

# Interface Design of Toy Sharing Service System Based on User Interaction

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**Abstract**—Based on the user interaction behavior and the current situation of toy use in the market, the paper is to explore how to better to solve the ubiquitous problem concerning toy waste and difficult disposal in the society from the perspective of sharing and toys. Dialectical analysis on current situations concerning the toy market and service and the methods of investigation and interview were taken to analyze a series of problems concerning interaction behaviors between relevant products and users, such as difficulty of selection, excessive amounts of operator interface, relatively low amounts of optional product content, low attraction of product presentation, and so on. The author tried to take the interfaces of service systems as the carries, and present a systematic scheme to solve problems concerning toy waste and user interaction behaviors. The design of the shared toy service system was an attempt based on user interaction behavior as well as effective discussion on solutions to market-available toy-concerned problems, and shows high practical significance and service value. By integrating with the hot topic of “sharing economy” in today’s society and starting from the current situation of services, problems concerning user interaction, such as assisted user selection, operation pages, presentation methods, etc., were deeply explored in the paper to summarize the functions and modes of the service systems and thereby to propose the interfacial design of a shared toy service system.

**Keywords**—*industrial design, Interaction design, Interface design, Shared patterns, Toys, Service system*

Toys are necessities in children’s growing process [1]. Good toys not only bring happiness to children, but also develop their intelligence, stimulate imagination, build up manipulative ability and promote their healthy growth. However, in the face of the ever-changing world with wide toy varieties, many parents have same troubles--the variety of toys and the prices are increasing, children’s curiosity is gradually rising, and children are faster in “abandoning the old for the new”. Consequently, parents buy new toys to satisfy their kids’ desires, while constant accumulation of new and old new toys results in great wastes, since it is unnecessary to keep all toys, but it is wasteful to abandoning them. In view of the situation and in combination with the currently hot topic of “sharing economy” in the society [2], a toy sharing platform is created to alleviate the social problem. Based on the universal phenomenon, toy rental in a shared way will effectively ease the problem of toy waste. There are similar mobile APP-based service platforms available in the market, but there are many problems concerning their industrial designs. From a new perspective, the author tried to explore the interaction design of the toy rental service system based on multiple age brackets of infants and young children.

## I. A SIMPLE INTRODUCTION ON PRESENT CONDITION OF CHILDREN’S TOY MARKET AND SERVICES

### A. The State of Children’s Toy Market

Generally, toys can be classified into metal, plastic, cotton, electronic, paper and other groups according to their raw materials. Since cotton and velvet toys are susceptible to be stained and cannot be cleaned simply and paper toys are inclined to be damaged, suitable toys for rental are mainly metal, plastic and electronic products. With the continuous growths of social economy and people’s consumption power, the amount of discarded toy has also increased with the rising of purchasing volume. As children grow older, some toys might be no longer suitable for them, or children might no longer like some toys after a period of time, and the amounts of unused and discarded toys also increase [3]. Besides, with the growth in the living standard, people have been posing increasingly high requirements on the quality, safety and function of toys [4], and the prices of toys keep increasing. People are at their wit’s end trying to dispose purchased high-end toys. According to the statistics of China’s toy market scale, it can be seen that families are spend more and more money on toys. Therefore, the toy sharing APP designed in combination with “sharing economy” mode will allow constant recycles and reuses of toys, reduce the terrible waste of toy resources in families, and surely be welcomed by parents. See Table I.

TABLE I. STATISTICS OF CHINA’S TOY MARKET SCALE AND THE PREDICTION

Year	Population of 0-14 YO (10,000)	Domestic Sales (0.1 Billion CNY)	Export Amount (0.1 Billion CNY)	Per Capita Toy Expenditure (CNY)
2013	22315.81	564.61	804.77	253.01
2014	22555.35	582.40	918.91	258.21
2015	24193.31	649.48	973.50	268.45
2016	24898.99	707.01	1067.79	283.95
2017	25837.75	759.18	1152.16	293.83

### B. Analysis of Current Toy Sharing APP Service

Toy sharing, also known as toy rentals <sup>[5]</sup>, is an economic behavior of toy-based physical credit. Based on the economic behavior, a lessee has the right to use a toy for a certain period of time by paying a certain fee, while the ownership of the toy is still owned by the lessor. In the current market, there are three relatively well-known toy rental APPs --Wanduoduo (Fig. 2),

