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Community Cat Shelter - a system that brings the community
together to raise community cats

By

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A Thesis submitted
in Partial Fulfillment of the Requirements
for the Degree of
Master of Fine Arts in Industrial Design

School of Design
College of Art and Design
Rochester Institute of Technology
Rochester, NY
May 2, 2022

Thesis Committee

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Community Cat Shelter - a system that brings the community together to raise community cats.

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Keywords: stray cats, community cats, humane care for feral cats, animal protection

Abstract:

Due to the frequent abandonment of domestic cats and their proliferation in the wild, more and more stray cats, or feral cats, have been born in the city. These cats have a high mortality rate, kill birds, make noise, and have an impact on the human habitat. This study explores the pain points of harmonious coexistence between humans and stray cats and proposes a design intervention for some of these problems.

The goal is for each community to address the problem of stray cats in that community from within, including issues such as securing the survival of stray cats and controlling the number of stray cats.

The design process of the project considers potential strategies for people to care for stray animals, so that more people can understand the knowledge related to the protection and feeding of stray cats, thus allowing people in the community to jointly participate in the feeding and care of stray cats to form a circle of support for these animals.

The resulting products and systems and services for stray cats also serve the residents in the community. Among them, the shelter has the functions of housing, feeding, trapping and isolation, and also provides adoption for cat lovers and popularized the knowledge of stray animals for residents.

Introduction:

In China, there is no law on animal protection, so it is difficult for rescuers and law enforcement officers to effectively exercise their right to protect animals under the protection of the law, and it is difficult for abusers to be punished accordingly. Moreover, public animal shelters and private animal rescue stations in China's major cities face financial shortages, limited workforce, and insufficient space to receive large numbers of stray animals.

At the same time, there is a lack of knowledge about stray animals. Many Chinese people have many misconceptions about stray animals. Therefore, they still believe that it is too early to put animal protection on the legislative agenda when human rights are not yet fully protected.

This project aims to solve the problem of stray cats in the city gradually. The goal is to gradually solve the problems of stray cat placement, disease, and population control. At the same time, we will educate residents about stray cats so that more people will understand the problems of cat breeding and choose to "adopt instead of buying," thus gradually solving the problem of stray cats in the city.

Research

According to statistics, tens of millions of free-roaming, homeless strays and feral "community cats" in the United States (Levy and Crawford 2004) .ⁱ There are an estimated 247,429 stray cats in UK towns and cities (Lu, 2021) ⁱⁱ; China will grow by 40 million stray cats every year. Many stray cats in other countries, But only an estimated 2% of these community cats are de-sexed (Wallace, Levy, 2006, Chu et al., 2009) .ⁱⁱⁱ The emergence of stray cats is mainly due to abandonment, loss, and un-neutered resulting in constant mass breeding. On average, a female cat can give birth to three kittens a year, and then 60%-80% of these kittens will die before reaching adulthood due to disease, hunger, and cold. Adult cats also face capture, disease, starvation, and freezing to death at any time, and the average life expectancy of stray cats is only three years. At the same time, stray cats can also cause a certain degree of harm to the urban environment. According to statistics, free-ranging cats in China trap and kill 2.6-5.5 billion birds every year (Li et al., 2021).^{iv} In addition, stray cats can spread Rabies, Toxoplasmosis, and other diseases

ⁱ Levy, Julie K., and P. Cynda Crawford. 2004. "Humane Strategies For Controlling Feral Cat Populations". *Journal Of The American Veterinary Medical Association* 225 (9): 1354-1360. doi:10.2460/javma.2004.225.1354.

ⁱⁱ Lu, Yi. 2021. "Scientists model to estimate stray cats in the UK". *China Science News*, 002. doi: 10.28514/n.cnki.nkxsb.2021.003575

ⁱⁱⁱ Wallace, Jennifer L., and Julie K. Levy. 2006. "Population Characteristics Of Feral Cats Admitted To Seven Trap-Neuter-Return Programs In The United States". *Journal Of Feline Medicine And Surgery* 8 (4): 279-284. doi:10.1016/j.jfms.2006.02.004.
Chu, Karyen, Wendy M. Anderson, and Micha Y. Rieser. 2009. "Population Characteristics And Neuter Status Of Cats Living In Households In The United States". *Journal Of The American Veterinary Medical Association* 234 (8): 1023-1030. doi:10.2460/javma.234.8.1023.

