

## Research Article

# Traditional Paper-Cut Art and Cosmetic Packaging Design Research Based on Wireless Communication and Artificial Intelligence Technology

Shilin Wu 

School of Fine Arts & Design, Guangzhou University, Guangzhou 510006, China

Correspondence should be addressed to Shilin Wu; wushilin\_vip@outlook.com

Received 20 January 2022; Revised 11 February 2022; Accepted 19 February 2022; Published 22 June 2022

Academic Editor: Kalidoss Rajakani

Copyright © 2022 Shilin Wu. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

After hundreds of years of changes, due to the development of chemistry, the development of human life has undergone tremendous changes. People have used chemical science to manufacture many supplies, such as various medicines and various types of cosmetics. In recent decades, electronic components and computer software technology have developed rapidly, and the fourth round of technological revolution is underway, which has a favorable impact on the development of various industries. Traditional paper-cut and cosmetic bag design methods should also take into account the advantages of wireless communication and artificial intelligence technology and combine other types of traditional industries to carry out technological reforms to help traditional craftsmanship pass down. In modern life, due to the vigorous promotion of cosmetics, there are more and more cosmetics on the market, and the traditional paper-cut art itself is an artistic design method similar to cosmetic design. Both industries will grow rapidly after the use of artificial intelligence and wireless communication technology for the update of both industries. Therefore, the purpose of this paper is to combine wireless communication technology with artificial intelligence technology to transform the traditional paper-cut art and cosmetic packaging design. After consulting the reasons for the decline of the traditional handicraft industry and the reasons for the turmoil caused by modern technology, this paper conducts a combined design of artificial intelligence technology, wireless communication technology, and cosmetic packaging and then performs wireless communication and artificial intelligence on the cutting of traditional paper design elements. The design of the technical matching system is also designed for traditional paper-cut art and cosmetic packaging. And find professional practitioners for research and discussion and multiple transformations and obtain experimental analysis results data. After many experiments, it can be seen that the combination of wireless communication and artificial intelligence technology can transform the traditional paper-cut art and cosmetic packaging design, improve their relevance, continue the inheritance of paper-cut art, and possibly improve the efficacy of cosmetics.

## 1. Introduction

Artificial intelligence is one of the technologies with the widest audience in recent years. It stands side by side with big data technology and cloud computing technology. It is one of the three most practical high-tech technologies [1]. Because artificial intelligence uses algorithms to cooperate with databases and computing resources to make general reasoning about things to know the possible operation and consequences [2], therefore, if artificial intelligence technology is combined with big data, cloud computing can call a large number of computing resources to process the things

to be processed at any time through the server group, and the best server group is the supercomputer, which can help the data to conduct careful analysis and then get the data and processing results we want [3–5]. Artificial intelligence is generally used in conjunction with algorithms. Using different algorithms for each thing to be processed can help complete artificial intelligence to the greatest extent and improve utilization and accuracy [6]. Artificial intelligence combined with algorithms are usually suitable for different directions, and various artificial intelligence algorithms also have different roles. Some algorithms are good at accurate analysis and are suitable for querying small items; some

algorithms are good at target retrieval and are suitable for querying all kinds of given target ranges [7, 8]. Therefore, before the experiment, we usually need to adapt the algorithm in a certain situation to get the algorithm that best meets our situation and the use system [9].

Modern cosmetics are defined as preparations (other than soaps) applied to the human body for the purpose of beautifying, preserving, or altering one's appearance (for example, for performance) or for the purpose of cleaning, dyeing, rubbing, correcting, or protecting the skin, hair, nails, eyes, or teeth condiments used [10, 11]. However, because the ingredients are not obvious, the development of the cosmetics before is slow, such as rouge and blush. In modern times, due to the development of chemistry, people began to study the composition of substances. After the experiments of chemists, generations of cosmetics have been produced and improved [12–14]. Therefore, the main development era of cosmetics is modern, that is, less than 300 years since the eighteenth century [15]. Moreover, due to the decline of modern China's national strength and the stagnation of science and technology, most of the cosmetics we use are imported materials, which is also a pain [16–18]. Moreover, due to the problem of development time, the current domestic cosmetics cannot be compared with the development of hundreds of years abroad. It can only be said that we are still trying to catch up and have the opportunity to return to the previous peak and even surpass them [19, 20].