Toy Superman (Fig. 3) and More One (Fig. 4). But the popularities of these three APPs are not high, and many people are not very familiar with the manner of toy rental. By analyzing these three applications, it can be seen that their value the safety of disinfection. Moreover, it is suggested by the user research that safety is the primary consideration when selecting a toy. Therefore, a toy sharing APP should put the safety of disinfection and hygiene in the first place, and offer its users with a safe and secure concept to allow users to better use its products in a more secure way. Based on the them, the processes of booking, returning and lease-renewing can be done online, reducing the troubles of no-site operation and back-and-forth visits. In addition, all the three APPs distinguish age groups and toy types in detail, try to cover maximal age groups and toy types, provide more options, and maximize service time and age levels for users. However, the three APPs also have some shortcomings. Their offline services are limited by the geographical factor; delivery cannot be offered if a user is beyond a certain geographic distance, and it increases the use difficulty for users. Besides, since the three products are featured by burdensome operational procedures and relatively complicated user experience, there is still large room for improvement. It can be known from these three APPs that the design of a toy sharing APP should reduce the operation difficulty, simplify the interface content, provide users with more concise and direct choices, and offer better user experience. See Table II.

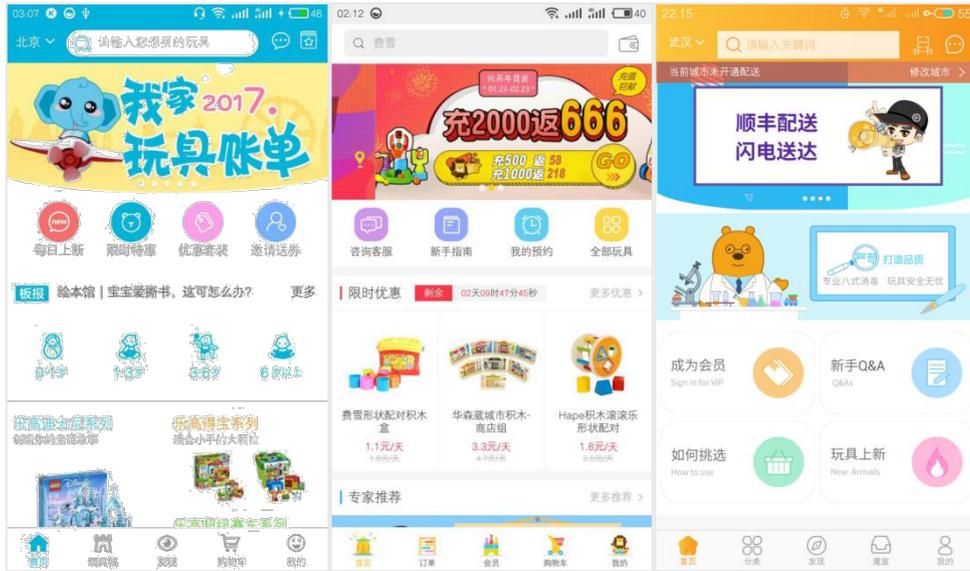


Fig. 2. Games to play

Fig. 3. Superman Toys

Fig. 4. Sharing Toys

TABLE II. ANALYSIS ON ADVANTAGES AND DEFECTS OF TOY SHARING APPS AND DESIGN INNOVATION POINTS

Advantages of Existing Products	Defects of Existing Products	Design Innovation Points
Complete Disinfection Process	Deficiency of Package Content; A Low Amount of Choice	Customizable Exclusive Toy Package
All user operations can be completed online.	Offline services are significantly affected by the geographical factor.	Comprehensive Package Choices
Detailed Division of Age Groups and Toy Types	Burdensome and Complicated Operational Procedures	Simple and Convenient Operational Procedures