^{iv} Li, Yuhang, Yue Wan, Hua Shen, Scott R. Loss, Peter P. Marra, and Zhongqiu Li. 2021. "Estimates Of Wildlife Killed By Free-Ranging Cats In China". *Biological Conservation* 253: 108929. doi:10.1016/j.biocon.2020.108929.

to humans. Un-neutered stray cats also produce much noise during their rutting period, affecting human life and providing an excuse for animal abusers(Ireland and Miller Neilan 2016).^v



Fig.1.Stray cats in the city

TNR is currently recognized internationally as the most effective method for rescuing stray cats("Fact Vs. Fiction: What Shelter And Field Services Staff Should Know About Free-Roaming Cats" 2022)^{vi}. Trap–neuter–return (TNR), also known as Trap–neuter–return, is a controversial method that attempts to manage populations of feral domestic cats((Robertson 2008). ^{vii}Trap-Neuter-Vaccinate-Return (TNVR) is

^v Ireland, Timothy, and Rachael Miller Neilan. 2016. "A Spatial Agent-Based Model Of Feral Cats And Analysis Of Population And Nuisance Controls". *Ecological Modelling* 337: 123-136. doi:10.1016/j.ecolmodel.2016.06.014.

^{vi} "Fact Vs. Fiction: What Shelter And Field Services Staff Should Know About Free-Roaming Cats". 2022. *Best Friends Animal Society*. https://resources.bestfriends.org/article/fact-vs-fiction-what-shelter-and-field-services-staff-should-know-about-free-roaming-cats?_ga=2.184737194.2039355792.1632328894-286036536.1631723786.

^{vii} Robertson, Sheilah A. 2008. "A Review Of Feral Cat Control". *Journal Of Feline Medicine And Surgery* 10 (4): 366-375. doi:10.1016/j.jfms.2007.08.003.

the most humane and effective method for managing community cats. The cats are trapped, spayed and neutered, vaccinated, ear-tipped, and then returned to their outdoor homes. Caretakers provide food and shelter and monitor the cats. When possible, young kittens are removed for adoption. The latest recommendation is that healthy, friendly adults be returned to the neighborhood. Levy et al. used the TNR method to capture 2,366 cats, representing approximately 54% of the projected community cat population in the target area. Historically, annual community cat TNR surgeries in the target area were 4–10/1000 residents, then increased to 57–64/1000 residents during the two study years. The increase in neutering was accompanied by a decrease in shelter cat intake and euthanasia (Fig. 1A). Shelter cat intake from the target area decreased by 66% during the 2-year study period (Fig. 2A)

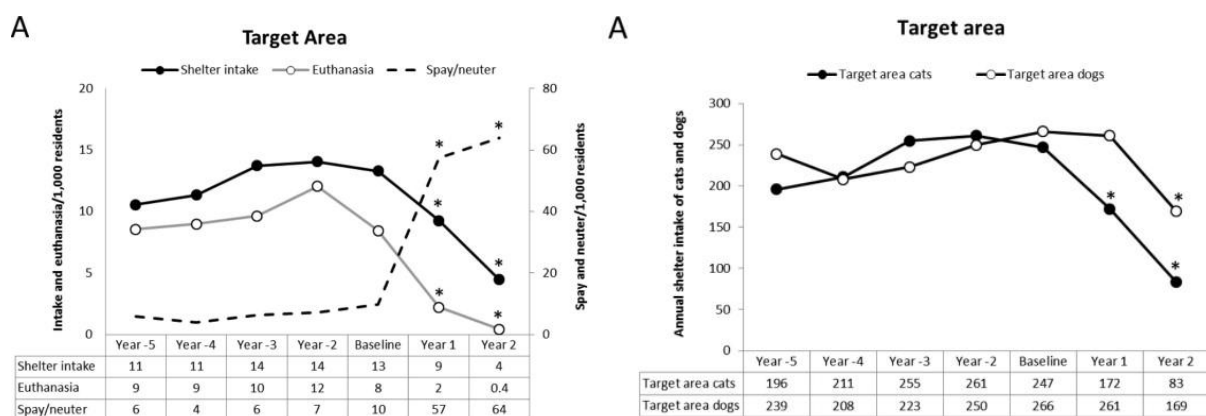


Fig.2. Annual per capita community cat trap-neuter-return (TNR) surgeries in the target area (A) increased significantly during the 2 study years (Years 1 and 2; $P < 0.05$). This was accompanied by a significant decrease in shelter cat intake and euthanasia.

