much space on the top layer.

Addressing on these problems, the author tried to improve the idea and adjust the size of the hole and the lid. Finally, the final design of the product is shown in the pictures show (Figure 12-13). The author leaves a small hole on the lid, making it easy to take out. The host can observe his/her cat sleeping or playing with these holes and also, when the lid is removed, the cat might stick out a little round head, which is an interesting interaction. The host and cats can use the table together, which means that the young people who

rent the house can leave spaces for the cats to sleep and live.



Figure 12-13 The Final Design

## 5. CONCLUSION

Nowadays, more and more people start to search for emotional support from the pet. The increase in the number of the pet has led to a boom in pet-related industries. However, for the pets furniture in the market, they still should be improved. And the research in this area still needs more support.

Through the literature review, it can be concluded that the interaction between cats and human is beneficial for human's mental and physical health, and it should be considered in the pet furniture design. Based on the investigation on human and pet habits and interactive activities, this study explores the methods of pet furniture design and finally proposes a cheap, practical, and interactive cat table. The specific size and materials are justified in the model making and testing. However, as the variety of materials is limited, the MDF board chosen for the product is not very suitable for cat claws. Additionally, the edge is also a little sharp, which needs to be improved. In the future, the author will try more materials to make and bring the product to the market.

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