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SPECIAL SECTION ON DATA MINING FOR INTERNET OF THINGS

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Internet of Things Recognition and Sensing Technology in Interactive Display Communication

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ABSTRACT To study how to display the scientific and technological information of enterprise products through interactive dissemination and make a pre-marketing, the Internet of Things is integrated and how to attract people's attention and interact more with the support of the Internet of Things technology is discussed. With the rapid development of science and technology, there are more and more platforms to display enterprise products. Because of its extensive application needs, it opens a new direction for the development of various fields in China and provides new innovative ideas. In terms of product exhibition, the Internet of Things may connect various scenarios of product use, satisfy the practical needs of consumers, truly realize customer experience, gain the trust of consumers, and ultimately facilitate transactions. Therefore, referring to relevant literature and through the perception layer of the Internet of Things, obtain the information of visitors, guide them to exhibition visits, and give feedback in the process of experience. The results show that the identification and sensing technology in the Internet of Things can be applied to the interactive display, which can interact with the visitors well, not only let them have a better experience, but also achieve efficient marketing in the exhibition. It lays a certain foundation for expanding the audience of related technologies and products after that but also provides new ideas for the application of the Internet of Things technology in the direction of cultural communication.

INDEX TERMS Internet of Things, interactive communication, RFID, sensing, customer experience, marketing.

I. INTRODUCTION

As social economy and information technology develop rapidly, various platforms have emerged. There are more choices to display products, such as network platform, TV shopping platform and offline physical store platform [1]. On the one hand, product exhibition is to show the research results of enterprises for a certain period; on the other hand, it is to expand the brand awareness of their own enterprises and publicize their products to achieve marketing [2]. With the change of people's visit and consumption demand, they turn their attention to self-satisfaction and interaction with products. Therefore, in this era of experience economy, more and more people have a higher demand for experience. They think that only when they really experience it, they can appreciate it more intuitively, and even have a more appropriate evaluation of a company's ability [3]. In the exhibition activities, China's common and hot industry mainly concentrates in the information technology industry, especially in the communication industry. The telecommunications industry shows its own new technologies and products. For instance, the Mobile World Congress is the most influential Mobile Communication Exhibition in the world [4]. It is the vane of the entire telecommunications industry; additionally, major enterprises will show their heavy flagship products, and also enable ordinary consumers understand the industry trends, which will help them make more reasonable decisions when they buy the products.

The emergence of Internet of Things technology helps people connect all kinds of objects to a network with related technologies, which facilitates obtaining object information. In the exhibition link, the Internet of Things, as a bridge, puts the traditional exhibition mode and things in an interactive situation and realizes the innovation of scientific and

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technological means [5]. As an inevitable product of the development of social economy and intellectualization, the Internet of Things influences the real economy by changing the industrial structure, innovating business and having certain competitive advantages in its delicate and dynamic way. Internet of Things technology has also been applied in many fields to improve resource utilization and productivity [6].

However, the application of the Internet of Things to product exhibition is rarely studied. Therefore, the marking, sensing and recognition technology of the perception layer of the Internet of Things are used to transmit information to the application layer through the transmission network, to interact with visitors in the process of exhibition, and realize the display of exhibits and the interaction between visitors. It not only shows more visitors and enterprises for a period, but also expands the influence of enterprises invisibly. This research integrates the Internet of Things technology into the exhibition, realizes the cross-domain integration, enables people to appreciate the latest technology products while experiencing the convenience and intellectualization brought by science and technology. It provides new ideas for related enterprises to further display other products, emphasizes people's sense of experience, thus expanding brand awareness and popular science and technology knowledge, and also makes a good business for products.

II. LITERATURE REVIEW

A. SUMMARY OF DISPLAY INTERACTIVE COMMUNICATION

The development of science and technology has promoted the economic progress and produced many digital media platforms which are different from traditional media. Liu Jingming pointed out that the exhibition is very similar to the media [7]. It is a specific space, place or form of information dissemination. People hope to see some advanced and new forms of products from the exhibition. They also hope that the concept of the enterprise is advanced and conforms to the current people's habit of accepting information. Wu Hua pointed out that adding situational art to exhibition art and creating corresponding and efficient art exhibition environment for different subjects can arouse the attention of ordinary audiences and potential audiences [4]. Zhang Yuanhu synthetically uses computer technology and ant colony algorithm to design a multimedia exhibition and display system, which can play reasonably according to customers' needs and exhibition themes, and achieves the optimal management of the system [8]. Ge Haisong, Zou Xinwei and Yi Yingxiang elaborated the functions and principles of somatosensory technology, and analyzed its advantages and disadvantages in practical application. By comparing some commonly used interactive devices and somatosensory technologies, they found that the application of somatosensory technology would bring them a qualitative leap in science and technology museum, exhibition, electronic games and other fields [9].