Fig. 3. Shelter cat impoundment from the trap-neuter-return (TNR) target area (A) decreased 66%

Therefore, TNR+adoption is the most efficient, direct and humane way to rescue stray cats.

1. Stray cats need a shelter

There is a large number of stray cats freezing and starving to death each year.

2. Resolve the conflict between people and cats in the community through design

There are often a fixed number of stray cats in a community. Stray cats in the community have an impact on the lives of residents.

3. Promote scientific stray cat rescue methods

Human food contains a lot of adjuvants, which can cause kidney failure and other diseases in stray cats. The act of feeding without de-sexing and adopting will make stray cats multiply. Therefore, blind and unscientific rescue behavior is ineffective and counterproductive.

Design Process and Methodology

1. User and Consumer Target

The target users of this design are animal rescuers, and the potential target users are people who love animals.

Due to the lack of animal protection laws and other related laws, there are no government organizations investing in animal rescue centers in China, and all animal rescuers in China are individual rescuers. These rescuers are often part-time rescuers who have the knowledge of animal rescue, but they do not have a lot of time and financial resources to devote to animal rescue.

Potential users are animal-loving residents in the community who may not have owned animals for various reasons and therefore lack animal rescue knowledge. They want to help stray animals, but often do not know how to do so. Some want to adopt a cat, but do not know where to do so or how to choose a cat that suits them.

2. Design Validation Method

I observed the rescue process of stray cat rescuers and identified a series of problems and touchpoints.

I conducted interviews with target users and potential users. Stray cat rescuers presented their difficulties and challenges in the rescue process. In addition to frequent scratches and bites, the most significant difficulty faced by rescuers is the lack of sufficient funds and space for housing. A rescuer can rescue more than ten stray cats a year, and a rescue station can rescue dozens or even hundreds of stray cats. It costs much money to treat and de-sex stray cats, and some rescuers are already in debt (Huang 2014).^{viii} At the same time, some cats with chronic diseases or newly de-sexed cats need to be placed in shelters for observation and treatment. Some unadopted cats also need places to be housed, which makes the shelters often stockpile many cats, resulting in a noisy and even smelly environment, which is not conducive to the recovery of sick cats and the growth of young cats. In addition, rescuers are often misunderstood and blamed, and people who do not know stray cats think rescuers waste money and take up public space and resources. These inevitably add to the difficulties of rescuing stray cats.

^{viii} Huang, Shaojie. 2014. "After Dog Rescues, Activists Left With A Daunting Task". *The New York Times*. <https://cn.nytimes.com/china/20140915/c15dogs/>.



Fig. 4. Status of stray cat rescue stations in China



Fig. 5. Individual Rescuers

The project counted the attitudes of 59 residents in the "Lijun Tomorrow" community towards stray cats. Twenty-three residents have cats themselves, love stray cats, and often bring cat food to feed them. Eight residents think stray cats are pitiful and often bring their food to feed them (human food often contains a lot of additives and seasonings, which is not only suitable for stray cats. (human food often contains a lot of additives and seasonings, which is not beneficial except for filling the stomach of stray cats). However, three residents believed that stray cats pollute the environment, cause nuisance, and scratch residents. One of the residents even though that stray cats should be trapped and killed in the community.

The project also interviewed vets to find out what else we can do for stray cats. The veterinarians said that animal clinics are also very concerned about stray cats, so many cooperate with rescue centers and offer free de-sexing places and great discounts to rescuers every year. The veterinarian supported "de-sexing to control the number" and "adoption instead of purchase" and suggested that animal owners often abandon their pets because they are not willing to pay for their medical bills. Hence, she believes that relevant legal policies should be introduced to hold owners responsible for abandoning their pets. Therefore, she believes that relevant legal policies should be introduced to hold pet owners responsible for abandoning their pets and holding those who abuse animals accountable. To gradually reduce and eliminate the abandonment phenomenon to control the number of stray cats at the source.

Design Goal

1. "House" designed for stray cats in the community

The large number of stray cats that freeze and starve to death each year. There are often a fixed number of stray cats in a community.

2.A more efficient adoption system

Let people who want to adopt cats have a better adoption experience, so that more people choose to "adopt instead of buying".

3. Let more people understand the knowledge of stray cats

To popularize the knowledge of feeding stray cats to avoid blind feeding that causes stray cats to get sick or breed in large numbers, and to allow owners to take better care of their cats and reduce cat diseases and abandonment problems. Popularize the behavior of stray cats to prevent residents from being scratched by stray cats and other phenomena, so that more people can eliminate their prejudice against cats.