The traditional paper-cut art, which has been circulating in China for thousands of years, contains the ancestors' yearning for a better life and their blessings to others and themselves [21]. Paper-cuts are generally carried out around the Spring Festival to celebrate New Year's Eve and the Spring Festival. Different paper-cuts represent different attitudes of people. Some hope that the whole family will be happy and prosperous in the coming year, some hope that there will be a good day and a good harvest in the coming year, and some hope that they will go to high school in the coming year. Therefore, each person's blessing is different, and the shape and meaning of paper-cuts are also different [22–24]. Then, a few days before New Year's Eve, paper-cuts are pasted on doors and windows to express people's best wishes and wishes for each other. Then, with the sound of firecrackers, we enter New Year's Eve and the New Year, reflecting the simplest wishes of people at that time [25]. Now, due to the development of various electronic products and new technologies, people experience various novel toys and gradually forget the traditional art [26]. In order to revitalize the traditional skills of our own country and nation, the state has begun to vigorously support and help, so we should redevelop the art of paper-cutting. Although the art of paper-cutting is going downhill now, due to the low cost, labor, and low price of paper-cutting art, it may still be brilliant in the future after combining with new technologies. Therefore, we decided to combine the art of kirigami with other current state-of-the-art technologies to achieve the purpose of supporting and revitalizing the traditional art industry [27–29]. In the end, we chose the packaging of cosmetics as the final consideration, using wireless communication and artificial intelligence technology to design the

TABLE 1: About the market specifications for the paper-cutting industry for 2015-2019 years.

	2015	2016	2017	2018	2019
Market specifications/billion yuan	24	26	29	32	43
Profit/billion yuan	3.6	4.2	7.3	14	17

TABLE 2: About the cosmetic packaging industry's market specifications for 2015-2019.

	2015	2016	2017	2018	2019
Market specifications/billion yuan	73	82	95	107	126
Profit/billion yuan	25	29	38	43	57

traditional paper-cut art and cosmetic packaging to produce the most favorable design effect [30–33].

## 2. A Nuclear Adaptive Algorithm Based on the Softplus Function for Paper-Cut and Cosmetic Packaging Design

*2.1. Paper-Cut.* The art of paper-cutting is an excellent cultural tradition of the Chinese people. Especially when the Spring Festival is approaching, paper-cutting activities based on window decorations are carried out all over the country, which not only makes the art of paper-cutting continue to be inherited, but also enriches the festive atmosphere. Paper-cutting is mainly to cut paper into various shapes and patterns through scissors, such as the shape of flowers or Chinese characters. As a cultural and artistic carrier, paper-cut expresses people's joys, sorrows, and joys with exaggerated and figurative techniques [34, 35].

*2.2. Cosmetic Packaging Design.* Packaging design is very important to the sales of products. Packaging design can leave a first impression on consumers. Some surveys have shown that the first impression has a significant impact on consumers' purchase intention. Cosmetic, as an important commodity that is popular all over the world, is an indispensable commodity for female consumers. Cosmetics have a large consumer group, and as consumables, they need to be purchased repeatedly, which can bring continuous profits to enterprises. As more and more companies join the cosmetic industry, the competition in cosmetics is also intensifying. In the case of similar effects, it is the packaging design of cosmetics that can make consumers willing to buy.

How to design cosmetic packaging with features and attract consumers' attention is an important task. How to allow consumers to experience the efficacy of cosmetics but also to have care on the packaging, to enjoy visual and spiritual pleasure, is also crucial and even has an important impact on the sales of cosmetics. The packaging design of cosmetics needs to reflect the characteristic concept of the product, show the brand effect, and make consumers feel humanized care.