B. SUMMARY OF THE APPLICATION OF INTERNET OF THINGS TECHNOLOGY

Zhu Hongbo, Yang Longxiang and Yu Quan put forward the core technology idea of multi-domain integration and sharing and ubiquitous integrated services in the Internet of Things, and set up business application models such as future Internet of Things market application, integration and sharing business model [10]. The new intelligent service industry characterized by industrial application and intelligent service pushes Internet of Things technology to more fields. Hu Yongli, Sun Yanfeng and Yin Baocai discussed the related issues of information perception and interaction research in the Internet of Things, pointed out the problems they face in the development process, and made expectations for their future research directions [11]. Dai Yong used the Internet of Things technology to analyze the business model of cultural communication industry, proposed three new business models, and analyzed the innovation mechanism and path [12]. Yu Chunshun, through the analysis of the forms of interpersonal communication, ideological expression and identity differences in the Internet of Things communication system, put forward that people's concepts will change with the communication situation and show a trend [13]. Vanzara, Thakkar, and Sharma proposed a TCP exhibition, which mainly integrates video transmission applications, big data analysis and Internet of Things technologies, and they applied them to emerging scenarios to make them running at high speed [14]–[16].

III. METHODS

A. INTERNET OF THINGS

The Internet of Things was officially proposed by Auto-ID in the late 1990s. The World Information Summit in 2005 opened the era of the Internet of Things. It links all ordinary objects which can independently perform their functions with the network to realize the information exchange between objects. In the Internet of Things, each object is tagged with its information. People can get the specific location of these objects and related information through identification technology [17], [18]. Of course, people can also manage equipment and personnel by computer, and control some intelligent products remotely, to obtain data and realize the information exchange between people and objects and between objects.

The Internet of Things has been widely used in many fields, such as logistics identification and tracking, intelligent environment monitoring, industrial manufacturing and personal life, which helps people deal with many problems and optimizes many links. The three key technologies are sensor technology, radio frequency identification (RFID) technology, and embedded system technology. Through sensors, global positioning system (GPS), and scanning equipment, and based on certain regulations, it makes information exchange in the Internet environment, to achieve intelligent and dynamic monitoring of objects [19], [20]. Typical Internet

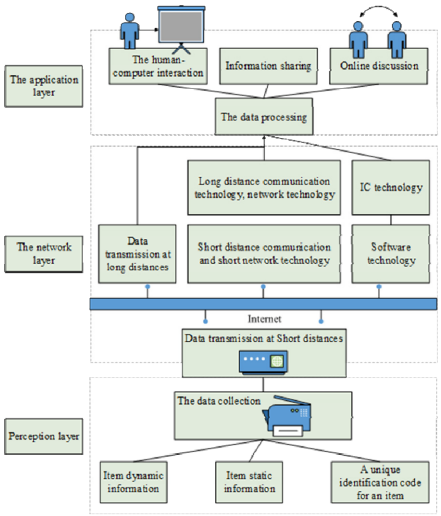

FIGURE 1. System architecture of internet of things.

of Things architecture has three layers: perception layer, network layer and application layer. The architecture diagram is shown in Figure 1.

In the three-layer architecture the perception layer has two main functions: data collection and data short-distance transmission. Data acquisition mainly depends on sensors and other instruments, digital cameras, cameras, etc. Data short-distance transmission mainly depends on RFID, barcode, Bluetooth, infrared, WI-FI and so on [21], [22]. After that, the information is transmitted to the network layer, and the data is transmitted over long distances through mobile communication, Internet, intranet and private network. In practical application, data processing is applied to safety protection, traffic management, environmental protection, production process control, site dynamic monitoring and so on. Finally, human-computer interaction is realized on mobile phones, computers and traffic lights.