Problem Statement:

At present, the problem of stray cats still causes different degrees of trouble in many countries, including the excessive number of stray cats and the problem of stray cats disturbing the lives of citizens. Both individual stray cat rescue organizations and government-supported stray cat rescue organizations still have insufficient funds and an insufficient workforce. The rescue of stray cats should become a problem for all people to help solve. How can the community be involved in stray cat rescue in a efficient way? How to get more people to pay attention to and participate in the rescue of stray animals?

Project Overview:

As a case study, I chose to do a project that could efficiently rescue stray cats and solve the problems of high mortality, homelessness and mass breeding.

Ideation and Development of Ideas

The first stage of ideation discussed the shape, structure and some of the functions of the stray cat shelter in the community. The functions include a feeding device, a cat toilet, a cat den, a device to protect the staff from being scratched and bitten by the stray cats isolated in the shelter; and a device to monitor the health status of the stray cats.

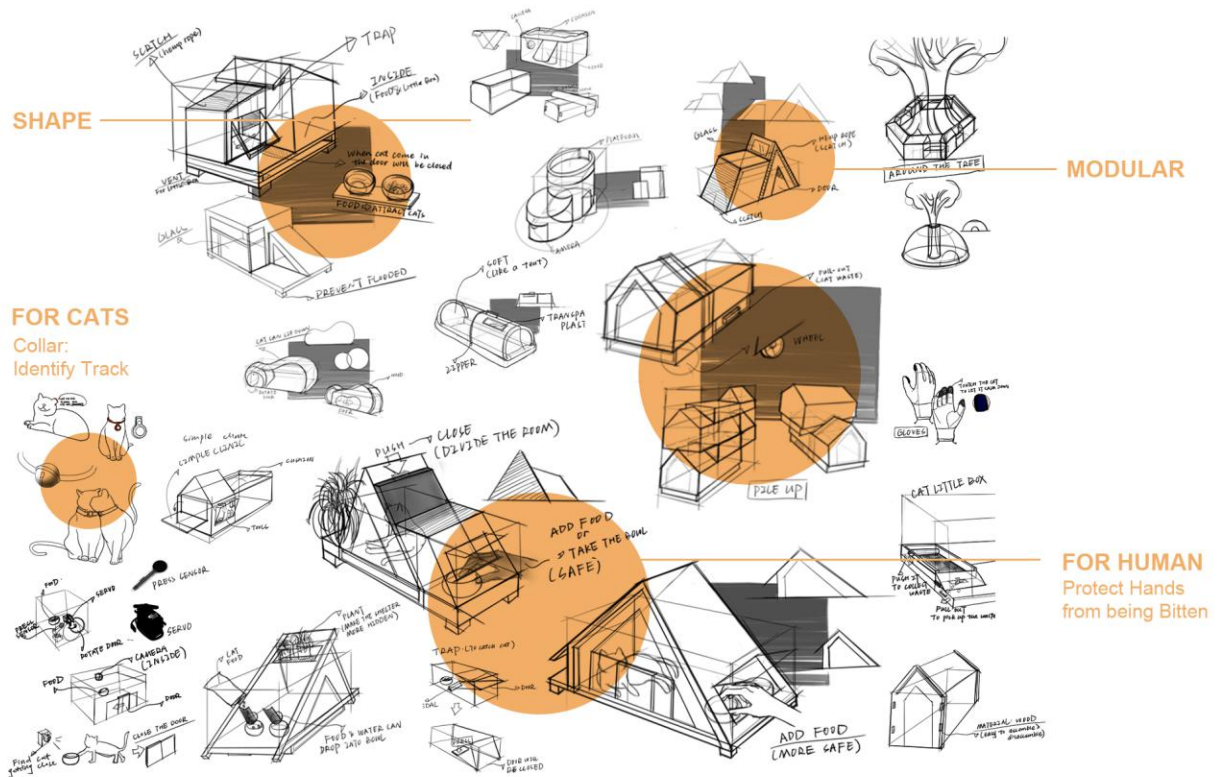


Fig. 6. Sketches

Validation of Preliminary Designs

The previous mock-up tested the modular shelters for size, shape, and function as isolation areas, open areas, and trapping areas.