## II. ELEMENTS OF USER INTERACTION BEHAVIOR

### A. Target Users

Users are the objects of products and services provided by an enterprise or merchant. The different age groups and consumption abilities of users lead to different consumption behaviors. In this sense, the content carried by a product must meet users' different needs as comprehensively as possible. Regarding a toy sharing APP, the interactive content should satisfy parents' purchasing needs, such as type requirement, brand requirement, targeted age ranges corresponding to toy choices, simple operations for selection, safe purchasing, identifiable content buttons, etc. Among the existing toy rental APPs available on the market, only a very few APPs offer customized toy packages to reduce the selection difficulty, and these packages are characterized by low content volumes and deficient orientation. Based on the problem, this APP is designed with additional customized toy packages and customized package services to reduce selection difficulty. In child-bearing families, many parents, especially new parents, have no idea about how to buy and choose toys that are suitable for and preferred by children. Therefore, we should use the designed product to provide parents with more professional guidance on toy selection and to reduce ubiquitous the problem of toy waste in families.

### B. Behavior of Users

User behavior consists of five elements--time, place, person, interaction and interactive content. When a user is using an APP, he/she wants to obtain contents he/she needs quickly during the search and browsing process. Therefore, a toy sharing APP shall be simplified for its operational steps to the most to reduce the difficulty of user operation. During the operation

process, the interactive language should be as precise and clear as possible, so that a user can use and operate it more smoothly. When the operation behavior is interrupted, prompts with appropriate interface language shall be used to guide the user's operation behavior. A return icon is supplemented in the pages to allow a user to return to a previous page and to avoid erroneous operation. Users' fixed operations and habits, fixed subconscious concepts, and operational defects in APPs currently available in the market are comprehensively considered to improve the problems (Table III), while easy-to-recognize icons and language are applied to reduce user thinking and to offer better usage experience.

TABLE III. OPERATIONAL DEFECTS OF SIMILAR APPS AVAILABLE IN THE MARKET AND THE IMPROVEMENTS

Operational Defects of Existing APPs	Improvement
An Excessively High Amount of Operational Page; Generally, 5 pages are set.	Control the amount of operational page to and below 4.
An Excessively High Amount of Page; Burdensome Headline Language	Extract and purify key words; summarize and simplify language and words.
An excessively high amount of ad page increases the difficulty of browsing.	Delete unnecessary ad pages to reduce the difficulty of user browsing and operation.

### C. Service Situation

A service scenario is a collection of integrated physical and social environments in which services are presented physically. A service scenario is the direct tangible and social environment for service experience, a transaction or an event. The direct tangible environment includes the performances of in-service network environment, the safety of the network environment during a transaction, etc.; the social environment includes product familiarity of a surrounding social circle, the experience, the promotion and so on. Currently, the existing APPs available in the market mostly adopt the toy distribution mode of home delivery for customers within a certain geographical range and mail delivery for nationwide customers; only a few APPs limit their service scope to some regions. Offline stores are set up to serve home delivery for neighboring regions, while mail delivery services are offered to cover other regions. The online + offline operating mode can minimize geographical restrictions to the most. Therefore, in the subsequent design, the operating mode will be mirrored for better development.

### D. Technology of Interaction

Human-computer interaction technology refers to the technology of realizing effective human-computer dialogue with computer input and output devices. During an input process, a toy sharing APP introduces interface contents and services to people via a classification module. During an output process, people experience the specific contents of the product via vision- and touch-based activity perception. By content input and output as well as icon-text conversion, a toy sharing APP conveys the content and service structure of the product to people, guides people on product use, allows people to obtain the idea of toy resource reuse in the experience process, and reduces the waste of toy resources. Although most of the APPs available in the market are designed with buyer exchange boards, which, however, achieve little practical effect, popularization and promotion of scientific parenting knowledge are generally deficient, and the APPs fail to disseminate the benefits of the sharing idea. Nowadays, since many families are lack of these scientific concepts and knowledge, we are required to provide them with a learning platform to promote scientific parenting knowledge and environmental protection concepts.

## III. NEW DESIGN OF SHARING TOY APP

### A. Preliminary Design Concept

A toy sharing APP is a service innovation project. Problems to be solved and elements of interactive design shall be considered comprehensively to innovate and design the content of the APP. Thereby, a preliminary conception plan of the interface design is formed, as shown in Table IV and Fig. 5.

The toy sharing APP is designed with an additional "Customized Package" module on the homepage to provide scientific, effective and intelligent guidance and plan options to numerous new parents or to parents who are confused by how to buy toys. In order to reduce the complexity of user operations, the overall APP operation page amount is controlled to four, and the method of keyword guidance is adopted to create better operation experience. The operation mode of online-offline collaboration for global operation allows users to select more suitable purchasing and returning ways according to their own situations, and thereby reduce the inconvenience caused by the geographical factor.