B. INTERACTIVE DISPLAY COMMUNICATION

Exhibition activities have existed since ancient times. Traditionally, exhibition is organized being guided by units and organizations. Other units and organizations undertake the operation of the whole exhibition period. They provide a visit, appreciation and communication opportunity for specific groups or people through propaganda or advertising. On the one hand, it is to show the research results of their own enterprises during this period and share them with the public. On the other hand, it is to publicize their own enterprises and related products, and to actively share the information that is not easy to access in peacetime [23], [24]. The development of information technology not only promotes the research and development of new products and technologies of enterprises, but also adds scientific and technological elements to the exhibition, enabling people to appreciate products through their own actual feelings and experiences. In the product experience, some also add interactive elements, so that enterprises and product information in the process of dissemination have feedback and further optimize the product; so that the public also have certain feedback in the experience and they can understand the basic information of the product [25].

Interactive exhibition communication is a kind of ideological communication. They think that people, machines and art forms are active and can interact with each other. In fact, it is a dynamic and two-way information flow. With the continuous innovation of computers, Internet, Internet of Things and intelligent devices, the traditional one-way communication such as books and TV has gradually become interactive, which can sense the user's action trend and predict the user's needs. The collaboration of new technologies has rapidly increased the opportunities for cross-field, cross-disciplinary and interactive exchanges of various matters. Nowadays, interactive communication has become a fashion, a black technology, with different forms of communication, such as social media and interactive marketing with verbal communication, and non-verbal communication video games, interactive television and so on. It enhances the relationship between users and virtual things, and improves users' experience of virtual products.

With the continuous updating of interactive communication, there are also many communication modes. The specific mode, ''5W'' mode, is shown in Figure 2.

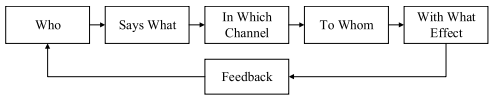

FIGURE 2. "5W" communication mode.

''5W'' communication mode is relatively old, ignoring the ''feedback'' communication factors, which has certain limitations, but this mode has a strong generalization ability, which plays a great role in promoting the research of mass communication.

Schramm then proposed a more popular mode of interpersonal communication. The communication chart is shown in Figure 3.

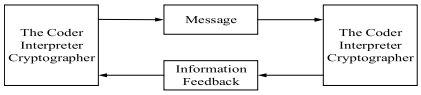

FIGURE 3. Schramm's communication model.

Schramm's communication mode emphasizes the identity of the transmitter and the receiver and the process of information processing, which is a two-way communication process.

With the continuous advancement of two-way circular transmission mode, De Fleur proposed closed-circuit circulation, and pointed out that in this closed-circuit transmission system, the receiver is not only the information receiver but also the information transmitter, and noise can appear in any link. This model is also considered to be a more

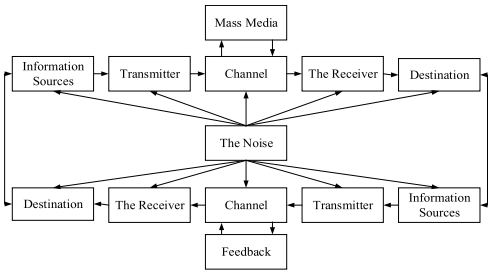

FIGURE 4. De Fleur's communication model.

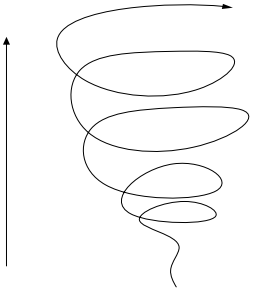

FIGURE 5. Dance's spiral propagation model.

complete model for describing the mass communication process, as shown in Figure 4.

Then, Dance pointed out that the process of communication should be dynamic, so he proposed a spiral model, as shown in Figure 5.

Hilbert regards the communication system as ripple. Information is expanding and rebounding, which is influenced by many factors. It shows the complexity and dynamics of the communication process, as shown in Figure 6.

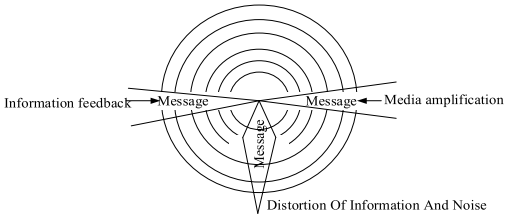

FIGURE 6. Corrugation center communication model.