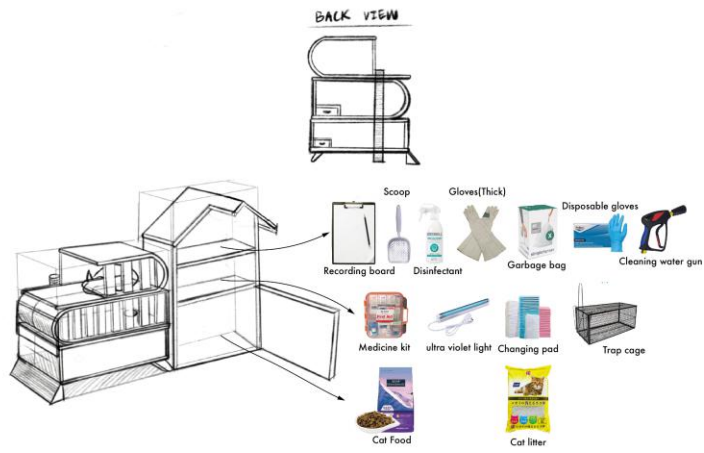


Fig. 7. Concept 1

Fig. 8. Mock-up 1

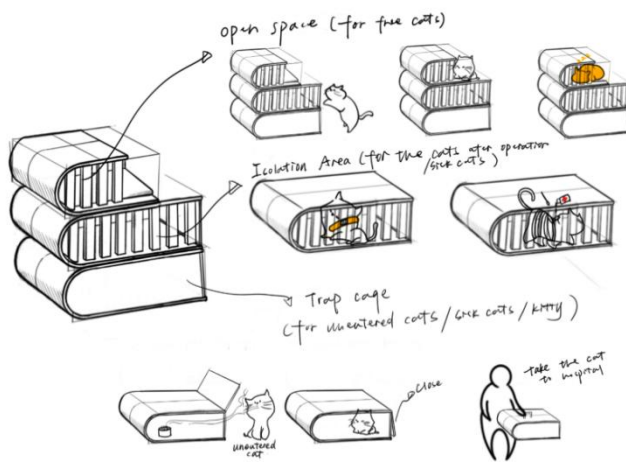


Fig. 9. Concept 2

Fig. 10. Mock-up 2

Further Refinement and Development

The model consists of several trapezoids that the user can freely assemble to achieve functionality.



Fig. 11. Mock-up 3.1

Fig. 12. Mock-up 3.2

Fig. 13. Mock-up 3.3

User Testing

This model allowed me to test the product's functionality, including trapping, cat identification, and user testing of cats and humans.

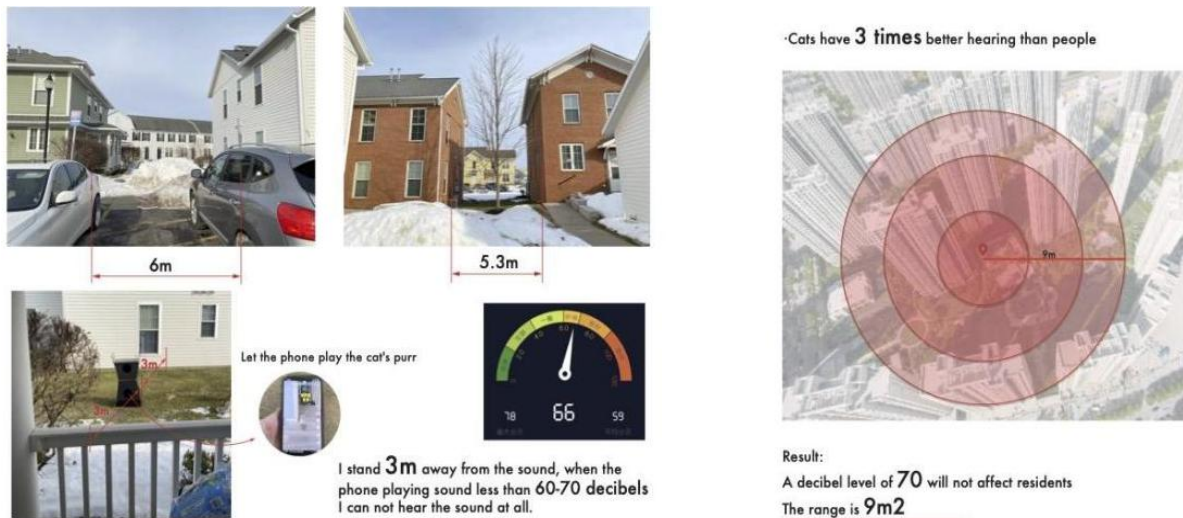


Fig. 14. User testing--Sound distance

The conclusion is that if the product is placed in the middle of two houses, the audio played should be less than 70 decibels. The range of cats that the product can attract is approximately a circle with a radius of 9m centered on the product.

