



Research on Yixing Zisha teapot design innovation based on AIGC Technology

Pan Shimin^{1 2}, Rusmadiyah Bin Anwar¹, Nor Nazida Binti Awang^{3 4}, He Yinuo^{1 2}, ¹National Design Centre, College of Creative Arts, Universiti Teknologi Mara, 40450, Shah Alam, Selangor, Malaysia, ²Wuxi Vocational Institute of Arts & Technology, 214206, Yixing, Jiangsu, China, ³College of Creative Arts, Universiti Teknologi Mara Perak Branch, 32610, Seri Iskandar Campus Perak, Malaysia, ⁴GreenSafe(GreSAFE), Faculty of Architecture, Planning, & Surveying, Universiti Teknologi Mara Perak Branch, 32610, Seri Iskandar Campus Perak, Malaysia

Yixing Zisha teapot carries a significant value as a collection of traditional Chinese ceramic art. However, evolving social and aesthetic perceptions are challenging conventional design methods, necessitating inventive design solutions. The digital and intelligent age has created numerous advanced technologies, including artificial intelligence and computer graphics computing, which have unlocked fresh prospects in the design domain. AIGC (Artificial Intelligence and Graphics Computing) has emerged as a research area of interest in design, centred on the convergence of artificial intelligence and graphics computing. In this study, we utilise AIGC technology along with design theory and modern technological tools to investigate the innovative potential of Yixing Zisha design. Our study incorporates artificial intelligence, graphics computing, and idea generation for achieving innovation and customisation in Zisha design. As a result, we evaluate the effectiveness and feasibility of this technique in the domain of Yixing Zisha teapot design. The objective of this research is to augment the design of Yixing Zisha teapots, introducing more imaginative options and propelling their development. The assessment of the AIGC technique's efficacy will steer subsequent research and practice, boosting innovation and progress in Yixing Zisha teapot design.



Keywords: *Yixing Zisha teapot design, AIGC, process innovation, industrial technology innovation*

1. Introduction

Design faces both challenges and opportunities as technology advances and society progresses. Yixing Zisha, a traditional Chinese ceramic art, enjoys high esteem for its exceptional artistry and unique cultural significance. Nevertheless, the conventional Yixing Zisha teapot design methodology encounters technical and innovative obstacles. The conventional approach to handcrafting, despite its focus on individual creativity and artistry, is unfit for contemporary design trends which prioritize mass production and individual preferences. *The Revitalisation Plan for Chinese Traditional Crafts*(2017)emphasises the necessity of reinforcing the establishment of disciplines and theoretical and technical research related to traditional crafts, enhancing the design, production standard, and overall quality of traditional craft products. Therefore, designers must conserve the customary skills and styles whilst also integrating novel design concepts and utilising emergent technological techniques to elevate the level of Yixing Zisha teapot design.

In just these months, the AIGC software has impacted people's lives in countless ways under the guidance of ChatGPT and Midjourney. AIGC technology combines the astute decision-making prowess of artificial intelligence with real-time graphic computing capabilities, providing designers with a broad creative platform and inventive tools for improving design quality, efficiency and promoting innovation. The potential of technology to promote the merger of traditional crafts with modern technology and innovation in education and heritage is enormous. As a result, in line with *The Revitalisation Plan for Chinese Traditional Crafts*, we recommend utilising AIGC technology in Yixing Zisha teapot design in order to better meet the demands of the market, elevate design standards and introduce novel and contemporary elements, all while safeguarding traditional culture.

The abbreviation AIGC pertains to Artificial Intelligence Generated Content. *The AIGC White Paper*(2022)published by the China Academy of Information and Communications Technology reveals the current lack of a unified definition for the AIGC concept. However, it is commonly acknowledged in the domestic industry and academic community that AIGC is a novel production technique that employs artificial intelligence technology to generate content automatically in accordance with the established models of Professional Generated Content (PGC) and User Generated Content (UGC). According to Wikipedia(2023), AIGC refers to

"AI-generated Media" or "Synthetic Media[3]" and encompasses the use of artificial intelligence algorithms for creating, altering and manipulating data or media. The evolution of PGC, UGC, AI and AIGC is shown in Figure 1.