Corrugation diagrams from inside to outside are respectively transmitters, codes, gatekeepers, media, regulators, filters, and audiences. Codes refer to the text symbol system, regulators mainly refer to the government, groups, and consumers, and filters mainly refer to the cultural and social system.

The ripple center propagation mode is used to analyze the communication problems in the interactive display, so that the identification and application technology in the Internet of Things technology can help the interactive display to better disseminate information to the public.

When interacting with other visitors, they need to share their own views, so they need handwritten content and have certain requirements for handwriting recognition on the screen. Then the visitor's handwriting is assigned X and scaled down.

$$sumi.scaleX = \left(\frac{1600}{a_1 - d_1}\right) \tag{1}$$

$$sumi.scaleY = \left(\frac{1600}{a_1 - d_1}\right) \tag{2}$$

In the above formulas, a_1 refers to the leftmost value, and d_1 indicates the rightmost value.

IV. DISCUSSION

A. INTERACTIVE DISPLAY

Usually, there are many exhibitions every year, up to 80,000 international exhibitions, accounting for 50% of the world's major exhibitions, and the direct economic benefits of these exhibitions are as high as 300 billion US dollars. International exhibitions contribute to economic growth. In international exhibitions, European exhibition technology is the most developed, the concept is also the latest, and it can be said to be the leader of the exhibition industry. Their exhibitions are highly branded, and because of their novelty, they constantly promote the rapid development of science, technology and economy in Europe. The United States is the main representative of the Americas, whose science, technology and culture are far ahead, which provides a good platform for the development of the exhibition industry. But it is also found that the American exhibition is more a side event than a product promotion and sales part of the exhibition work. Even so, the American exhibition will bring hundreds of billions of dollars to the U.S. economy every year.

With the rapid development of exhibition industry in Europe and the United States, its capacity has become saturated. At this time, the rise of Asian countries enables the exhibition industry have a new space for development, and Asia has become the core area of exhibition and development of the industry. For China, the rapid development of economy and technology provides a good basis for the development of exhibition industry. Especially in Beijing, Shanghai, Guangzhou, Tianjin and other cities with rapid development, it has become a hot platform for exhibiting enterprises and corresponding products in various industries. Communication and automotive industries have more exhibitions and wider audiences.

In the traditional exhibition industry, there may be some booths only in the prescribed venues to lay out their products, waiting for people to appreciate, relying solely on the mood and purpose of customers to visit the exhibition hall to determine the publicity effect of enterprises. Some booths are crowded, but this does not necessarily mean that the less crowded booth products are not good, or the more crowded booth products are better. Therefore, with the development of various technologies and the continuous innovation of enterprise strategy, interactive display has emerged.

In order to achieve good publicity effect through interactive display, on the one hand, enterprises should transmit product information to more people as far as possible in order to obtain more effective groups; on the other hand, they should provide a low-cost, all-weather, and interactive way for individuals, media and potential customers who come to visit and appreciate new products in the field, to get more feedback and help enterprises to optimize the design of the products.

Interactive presentation is not only to show potential users their new technology and new products, but also to show other companies in their own field their research results during this period, and products with interactive nature can attract more people's attention. When a visitor experiences the product, the amount of information he receives far exceeds the amount of information explained by the interpreter. In the process of experiencing, more visitors will be attracted to watch. When the information they get is beneficial to themselves, they will quickly pass it on to the people around them or their family and friends. This kind of exhibition communication is undoubtedly the most effective and fastest. Enterprises can effectively transmit product information and corporate brand without spending huge funds, which also saves a considerable amount of advertising costs for enterprises.

Not only communication technology, but also exhibition activities involve many fields, such as architecture, popular science, astronomy and geography. The strong sense of experience makes people have a strong sense of identity for the product, and also makes visitors interested in the product, as shown in Figure 7.

FIGURE 7. Household design exhibition.

B. INTERNET OF THINGS

The promulgation of national policies has given the Internet of Things industry a reassuring pill, provided an inexhaustible impetus for the continuous promotion of the development of the Internet of Things industry, and also made the Internet of Things industry achieve remarkable results, thus driving the rapid development of both upstream and downstream industries. The scale data of the Internet of Things market in China from 2012 to 2017 are collected, as shown in Figure 8 and its growth data are shown in Figure 9.