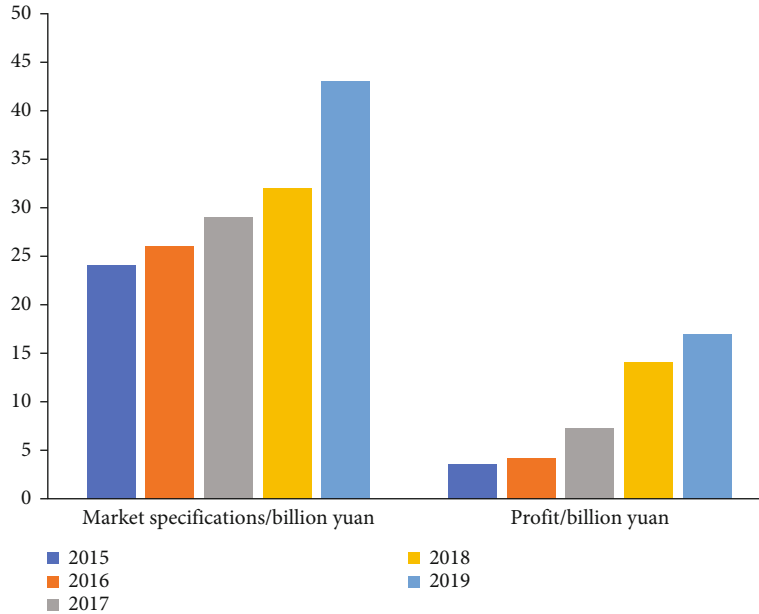


FIGURE 1: Market specifications for the paper-cutting industry 2015-2019.

**2.3. A Nuclear Adaptive Algorithm Based on the Softplus Function.** The characteristics of the softplus function ensure that the kernel adaptive algorithm has good anti-impulse interference performance and can also improve its convergence speed. These two performances can eliminate interference signals during traditional process design. Therefore, this paper chooses Softplus-based algorithm. The kernel adaptive algorithm is designed. The softplus function is combined with the cost function of the nuclear split low power algorithm to construct a new cost function with the expression:

$$K(\theta) = \frac{1}{\mu} \log \left( 1 + e^{-K_{\omega}(\theta)} \right). \quad (1)$$

Therefore, the weight update formula of the algorithm can be obtained by using the negative random gradient drop method:

$$\theta(\alpha) = \theta(\alpha - 1) + \mu \nabla_{\theta} k(\alpha). \quad (2)$$

The algorithm is similar to the general nuclear adaptive filtering algorithm, except that a softplus function is introduced to further enhance the convergence speed and anti-flush interference capability of the algorithm.

### 3. Experiment

**3.1. Experimental Purpose.** With the development of new technologies such as artificial intelligence and wireless communication, traditional Chinese art has also changed. Therefore, in order to support the development and revitalization of the traditional art of the country, we need to use new technology to carry out industry changes in traditional industries, to help traditional industries in the modern out of

their own way. After a long period of time on the various types of traditional art, we found that the traditional paper-cut art is more in line with the current environmental protection line, because the basic art of paper-cutting is paper, will not cause a lot of pollution, and can simply be linked with other modern popular items, such as cosmetics, beverages, and snacks. We chose cosmetic packaging as a joint project. Since the cosmetic packaging itself is not designed in combination with paper-cutting, wireless communication technology and artificial intelligence technology can realize the combination of two artistic designs, so we choose to use wireless communication and artificial intelligence technology to combine traditional paper-cutting technology. Art and cosmetic packaging design for joint design.

**3.2. Experimental Process.** We first use the softplus function-based nuclear adaptive algorithm to work with artificial intelligence to analyze and put the specifications, size, shape, and form of the cosmetic packaging for paper-cut art. The overall laboratory environment in which we work is adapted to the packaging of paper-cuts and cosmetics, and the function of the laboratory is changed according to the needs of paper-cut and cosmetic packaging; rearrange, divide the layout, and place the instruments in a safe and reasonable position. Then we need to make the package using CNC machine tool design, get the final finished product, and then the results of the finished product will be analyzed, to the professional observation and advice.