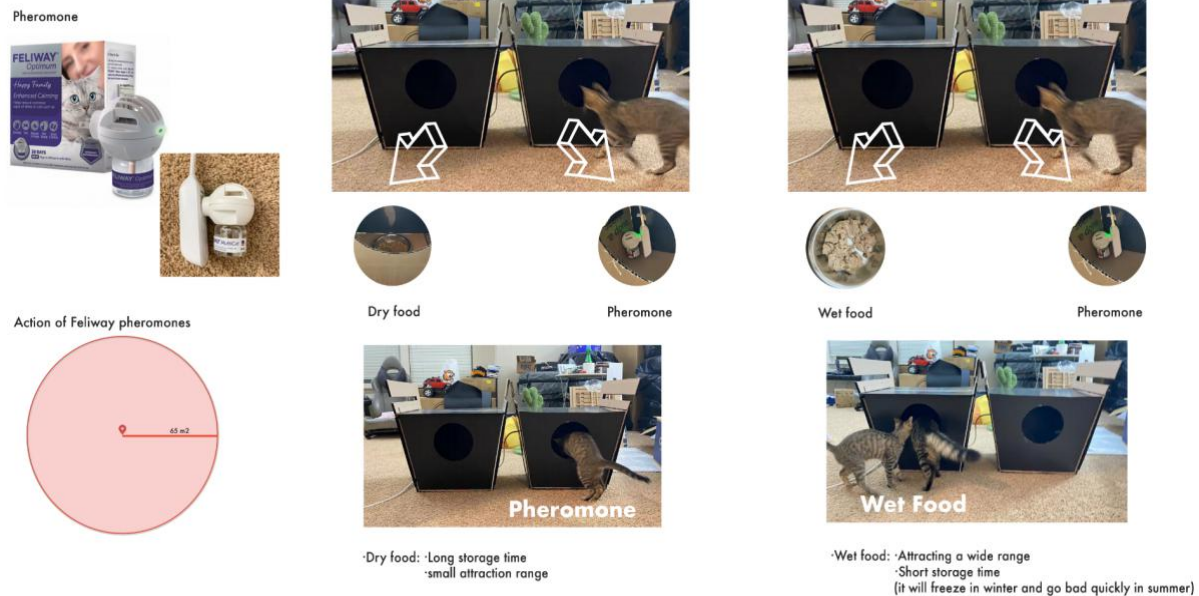
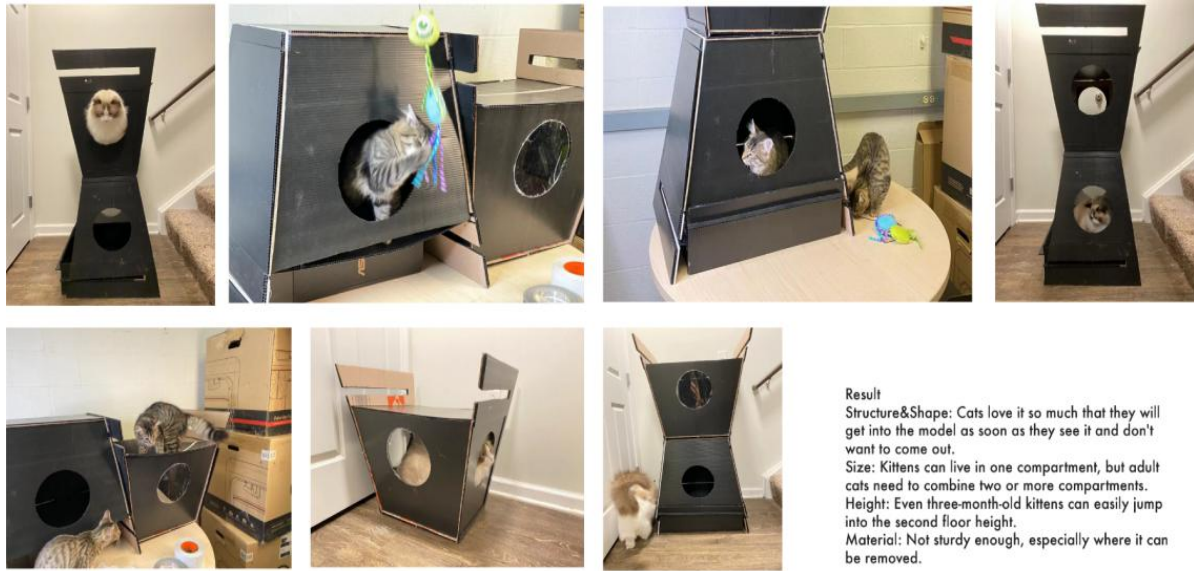


