Insight into the Development Trend of Future Office Intelligent Devices from the Perspective of User Experience

Xiao Hu

GUANGZHOU MEIA EDUCATION CO.LTD, Guangzhou, 510630, China

jack@meia.design

Keywords: User Experience, Intelligent Office, Office Equipment, Remote Office

Abstract: From the perspective of user experience, this paper expounds the future development trend of office intelligent equipment from four aspects: environment level, user level, interaction mode and media level: environment level pays attention to the upgrading of office mode and scene; at the user level, the development of intelligent devices should pay attention to the core trend of "people-oriented"; in terms of interactive modes, rich human-computer interaction modes will improve the authenticity and immersion of interactive experience and meet the needs of users for human-computer collaborative interactive experience in the office process; finally, the media pay more attention to the intelligent upgrading of office equipment and the development of software and hardware office ecology.

1. Introduction

With the rapid growth of the type and number of intelligent terminals owned by users, one person will use many different types of products at the same time in the office process. Equipment interconnection has become one of the urgent needs of users. After the epidemic, a large number of users will have a deeper understanding of the online office mode and have an updated experience demand for high efficiency. In the future, the development direction of people's intelligent office will be closely related to the development trend of office equipment.

With the continuous development of science and technology, many experts have studied the future office intelligent equipment. For example, chraibi s, creemers P, rosenkotter C. evaluated occupancy based dimming in a simulated office using different dimming speeds for 17 participants (30-50 years old). The research shows that with the shortening of fading time, the light change caused by darkening increases significantly [1]. Si y, Korada n, ayyanar R. proposed a high-performance 4-layer communication architecture of smart microgrid test-bed, which provides a convenient and comprehensive solution for the implementation of SPI and Modbus TCP / IP communication in smart microgrid. It solves the coordination problem between communication and system control and between different communication protocols, so as to improve the communication efficiency and make the system highly scalable, flexible and adaptive [2]. Gao J, Wang J, Li Z. introduced the background of intelligent map hardware, and proposed a cloud intelligent map technology system. With the support of industry service mapping engine, the cloud intelligent mapping technology system is constructed [3]. Although the research results of future office intelligent equipment are quite fruitful, there are still deficiencies in the research on the development trend of future office intelligent equipment from the perspective of user experience.

In order to study the development trend of future office intelligent equipment from the perspective of user experience, this paper studies the new development trend of intelligent office equipment and future office experience from the four perspectives of environment (scene), people (user), information interaction and media (equipment and application).

2. Method

2.1 Environment: Mobile, Intelligent and Scene Oriented Office Mode

(1) Mobile office mode puts forward new requirements for portability and durability of equipment

From the perspective of equipment convenience, users want office equipment to be lighter, thinner and easy to carry at any time [4]. Through the application of new materials and structural innovation, coupled with strong chip computing power, notebook computers have developed in the direction of lighter and thinner. For example, VAIO sx14 2020 model, although its weight is only 1kg, its endurance time reaches 10.5 hours; although ThinkPad X1 carbon fiber remains light and thin, its maximum durability can reach 19.5 hours [5]. In addition, users' demand for the convenience of office equipment also comes from charging equipment, and space charging has become a trend. Space charging technology allows users to move freely within the coverage of 10 meters without connecting data lines, and can also charge the equipment, greatly improving the flexibility of the equipment and the durability of office equipment [6].

(2) AR / VR technology contributes to the new experience of telecommuting mode

The combination of AR / VR technology and remote office mode gave birth to a new virtual portrait remote conference mode [7]. Remote office users can communicate face-to-face with colleagues in the form of virtual portraits in the virtual space through VR / AR technology, greatly restore offline face-to-face meetings, fully enhance users' sense of participation and immersion, and optimize the meeting experience [8]. Through the unique ID of the camera and three-dimensional numerical calculation, we get a "virtual reality" scene of employees working in the company. The cloud sends this scene to the VR glasses of employees. In this way, employees working at home is just like working in the company, which solves the problems of communication, concentration and environment in the office process, and greatly improves the quality and efficiency of work [9]. At the same time, the cloud can pre-record a variety of different types of office environments for enterprises to choose from, which cannot be done in real office scenarios. Changing the office environment can greatly improve employees' interest and fun in work.