**3.3. Survey.** After conducting the experiment to obtain the packaging we need, in order to observe the success of the experimental product, we invited professionals related to paper-cutting, cosmetic packaging design, and marketing design to evaluate and analyze the experimental product and then collect their suggestions for follow-up

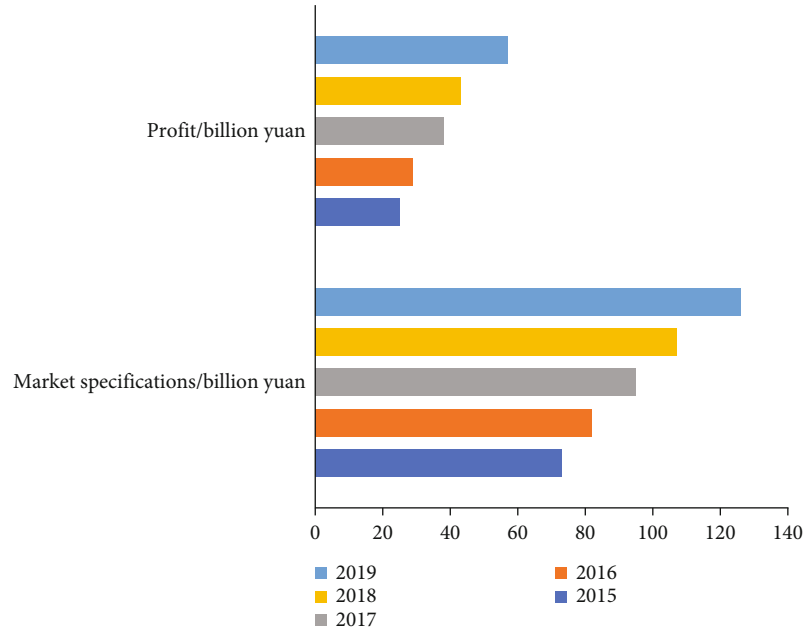


FIGURE 2: About market specifications for the cosmetic packaging industry 2015-2019.

TABLE 3: About the proportion of drawing design for paper-cut art.

Picture	Percentage/%
More than a year	14.21
Family reunion	18.13
Children play	17.26
Promotion to make a fortune	11.57
Everything went well	16.46
Elegant scenery	11.77
Famous people	13.26

improvement, replan a new design plan, and design a new protocol, and then repeat this questionnaire step according to the experimental situation, in order to obtain the optimal design plan. This paper mainly conducts a questionnaire survey on 180 paper-cutting workers in 32 different paper-cutting factories, also conducts a questionnaire survey on 120 designers from 25 cosmetic packaging design companies, and finally evaluates 25 marketing designers from related companies. Questionnaire survey, through the investigation of a large number of relevant personnel, ensures the number of samples analyzed in this questionnaire survey and the credibility of the questionnaire.

#### 4. Experimental Results

4.1. Comparison between the Paper-Cutting Industry and the Cosmetics Packaging Industry. Before we do the experiments in this article, we will do what we need to do by comparing the market specifications of the cosmetic packaging and paper-cut we need to make in recent years. The results of the data collection are shown in Tables 1 and 2.

In order to express the obvious, the data of Tables 1 and 2 are compared with Figures 1 and 2, and it is found that the market specification for cosmetic packaging in the same year is paper-cut 3 more than double, and at first cosmetic packaging, profits are much higher than paper-cut, close to 7 times, until recent years of vigorous development to catch up with nearly 3.5 times. Explain that we can use cosmetic packaging to support the revitalization of the paper-cutting industry.