Fig. 15. User testing--Pheromone test

According to the survey, cat pheromones can effectively calm the anxiety of cats in unfamiliar environments(Cozzi et al. 2010)^{ix}, Statistics also show that the pheromones of female cats in heat are effective in attracting male cats(Patel et al. 2010). ^xThus, the model allowed me to test the attractiveness of dry food, wet food, and cat pheromones to unneutered cats. It was concluded that pheromones are highly targeted, have a wide range of action, and are long-lasting. Wet food attracts cats the fastest but is not targeted and has a longer duration of application due to disadvantages such as being easily spoiled and freezing in winter. Dry food is less attractive and untargeted.

^{ix} Cozzi, A., P. Monneret, C. Lafont-Lecuelle, L. Bougrat, E. Gaultier, and P. Pageat. 2010. "The Maternal Cat Appeasing Pheromone: Exploratory Study Of The Effects On Aggressive And Affiliative Interactions In Cats". *Journal Of Veterinary Behavior* 5 (1): 37-38. doi:10.1016/j.jveb.2009.10.014.

^x Patel, G., S. Heath, K. Coyne, and A.C. German. 2010. "Pilot Study To Investigate Whether A Feline Pheromone Analogue Reduces Anxiety-Related Behavior During Clinical Examination Of Cats In A Rescue Shelter". *Journal Of Veterinary Behavior* 5 (1): 33. doi:10.1016/j.jveb.2009.10.022.



Result
Structure&Shape: Cats love it so much that they will get into the model as soon as they see it and don't want to come out.
Size: Kittens can live in one compartment, but adult cats need to combine two or more compartments.
Height: Even three-month-old kittens can easily jump into the second floor height.
Material: Not sturdy enough, especially where it can be removed.

Fig. 16. User testing--for cats



Results.
Right height
Functional and practical
Not sturdy enough, especially the handle part

Fig. 16. User testing--for human

The model also allowed me to test the use of the product by cats and human. The conclusion was that the shape cats liked, but the height was high, the size was large, and the material was not sturdy. And the handle does not meet the ergonomics standards and needs to be improved.

Final Design:



Fig. 17. Final design in photo shot



Fig. 18. Rendering of final design

The final design is a powerful combination of three areas: the isolation area, the trapping area, and the open area.

The isolation area is a cat litter fixed to an integral shelf and comes with its litter box, deodorizing device, ventilation holes, and light windows.



Fig. 19. Rendering of cat litter box



Fig. 20. Rendering of activated carbon deodorization

The trapping area is equipped with an internal attraction device consisting of a cat pheromone diffuser and a sound system that plays catcalls; the one-way door enables the cat to enter and exit; after trapping the cat, residents can take the trapping box directly to the hospital for treatment or de-sexing; after

returning from the hospital and placing the trapping box, the side sliding door can be pushed open to allow the cat to enter the isolation area, and then close the sliding door for the subsequent trapping.