TABLE IV. DESIGN THOUGHT OF THE USE CONTENT

Possible Problems	Discussion on Coping Strategies	Core Innovation Points
A small variety of toy? A few options?	Release new products every day?	Customize product labels;
Established packages are not suitable for users?	Fill in data for a customized package?	recommend most suitable toys in an intelligent way.
Too much parenting knowledge is poorly organized?	Select and push most scientific and appropriate information?	Push parenting knowledge and life tips irregularly according to the filled baby information.
Like a toy so much, and want to buy it?	Online payment for purchasing?	A rented toy can be purchased online; after paying corresponding cost, a user does not need to return the toy.
Want to renew a rental or buy the product after due date?	Online rental renewing or purchasing?	
How to return?	Mail delivery? Visit a store?	

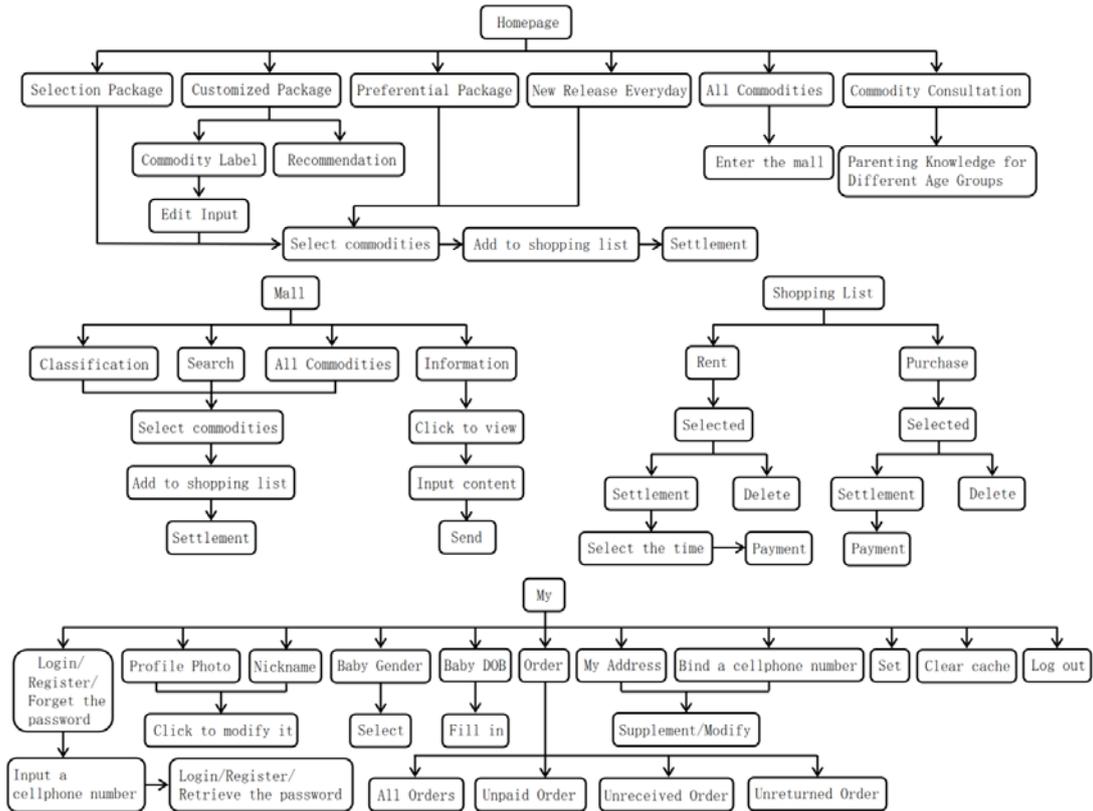


Fig. 5. Operation Flow Chart of the Toy Sharing APP

## B. Interface Visual Design Scheme

### 1) Solutions Shows

Interface design is the medium for information transferring and exchanging between people and machines, and interface content should conform to users' usage habits and thinking logic. In interactive pages, the fragmented module use should be minimized, the content should be integrated and simplified to the top extent, and the operational complexity and difficulty should be reduced, so as to present better experience in users. The size of each icon should conform to users' operations to reduce operational inconvenience, and different modules shall be distinguished with different graphic languages and colors. Moreover, a return identifier is set on every page to offer users the option of undoing an operation and returning to a previous page. Lastly, the design framework of the operational flow of the toy sharing APP is integrated for visual presentation. The visual interfacial design scheme of the toy sharing APP is shown in Fig. 6.