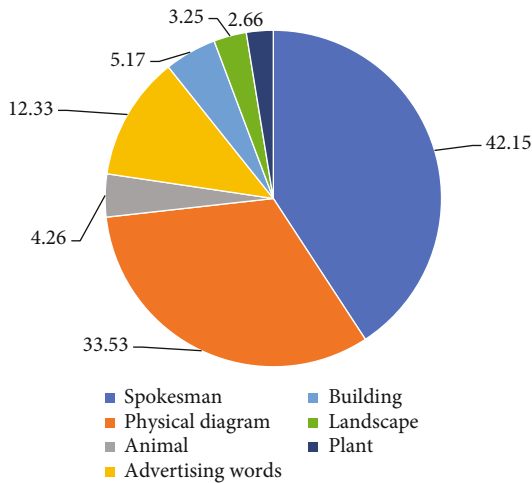


FIGURE 3: About the proportion of picture design for cosmetic packaging.

4.2. Comparison of Drawings of Cosmetic Packaging and Paper-Cut Art. After the analysis of the first round of experiments, it was learned that artificial intelligence systems could be calculated using larger computing resources, so

we conducted a second experiment, which was to compare the drawings of cosmetic packaging and paper-cutting art for packaging design.

After a survey of the data, we published the data in Tables 3 and Figure 3. According to the data collected, cosmetic advertising is dominated by spokespersons and physical drawings and paper-cut in all kinds of situations, and the proportion is close, so we carry out design experiments.

*4.3. Design Experiment Results.* After the above data collection and comparison, we carried out our experiment and then found that the design graphics favor paper-cut and endorse physical map to cooperate; we will give the results to the professional designers to observe, after evaluation, and pay more attention to the paper edge elements of the design and integration; and finally we designed it into a close to the paper-cut spokesperson holding the physical drawings of the packaging, who got a positive response results; the experiment was basically successful.

## 5. Conclusion

After collecting the data of paper-cut art and cosmetic packaging, we found that the times have changed faster and faster in recent years, emerging industries are developing rapidly, while traditional industries are rapidly declining. This paper mainly uses artificial intelligence technology and wireless communication to make paper-cut art and cosmetic packaging design, in order to increase the attention of all sectors of society to traditional industries and regain the glory of traditional industries. This paper mainly collects the marketing and profit data of traditional industries in recent years, then conducts data analysis, and explores modern people's marketing views and classic cases of marketing based on big data. Later, use wireless communication and artificial intelligence technology combined with paper-cut art and the needs of cosmetic packaging to design images and to design a packaging map that is more in line with the public's taste and is also full of traditional and innovative cosmetic images. After the redesign is completed, we use the CNC machine to print the completed diagram, then further modify it by cutting or other methods as needed, and then give a professional comment, so that the entire experimental process is completed. In fact, the manual design is still relatively complicated, and the desired image can only be automatically generated by the computer, and then a corner is cut and modified, and finally the template graphic is obtained. After reviewing and modifying a little bit of refinement, we finally got the finished product. We believe that in the future, with the further development and upgrading of wireless communication and artificial intelligence technology, the application of the two new technologies to the paper-cutting and cosmetics industries will provide strong vitality for the development of traditional industries. When the reform of traditional art is completed in the future, the paper-cutting industry and other traditional arts will also be endowed with different colors.

## Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Conflicts of Interest

It is declared by the author that this article is free of conflict of interest.

## Acknowledgments

This study was funded by the Ministry of Education of Humanities and Social Science project 2021 (21YJA760091 and 21YJC760042) and Guangzhou Social Sciences Planning Project 2019 (2019GZGJ244).