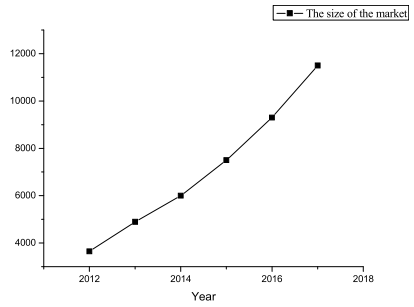

FIGURE 8. The scale of the internet of things market in china from 2012 to 2017 (unit: 100 million yuan).

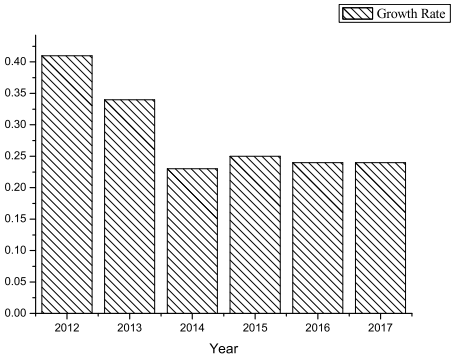

FIGURE 9. Growth rate of internet of things market in china from 2012 to 2017 (unit: %).

In the Internet of Things technology, RFID is a set of tags, readers, and antennas. Each thing has its corresponding unique identification, which distinguishes the objects and corresponding information of different objects, and this technology has low cost and good water resistance, and can maintain a long-term corresponding relationship with objects.

Sensors can sense the information of the measured object, and convert the information into signal available to the equipment according to certain rules, to facilitate the transmission, processing and storage of follow-up information. Temperature sensors, light sensors, displacement sensors, gravity sensors, digital signal output sensors and analog signal output sensors are commonly used in sensors. The handwriting test shows that the screen can recognize these strokes, thus presenting the commentary content of the sharer and realizing interaction with other participants, as shown in Figure 10:

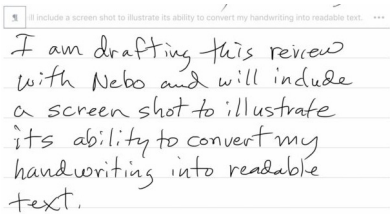

FIGURE 10. Screen handwriting test.

These sensors will show different states when they are applied in practice, as shown in Figure 11 (a), (b):

(a)

(b)

FIGURE 11. Application of sensors in different states.

Recognition technology plays a key role in exhibition activities. Whether fingerprint recognition or gravity recognition, it increases visitors' experience. At the same time, many innovative products in exhibition activities can also increase brand consumption, brand exposure, mention rate and topic. For example, some luxury exhibitions not only display watches on the counter, or try-on by customers, but also have a product exhibition area to display all the latest products in digital form, so that customers have more choices. At the same time, enterprises can also use the Internet of Things technology to collect customer selection information, and process the information, to predict customer preferences. Background system will also recommend products that customers have selected, or even have online virtual trial wear, enlarging the product and personal situation of the times, so that customers can choose more accurately. Figure 12 shows a watch manufacturer's watch:

C. INTEGRATION OF INTERNET OF THINGS AND INTERACTIVE DISPLAY COMMUNICATION

The integration of Internet of Things and interactive exhibition communication focuses on three layers: perception layer, network layer, processing and application layer. The following applications are conducted to guide visitors, monitor exhibits and the interaction between visitors and exhibits.

FIGURE 12. Watch display interactive screen.

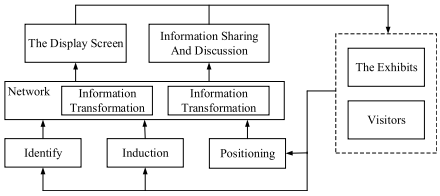

FIGURE 13. Integration system of internet of things and interactive display communication.

In the interactive exhibition, the identification chip is used to place equipment in the exhibition hall, which covers a wide range of areas, and then a comprehensive and full coverage information recognition and sensing system is established in the venue, to realize the dynamic monitoring of visitors and exhibits.

For the construction of the network layer, the Internet of Things technology is applied to analyze and process the information obtained from the perception layer, and ultimately realizes the interactive exchange of visitors, exhibits and related intelligent devices.

In the process of perceiving and identifying information, and establishing the relationship between visitors and exhibits, between visitors, and between exhibits, it is necessary to ensure the normal operation of the intelligent system during the actual system operation and provide visitors with a high-quality visiting environment. Moreover, it is urgent to set up inductive push devices in the space of the exhibition hall to get the prediction of time for visitors standing near or in front of exhibits, to push exhibition information and visit paths. In each pavilion, there are interactive screens. On the one hand, visitors can share the exhibits they visited and their feelings, and discuss and exchange further. On the other hand, they can get information about the exhibits.