(3) Scene matching to rebuild new functions of future offices

Nowadays, the functions of intelligent office equipment are becoming more and more perfect. In this regard, Fang Jie, a user experience design expert from the software development center of industrial and Commercial Bank of China, cited an example: "virtual reality technology can let people enter the space they want to work, for example, some people want to work at the sea or in the quiet forest [10]. The virtual workspace greatly improves employees' attention and job happiness. "

2.2 User Level: Office Experience Needs Emphasize "People-oriented"

"People-oriented" emphasizes people-centered and pays attention to the development of people themselves [11]. Interactive system refers to the software and hardware system for information processing, including all relevant components and equipment. These intelligent devices and systems will respond dynamically according to human behavior. More and more interactive components will be implanted into various forms of products, such as clothes, buildings, cameras and so on. The basic challenge for interaction system designers is to deal with the differences between people and interaction systems. Many designers are still machine centered, because it will be faster and easier for them, but it is not easy for people who use products, so we should take a people-centered perspective. Another difference between people and machines is that they use two different languages. People express their desires and emotions through what they want (needs) or how they want things to appear (the purpose of behavior), while machines need to strictly execute instructions. The human-computer interaction between users and technology is reflected in whether users adapt to machines or machines adapt to users. When the machine is more suitable for users, the human-computer interaction tends to be more healthy and efficient. This healthier machine adapts to human interaction form, which is also based on the research of paying attention to human's own physiological size and psychological behavior [12].

2.3. Interaction Mode: Diversified Forms and Natural Process

The interactive mode of office intelligent devices is to use computers to express abstract non

spatial and non-numerical data through intuitive visual expression, so that people can make full use of their visual and perceptual abilities to observe and process information, so as to find the relationship and hidden mode between information and enhance their cognition of the essence of data. Information visualization is essentially a visual interface between people and information, it is a technology to study the information expressed by human and computer and their interaction. Transforming the text information, data information and abstract data needed for office into simple, clear and easy to understand graphics or images is the focus and difficulty in the design of mobile office system. Office information has the explicit characteristics of large quantity, complexity and boredom. At the same time, there is also the implicit characteristic of the correlation of different structures between office information. The key is to use the skills and methods of information visualization to express the office information in a new graphical way.

2.4 Media Level: Combination of Software and Hardware, Science and Technology to Help Build Smart Office

At present, the rapid development of artificial intelligence, Internet of things and other technologies makes the interconnection of intelligent devices possible. The software system linkage carried by the equipment has also been strengthened. Major manufacturers began to pay attention to the construction of office ecosystem and emphasize the close cooperation of software and hardware. Multi device interconnection refers to building and experiencing more interconnection scenarios among multiple intelligent devices by breaking product barriers. Specifically, it includes technologies and functions such as seamless data flow between multiple devices, mutual access and control between multiple devices, task relay between devices, function call of multiple devices, etc. The functions of different devices can complement each other, build an intelligent hardware ecosystem, and improve users' office efficiency and product use experience.

3. Experience

3.1 Object Extraction

The original office intelligent device is based on Browser / server mode, which is a multi-layer architecture with safe performance. In the development process, JSF, spring, ATIS and other frameworks are adopted. The database is Oracle. The intelligent terminal can call the unified data interface provided by the server. Apache CXF is configured in the server-side spring framework to encapsulate these services into web services and publish them to the Internet.

3.2 Experimental Analysis

The system is divided into two functional modules, namely intelligent device detection module and vulnerability utilization module. The relationship between detection module and vulnerability exploitation module can be regarded as a gradual relationship. For example, in order to check the security of intelligent devices in the network environment, it is necessary to detect and identify all existing intelligent devices. After obtaining the equipment list, the detection system uses the vulnerability utilization module to conduct vulnerability utilization test and vulnerability detection; at the same time, the two modules can be used as independent parts, that is, if the device list is known, the vulnerability utilization test can be carried out directly, or the device detection and discovery can be carried out only in the network environment.

4. Discussion

4.1 Mobile Office System

According to the latest statistics of the famous Internet traffic monitoring organization net applications, the Android system still has the highest utilization rate of user terminal system in 2020. The distribution of major mobile platforms in the fourth quarter of 2020 is shown in Table 1.