## References

- [1] P. Havinga, N. Meratnia, and M. Bahrepor, "Artificial intelligence based event detection in wireless sensor networks," *University of Twente*, vol. 85, no. 6, pp. 1553–1562, 2017.
- [2] M. Seyedmahmoudian, B. Horan, T. K. Soon et al., "State of the art artificial intelligence-based MPPT techniques for mitigating partial shading effects on PV systems - a review," *Renewable & Sustainable Energy Reviews*, vol. 64, pp. 435–455, 2016.
- [3] R. Barzegar, J. Adamowski, and A. Moghaddam, "Application of wavelet-artificial intelligence hybrid models for water quality prediction: a case study in Aji-Chay River, Iran," *Stochastic Environmental Research and Risk Assessment*, vol. 30, no. 7, pp. 1797–1819, 2016.
- [4] L. Caviglione, M. Gaggero, J. F. Lalande, W. Mazurczyk, and M. Urbański, "Seeing the unseen: revealing mobile malware hidden communications via energy consumption and artificial intelligence," *IEEE Transactions on Information Forensics & Security*, vol. 11, no. 4, pp. 799–810, 2016.
- [5] Z. Wang and R. S. Srinivasan, "A review of artificial intelligence based building energy use prediction: contrasting the capabilities of single and ensemble prediction models," *Renewable and Sustainable Energy Reviews*, vol. 75, pp. 796–808, 2017.
- [6] C. Ma, Y. Yang, and C. Ma, "Mobility-based sinknode-aided routing in disaster network under the background of big data," *Cluster Computing*, vol. 22, no. S5, pp. 11583–11590, 2019.
- [7] A. F. Chen, A. C. Zoga, and A. R. Vaccaro, "Point/counterpoint: artificial intelligence in healthcare," *Healthcare Transformation*, vol. 2, no. 2, pp. 84–92, 2017.
- [8] C. Cath, S. Wachter, B. Mittelstadt, M. Taddeo, and L. Floridi, "Artificial intelligence and the 'good society': the US, EU, and UK approach," *Science and Engineering Ethics*, vol. 24, no. 7625, pp. 1–24, 2017.
- [9] M. Sayan, E. Bahsi, and S. Sayan, "The evaluation of the colour changes of traditional composites, ceramic blocks and cad/cam composites in different solutions," *Nigerian Journal of Clinical Practice*, vol. 23, no. 5, pp. 660–667, 2020.
- [10] L. I. Jiafang, "Nano-Kirigami: a nanoscale "paper-cut" developed for 3D intelligent nanofabrication," *Bulletin of the Chinese Academy of Sciences*, vol. 32, no. 2, pp. 43–44, 2018.
- [11] L. Sang-hyun, Y. Seung-il, and C. Tae-ho, "Development of natural dyed Korean traditional paper for cultural properties