The results show that the use of identification and sensing technology in the Internet of Things technology can enable visitors to have a clearer understanding and experience of the exhibits, and to share their experience and discussion with

other visitors. According to the feedback from the visitors, this display model increases the interactivity of the exhibits and wins the visitors' satisfaction and gains their trust.

In summary, in the process of interactive display and dissemination, the application of Internet of Things technology realizes the interaction between exhibition information and visitors and between visitors, which enables the whole exhibition to disseminate faster and more effectively. It enables more visitors to publicize enterprises and products while obtaining information, and indirectly improves the brand degree of enterprises.

V. CONCLUSION

The development of science and technology has promoted the rapid growth of the economy and brought new directions for the development of industries and fields. Intelligent products closely related to science and technology have gradually integrated into people's lives. Internet of Things technology is regarded as the driving force for the continuous development of all walks of life, which has a tremendous impact on many fields. The exhibition industry has also made great innovations with the help of the power of the Internet of Things. Various forms of exhibition are presented in front of people. While people visit and appreciate the exhibitions, they also have a stronger and deeper experience of products. This invisibly deepens the image of corporate brand in the hearts of visitors, and also develops visitors into effective potential users of enterprises. Therefore, in the course of participating in the exhibition, enterprises can not only show visitors and peers the latest research results in a certain period, but also invisibly expand the influence of enterprises, improve the brand awareness of enterprises, and obtain more loyal customers. It is conducive for enterprises to carry out updated scientific and technological research and to expand market share. The results show that the application of the Internet of Things identification and sensing technology in the interactive display can effectively interact with the visitors, not only let them have a better experience, but also achieve efficient marketing in the exhibition. However, this research only discusses the application of Internet of Things from the perspective of interactive exhibition industry, and does not analyze the user information collected on site. Therefore, in the later research, big data analysis can be used to study the influence of user behavior on exhibition communication, to optimize the exhibition process and make users' exhibition more authentic. It has certain reference significance for the information dissemination of the exhibition industry, thus achieving the purpose of exhibition enterprises.