Table 1. Distribution of major mobile platforms in the fourth quarter of 2020

type	proportion
IOS	32%
android	35%
Java ME	13%
Kindle	20%

It can be seen from the above that the market share of i0s is 32%, that of Android is 35%, that of java me is 13%, and that of Kindle is 20%. The specific presentation results are shown in Figure 1.

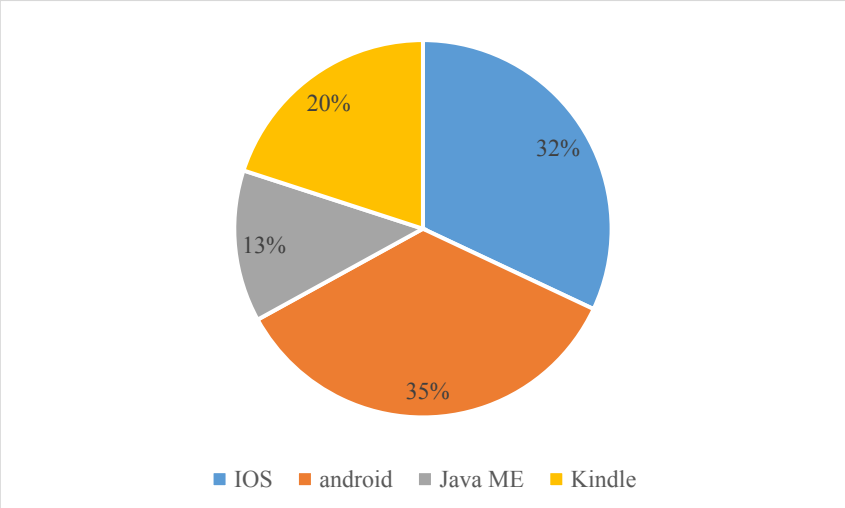

Figure 1. Distribution of major mobile platforms in the fourth quarter of 2020

Since the first quarter, Android's market share has steadily increased, but i0s's market share has been declining. By the fourth quarter, the share of Android system has reached 35%, exceeding 32% of i0s. With the continuous popularization of mobile devices and the continuous maturity of communication technology, the continuous transformation of applications is always affecting people's lives. Many enterprises have found the business opportunity of high demand for mobile applications, gradually extended the traditional PC applications to mobile devices, and some apps close to life have been created, which has brought a lot of convenience to people's learning and office.

4.2 Development Status of Office Products at Home and Abroad

On the design and research of office intelligent equipment, many domestic scholars study it from their professional perspective. Search for the keywords "office intelligent device" in HowNet, and the search results are shown in Table 2.

Table 2. Data of papers retrieved by CNKI

	2019	2020	2021
Academic journals	213	354	548
Dissertation	343	456	578
Conference Papers	528	574	658
Foreign literature	652	678	877

It can be seen from the above that there are 213 academic journals in 2019, 354 in 2020 and 548 in 2021. The specific presentation results are shown in Figure 2.

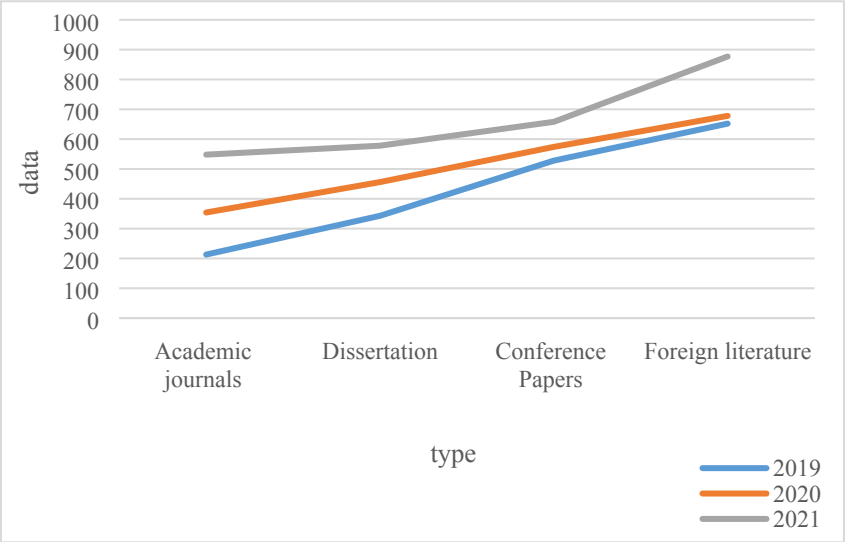

Figure 2. Data of papers retrieved by CNKI

The research on office intelligent equipment has always been a hot field. The research and papers on the design of office intelligent devices also grow with the increase of years.