- conservation and storage (part 2) - antifungal, insect repellent activities and stability on metals," *Journal of Korea Technical Association of the Pulp and Paper Industry*, vol. 48, no. 3, pp. 80–90, 2016.
- [12] M. Borcoman, "Traditional paper books vs. electronic books-a present day challenge," *Bulletin of the Transilvania University of Braşov, Series VII: Social Sciences and Law*, vol. 12, no. 1, pp. 51–58, 2019.
- [13] D. A. Purwaningsih, "Puppet movements in structure-specific traditional paper cut out animation production," *ULTIMART Jurnal Komunikasi Visual*, vol. 13, no. 2, pp. 61–68, 2020.
- [14] S.-y. Kim, "A study on civilization for the development and preservation of traditional Korean paper painting: focusing on the Kim Hee-Young family," *Journal of the Korean Society for Design Culture*, vol. 23, no. 1, pp. 63–73, 2017.
- [15] R. Lotriet, "Death of the traditional newspaper: a strategic assessment," *Tydskrift vir Geesteswetenskappe*, vol. 58, no. 4-1, pp. 716–735, 2018.
- [16] N. S. Lee, J. Y. Lee, E. H. Jo, and D. H. Lee, "A study on the improvement case of cosmetic packaging process using ARENA simulation," *Journal of Society of Korea Industrial and Systems Engineering*, vol. 43, no. 2, pp. 72–78, 2020.
- [17] Soap, Perfumery, Cosmetics et al., "Cosmopak," *Soap, Perfumery and Cosmetics*, vol. 91, no. 1, pp. 70–71, 2018.
- [18] J. B. Enteen, "Transitioning online: cosmetic surgery tourism in Thailand," *Television & New Media*, vol. 15, no. 3, pp. 238–249, 2014.
- [19] G. Klein, "Cosmetic packaging: you buy with your eyes," *Kunststoffe International*, vol. 108, no. 8, pp. 19–21, 2018.
- [20] P. Muralidhar, E. Bhargav, and C. Sowmya, "Trends in cosmetic packaging: a review," *International Research Journal of Pharmacy*, vol. 7, no. 12, pp. 1–4, 2017.
- [21] None, "Holland Colours launches bio-derived colorants for personal care packaging & biopolymers; invests in further upgrades," *Additives for Polymers*, vol. 2017, no. 3, pp. 1-2, 2017.
- [22] A. D. Permana-Citra and P. Purwanto, "Strategies for paint waste minimization in the packaging industry," *Waste Technology*, vol. 8, no. 1, pp. 18–21, 2020.
- [23] M. R. Borman, D. S. Gabriel, and R. Nurcahyo, "Impact of plastic packaging design on the sustainability of plastic recyclers," *International Journal of Applied Science and Engineering*, vol. 16, no. 1, pp. 25–33, 2019.
- [24] Q. Yun and C. L. Leng, "Using VR technology combined with CAD software development to optimize packaging design," *Computer-Aided Design and Applications*, vol. 18, no. S1, pp. 97–108, 2020.
- [25] W. Yu and P. Sinigh, "Application of CAD in product packaging design based on green concept," *Computer-Aided Design and Applications*, vol. 19, no. S2, pp. 124–133, 2021.
- [26] R. Johari, A. Rahman, and R. Harun, "The effect of packaging design elements on youth purchase intention of junk Food," *Jurnal Bisnis Manajemen dan Perbankan*, vol. 6, no. 1, pp. 25–38, 2020.
- [27] I. Ratnasari, A. Juraida, and A. M. Suyono, "Packaging design analysis of food packaging home industry dumpling ngenes," *International Journal of Psychosocial Rehabilitation*, vol. 24, no. 2, pp. 3839–3842, 2020.
- [28] M. Faishal, E. Mohamad, A. Rahman et al., "Safety and quality improvement of street food packaging design using quality function deployment," *International Journal of Integrated Engineering*, vol. 13, no. 1, pp. 19–28, 2021.
- [29] A. Dziadkiewicz, "Relevance of packaging design for customers' decision-making process," *Entrepreneurship - Education*, vol. 15, no. 2, pp. 125–138, 2019.
- [30] T. Vasileiadis, A. Tzotzis, D. Tzetzis, and P. Kyratsis, "Combining product and packaging design for increased added value and customer satisfaction," *Journal of Graphic Engineering and Design*, vol. 10, no. 2, pp. 5–15, 2019.
- [31] T. Wang, W. Liu, J. Zhao, X. Guo, and V. Terzija, "A rough set-based bio-inspired fault diagnosis method for electrical substations," *International Journal of Electrical Power & Energy Systems*, vol. 119, article 105961, 2020.
- [32] T. Wang, X. Wei, J. Wang et al., "A weighted corrective fuzzy reasoning spiking neural P system for fault diagnosis in power systems with variable topologies," *Engineering Applications of Artificial Intelligence*, vol. 92, article 103680, 2020.
- [33] J. Hu, H. Zhang, Z. Li, C. Zhao, Z. Xu, and Q. Pan, "Object traversing by monocular UAV in outdoor environment," *Asian Journal of Control*, vol. 23, no. 6, pp. 2766–2775, 2021.
- [34] B. Li, G. Xiao, R. Lu, R. Deng, and H. Bao, "On feasibility and limitations of detecting false data injection attacks on power grid state estimation using D-FACTS devices," *IEEE Transactions on Industrial Informatics*, vol. 16, no. 2, pp. 854–864, 2020.
- [35] C. Mi, J. Chen, Z. Zhang, S. Huang, and O. Postolache, "Visual sensor network task scheduling algorithm at automated container terminal," *IEEE Sensors Journal*, vol. 1, 2021.