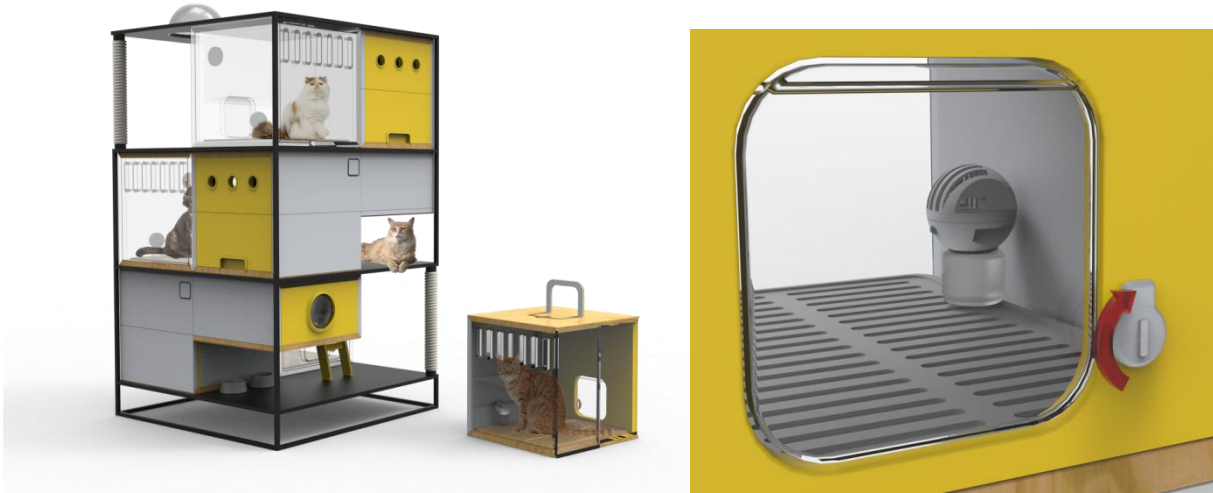


Fig. 21. Rendering of trapping cage

Fig. 22. Rendering of trapping device

The open area has three levels with scratching posts, food bowls, and other functions for stray cats in the community to play and eat.

The system provides residents and staff in the community with a common APP that helps the entire community work together to care for the cats, monitor their status, and allow residents to make donations or select the cats they want to adopt. Staff members monitor the Shelter situation within the APP and can receive timely news of new cats trapped, take the cats to the doctor and edit the cat information.

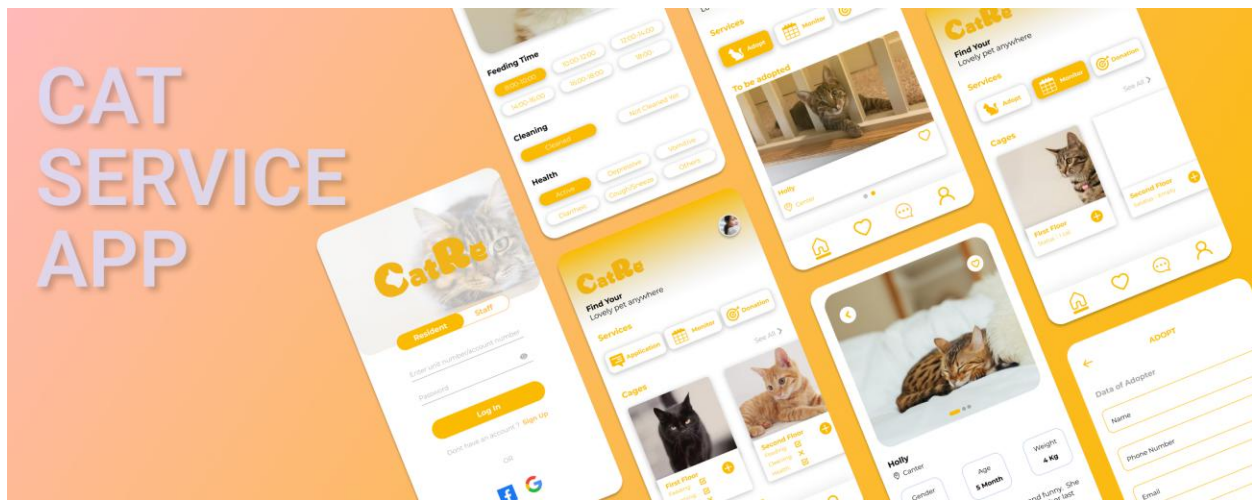


Fig. 22. cat service app

Conclusions:

Feedback from users led this project and study to conclude that the final concept was successful and accepted by the target audience. The performance of both the cats and the people reflected that they found the product attractive.

The project is a sustainable design that will fundamentally solve the problem of stray cats and residents in the community in a true sense for the mutual benefit of the stray cats and residents in the community.

The final design will further track the de-sexed and released stray cats and explore which chip or tracker can efficiently track and monitor the location and health status of the released stray cats further to study the habits and distribution of stray cats. At the same time, the design testing will also further follow up on the situation of adopted stray cats, upgrade the return visit and other functions for adopters, and further improve the after-sales function, so it will prevent the abandonment and abuse of animals.

The final project will not be limited to a single product but will be expanded to become a significant public facility in a community. In addition to the cat shelters, there will be spaces for workers to rest or for people to interact with cats so that residents who want to adopt cats can have a better experience.

Since residents' demographics and income levels in different areas or neighborhoods are different, the final project will require site visits to other cities, regions, and communities to make targeted improvements to the design. In conclusion, the project is humanitarian and in line with the trend of today's plan, which can solve some people's problems to a certain extent and guide some people to a better development path.

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