5. Conclusion

In the future, users' office experience needs will continue to upgrade, and office equipment will continue to upgrade. 2019 coronavirus disease has accelerated the popularity of global telecommuting and intelligent office, and a large number of employees work from home, which has promoted the rapid expansion of telecommuting and mobile office. Although the trend of telecommuting has declined in the post pop era, a considerable number of enterprises have retained the form of online office and maintained the state of "double line office". At present, the biggest pain point of intelligent office experience in the future is the surge in demand and insufficient preparation: the original office equipment configuration capacity is insufficient, and the traditional office mode is relatively solidified. Facing the surge of demand, the current intelligent device market cannot improve multi-function in a short time and quickly build an office ecosystem to meet the needs of many parties. Combining the subject of "user experience" with the research on the development trend of office intelligent devices in the future is conducive to effectively solve the pain point problem of "surge in demand and insufficient preparation" in the current market, and put forward corresponding further solutions from the observed trend.

References

[1] Chraibi S, Creemers P, Rosenkotter C, et al. Dimming strategies for open office lighting: User experience and acceptance. Lighting Research & Technology, 2019, 51(4):513-529.

[2] Si Y, Korada N, Ayyanar R, et al. A High Performance Communication Architecture for a Smart Micro-Grid Testbed Using Customized Edge Intelligent Devices (EIDs) with SPI and Modbus TCP/IP Communication Protocols. IEEE Open Journal of Power Electronics, 2021, PP(99):1-1

[3] Gao J, Wang J, Li Z. Challenges for the Development of Surveying and Mapping Technology in the Age of Intelligence. Wuhan Daxue Xuebao (Xinxi Kexue Ban)/Geomatics and Information Science of Wuhan University, 2019, 44(1):55-61.

[4] Pontoriero C, Zippo-Mazur G. Evaluating the User Experience of Patrons with Disabilities at a Community College Library. Library trends, 2019, 67(3):497-515.

[5] Bestak R. INTELLIGENT TRAFFIC CONTROL DEVICE MODEL USING AD HOC

NETWORK. Journal of Information Technology and Digital World, 2019, 01(2):68-76.

[6] Shi Y, Gao L, Wang J, et al. Exploration of Rapid Screening Mode of Wearable Intelligent ECG Device. Zhongguo yi liao qi xie za zhi = Chinese journal of medical instrumentation, 2021, 45(2):228-230.

[7] Ahram T Z, C Falcão. [Advances in Intelligent Systems and Computing] Advances in Usability, User Experience and Assistive Technology Volume 794 || In the Journey of User Center Design for the Virtual Environment. 2019, 10.1007/978-3-319-94947-5(Chapter 59):583-592.

[8] Research Status and Development Trend of Intelligent Water Fertilizer Integration Technology and Equipment. Hans Journal of Agricultural Sciences, 2020, 10(7):419-425.

[9] Qi F, Li K, Li S, et al. Development of intelligent equipment for protected horticulture in world and enlightenment to China. Nongye Gongcheng Xuebao/Transactions of the Chinese Society of Agricultural Engineering, 2019, 35(2):183-195.

[10] Song R, Zheng Y, Liu Y, et al. Analysis on the application and prospect of coal mine bionic robotics. Meitan Xuebao/Journal of the China Coal Society, 2020, 45(6):2155-2169.

[11] Aziz R A. Intelligent Bothouse: Trend of Development of Industry 4.0. International Journal of Advanced Trends in Computer Science and Engineering, 2020, 9(1.1 S I):339-349.

[12] Priyantono A C, Ardiansyah F. Perancangan Prototipe Mobile User Experience Aplikasi Peningkatan Sumber Daya Desa Menggunakan Metode Double Diamond. Jurnal Ilmu Komputer dan Agri-Informatika, 2020, 7(2):96-104.