REFERENCES

[1] B. L. R. Stojkoska and K. V. Trivodaliev, "A review of Internet of Things for smart home: Challenges and solutions," *J. Cleaner Prod.*, vol. 140, pp. 1454–1464, Jan. 2017.
[2] E. Bertino and N. Islam, "Botnets and Internet of Things security," *Computer*, vol. 2, pp. 76–79, Feb. 2017.
[3] J. Lin, W. Yu, N. Zhang, X. Yang, H. Zhang, and W. Zhao, "A survey on Internet of Things: Architecture, enabling technologies, security and privacy, and applications," *IEEE Internet Things J.*, vol. 4, no. 5, pp. 1125–1142, Oct. 2017.
[4] F. Al-Turjman, "Cognitive routing protocol for disaster-inspired Internet of Things," *Future Gener. Comput. Syst.*, vol. 92, pp. 1103–1115, Mar. 2019.
[5] I. Yaqoob, E. Ahmed, I. A. T. Hashem, A. I. A. Ahmed, A. Gani, M. Imran, and M. Guizani, "Internet of Things architecture: Recent advances, taxonomy, requirements, and open challenges," *IEEE Wireless Commun.*, vol. 24, no. 3, pp. 10–16, Jun. 2017.
[6] F. K. Shaikh, S. Zeadally, and E. Exposito, "Enabling technologies for green Internet of Things," *IEEE Syst. J.*, vol. 11, no. 2, pp. 983–994, Jun. 2017.
[7] S. Sarkar, S. Chatterjee, and S. Misra, "Assessment of the suitability of fog computing in the context of Internet of Things," *IEEE Trans. Cloud Comput.*, vol. 6, no. 1, pp. 46–59, Jan./Mar. 2018.
[8] I. Yaqoob, I. A. T. Hashem, A. Ahmed, S. M. A. Kazmi, and C. S. Hong, "Internet of things forensics: Recent advances, taxonomy, requirements, and open challenges," *Future Gener. Comput. Syst.*, vol. 92, pp. 265–275, Mar. 2019.
[9] J. Ni, K. Zhang, X. Lin, and X. S. Shen, "Securing fog computing for Internet of Things applications: Challenges and solutions," *IEEE Commun. Surveys Tuts.*, vol. 20, no. 1, pp. 601–628, 1st Quart., 2018.
[10] M. Braverman, K. Efremenko, and R. Gelles, "Constant-rate coding for multiparty interactive communication is impossible," *J. ACM*, vol. 65, no. 1, 2018, Art. no. 4.
[11] A. Stålberg, A. Sandberg, T. Larsson, I. Coyne, and M. Söderbäck, "Curious, thoughtful and affirmative—Young children's meanings of participation in healthcare situations when using an interactive communication tool," *J. Clin. Nursing*, vol. 27, nos. 1–2, pp. 235–246, 2018.
[12] R. Gelles, B. Haeupler, G. Kol, N. Ron-Zewi, and A. Wigderson, "Explicit capacity approaching coding for interactive communication," *IEEE Trans. Inf. Theory*, vol. 64, no. 10, pp. 6546–6560, Oct. 2018.
[13] P. Nuño, J. C. Granda, and F. J. Suárez, "Assessment of heuristics for self-stabilisation in real-time interactive communication overlays," *Int. J. Ad Hoc Ubiquitous Comput.*, vol. 28, no. 2, pp. 69–76, 2018.
[14] H. A. Te, "On the history of the exhibition," *Representations*, vol. 141, no. 1, pp. 59–66, 2018.
[15] C. P'ng, J. Green, L. C. Chong, D. Waggott, S. D. Prokopec, M. Shamsi, F. Nguyen, D. Y. Mak, F. Lam, M. A. Albuquerque, and Y. Wu, "BPG: Seamless, automated and interactive visualization of scientific data," *BMC Bioinform.*, vol. 20, no. 1, p. 42, 2019.
[16] H. Lee and J.-S. Lee, "An exploratory study of factors that exhibition organizers look for when selecting convention and exhibition centers," *J. Travel Tourism Marketing*, vol. 34, no. 8, pp. 1001–1017, 2017.
[17] M. A. Abou-Shouk, N. I. Zoair, and M. M. Farrag, "The role of international exhibition venues in marketing exhibitors' destinations," *J. Vacation Marketing*, vol. 24, no. 2, pp. 136–147, 2018.
[18] S. Riches, R. Maskey, P. Dishman, J. Benjamin, R. Waddingham, C. Tebrook, E. Mundy, P. Roberts, and H. L. Fisher, "Development, implementation and evaluation of *Altered States of Consciousness*: An immersive art exhibition designed to increase public awareness of psychotic experiences," *Arts Health*, vol. 11, no. 2, pp. 104–122, 2018.
[19] L. M. Q. Abualigah, *Feature Selection and Enhanced Krill Herd Algorithm for Text Document Clustering* (Studies in Computational Intelligence), vol. 816. Cham, Switzerland: Springer, 2019.
[20] L. M. Q. Abualigah and E. S. Hanandeh, "Applying genetic algorithms to information retrieval using vector space model," *Int. J. Comput. Sci., Eng. Appl.*, vol. 5, no. 1, p. 19. 2015.
[21] L. M. Abualigah and A. T. Khader, "Unsupervised text feature selection technique based on hybrid particle swarm optimization algorithm with genetic operators for the text clustering," *J. Supercomputing*, vol. 73, no. 11, pp. 4773–4795, 2017.
[22] G. Ke and Q. Jiang, "Application of Internet of Things technology in the construction of wisdom museum," *Concurrency Comput., Pract. Exper.*, vol. 31, no. 10, p. e4680, 2019.
[23] H. Li, J. K. Ng, V. C. W. Cheng, and W. K. Cheung, "Fast indoor localization for exhibition venues with calibrating heterogeneous mobile devices," *Internet Things*, vols. 3–4, pp. 175–186, Oct. 2018.
[24] G. Santoro, D. Vrontis, A. Thrassou, and L. Dezi, "The Internet of Things: Building a knowledge management system for open innovation and knowledge management capacity," *Technol. Forecasting Social Change*, vol. 136, pp. 347–354, Nov. 2018.
[25] K. Michalakis, J. Aliprantis, and G. Caridakis, "Visualizing the Internet of Things: Naturalizing human-computer interaction by incorporating ar features," *IEEE Consum. Electron. Mag.*, vol. 7, no. 3, pp. 64–72, May 2018.