- 1. Customized Package; 2. Page of Rental List; 3. Classification Page; 4. Mall Page**  
**5. Registration Page; 6. My Page; 7. Login Page; 8. Homepage; 9. Rental Settlement Page**



Fig. 6 Visual Interfacial Design Plan of the Toy Sharing APP

## 2) AR 3D Dynamic Imaging Technology

AR 3D dynamic image technology, also known as augmented reality technology<sup>[6]</sup>, is an augmentation of reality as well as a fusion of virtual image and real-world images. The AR system is mainly featured by the following three points—the information integration of the real world and the virtual scene, the real-time interaction, and the augmentation of virtual objects in a 3D space. The structure of an AR system is composed of a virtual scene generation unit, a tracking system, and a display-type interactive device. The virtual scene generation unit is responsible for modeling, managing and drawing of a virtual scene and management of other peripherals; the tracking device is used to track the change of a user's line of sight; the display-type interactive device is used to display the signal after the fusion of the virtual and the display and to realize the input and output of sensory signals and environmental control operation signals. When a user is using this APP, he/she can scan a relevant book via a mobile phone or tablet, and display a toy from the APP mall in front of him/her in an all-dimensional way. The design allows the user to know and experience a commodity of interest in a more direct, detailed and specific way. The conversion from 2D to 3D changes a user's operational behavior spatially, and brings about more interesting and attractive operating experience to the user<sup>[7]</sup>. By dynamic presentation, the integration of the new toy sharing APP and the popular AR 3D dynamic imaging technology enhances people's experience of the product, increases users' interest and favorable impression of the product, and promotes popularized usage of the APP.



Fig. 7. A Result Picture of AR Imaging[8]

## IV. CONCLUSION

With the continuous improvement of living standards and people's consumption ability, children's education and entertainment have occupied an increasingly important position in people's minds. With the continuous rising of toy purchasing volume, the problems concerning "loving the new and loathing the old" in children and blind purchasing in parents have been increasingly exposed. Consequently, the problem of toy resource waste has become more and more significant, and the reuse of toys has become a problem that cannot be neglected. Sharing economy-based toy rental APPs involve the problems existing in current society, and present a practical solution via the mode of online payment and offline use. Viewed from future development, the toy rental APP will effectively solve the problems concerning serious waste of toy resources and parents' troubles, and shows important practical significance and reference value.

## ACKNOWLEDGMENTS

This paper is the research result of the foundation item, which belongs to National college students' innovation and entrepreneurship training program in local universities in 2017. The number of the project is 201710523002. The self-promotion project of industrial design in Hubei Institute of Fine Art. The number of project is 201701.

## REFERENCES

- [1] Zhou Su-zhen. Education Value and Utilizing of Toys in Early Childhood Development [J]. Yinshan Academic Journal. 2006(06)
- [2] Zheng Lian-sheng. Sharing Economy: The Essence, Mechanism, Mode and Risk [J]. International Economic Review. 2017(06)
- [3] Meng Hai & Xu Qiu-feng. Factors Affecting Design of Children Toys [J]. Journal of Hunan Light Industry Junior College. 2000(01)
- [4] Shang Yan-ran & Elizabeth Gasiorowski-Denis. Combatting Toy-related Injuries [J]. China Standards Review. 2016(08)
- [5] Lu Zhi-yi. Internet Facilitates Toy Rental [J]. Toy Industry. 2016(12)
- [6] Cheng Lin. Augmented Reality[J]. Shanghai Education. 2013(26)
- [7] Yang Wen-yang & Hu Wei-ping. The Characteristics and Influential Factors of Immersion in Mobile Game of Science with AR [J]. Modern Distance Education Research. 2017(03)
- [8] <http://www.sidukj.cn/html/ar/>