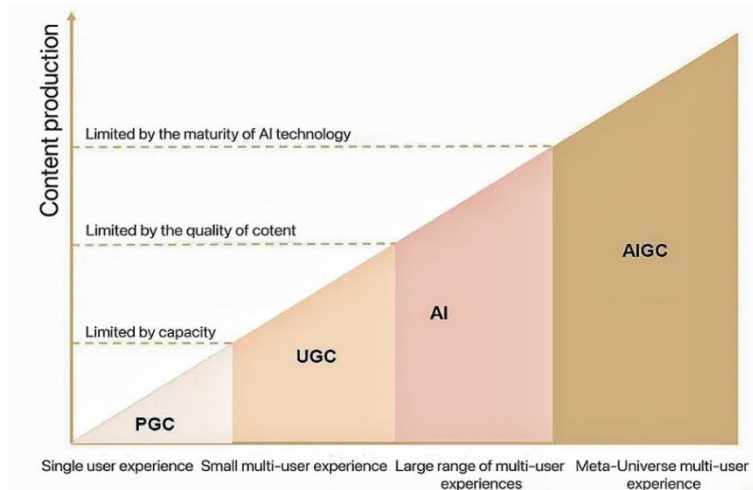


Fig. 1. The evolution of PGC, UGC, AI and AIGC

From a literal point of view, AIGC was proposed in comparison to the previous PGC and UGC. Consequently, the restrictive definition of AIGC is the production mode that utilises AI to create content. Nevertheless, AIGC has already indicated a new direction in the advancement of AI technology. In the past, conventional artificial intelligence has emphasised analytical capabilities, which entail the identification of rules and patterns in a dataset through analysis and their application to other objectives, notably the ubiquitous personalised recommendation algorithm. Nowadays, artificial intelligence is capable of generating new content, expanding beyond its original function of merely analysing existing data. This marks a significant leap from mere perception and understanding of the world to actively generating and creating new content (Gan et al, 2023). Therefore, the generalized AI generative capability (AIGC) can be considered as an AI technology that possesses the ability to create and generate content in a manner that is similar to how humans do - in other words, generative AI. The system has the capacity to independently generate fresh text, images, music, videos, 3D interactive content (including virtual avatars, virtual objects, virtual environments), and different kinds of data using training data and generative algorithmic models. Also, it has the capacity to trigger scientific breakthroughs, construct new values and significance, and more.

He Xiaoyou (2022), a professor at Nanjing Arts Institute, argues in his article "*Research on Design-Driven Creative Methods of Traditional Arts and Crafts - Yixing Zisha Pot as an Example*" that to revitalize the traditional arts and crafts industry and promote it



internationally, creative design of traditional Zisha pots should incorporate new concepts and methods from contemporary design. This will create a design that adapts to modern ways of life and exhibits present-day aesthetics while still retaining the unique characteristics of traditional arts and crafts. Design-driven innovation is a crucial means of developing traditional arts and crafts in an innovative way. Figure 2 shows the innovative works of Zisha pots by He Xiaoyou. The scholarship on Yixing Zisha teapot is extensive, covering research from various fields and themes. Most literature usually focuses on the techniques, production, and critical analysis of Yixing Zisha teapot, offering practical experience, innovative concepts, and expert viewpoints. It may also cover multiple aspects of Yixing Zisha teapot, such as its history, cultural background, artistic characteristics, and production processes, providing readers with comprehensive knowledge and understanding. However, the author has not found any literature on the combination of Yixing Zisha teapot design and AIGC technology. There is scarce literature on integrating Yixing Zisha teapot with emerging technologies since it's a novel research field. Nevertheless, a rising number of scholars are investigating ways to integrate these technologies in the production and design of Yixing Zisha. While there is a limited body of literature regarding the combination of Yixing Zisha teapot with emerging technologies, various investigations into this field exist through studies and case analyses. The application of digital design tools, computer-aided design, simulation, data analysis, and other technologies are commonly utilized in exploring the potential of Yixing Zisha teapot. Despite the limited literature available on the subject, this provides us with an opportunity to conduct further research and explore the potential of emerging technologies in Yixing Zisha design. Through a combination of design theory and modern technology, we aim to surpass the limitations of traditional design and unlock the innovative potential of Yixing Zisha teapot design. Our efforts include integrating artificial intelligence, graphic computing, and creative generation with the goal of achieving personalised and diverse Yixing Zisha teapot designs. The study's significance lies in exploring the innovative path of Yixing Zisha teapot design and integrating traditional culture with modern technology, promoting the inheritance and innovation of traditional ceramic art.



Fig. 2. He Xiaoyou's innovative design work "Pair Seal Pot" design and finished product

This study seeks to investigate the innovative design route for Yixing Zisha teapot utilising AIGC technology and to offer theoretical and practical foundations for the original progression of this product. Incorporating the potential application of AIGC technology in Yixing Zisha teapot design, our objective is to present inventive methods and tools for designers and artists, invigorating the inheritance and development of Yixing Zisha teapot. It aims to facilitate innovative breakthroughs in the decorative design of Yixing Zisha products, whilst providing new ideas and practical examples for the integration of traditional culture with technological advancements.

The remainder of this article is organized as follows: Section 2 reviews the traditional methods used in Yixing Zisha teapot design and the challenges faced, emphasizing the significance and urgency of this research. Section 3 presents the AIGC technology and its use in design, specifically exploring its potential in Yixing Zisha teapot design. Section 4 expands on the innovative approach of Yixing Zisha teapot design using AIGC technology to investigate its effectiveness and feasibility. Lastly, Section 5 provides the conclusion, discussing and outlining the research findings, as well as proposing recommendations for future research.

2. Traditional Approaches to Yixing Purple Sand Design and the Current Challenges

Yixing Zisha teapot is a valuable artifact of traditional Chinese pottery and is recognized as a significant element of China's intangible cultural legacy. The Yixing Purple Sand Pottery Making Technique was added to *The National Intangible Cultural Heritage List*, under the Traditional Techniques category, in May 2006 (NO.VIII-1). On 24 May 2018, the Yixing Purple Sand Pottery Making Technique was included in the first group of *The National Traditional Craft Revitalisation Catalogue*. As an Intangible Cultural Heritage item, Yixing



Zisha receives significant value and protection from the state and society to ensure the continuation of its valuable historical, cultural, and artistic traditions. The protection and preservation of Yixing Zisha encompasses more than preserving a craft skill; it also conveys the cultural connotations and aesthetic concepts embedded within the tradition. It is a significant aspect of conventional Chinese tea culture, embodying the comprehension and manifestation of people's perceptions regarding nature, life, and spiritual goals. The utilization of Yixing Zisha pottery enables individuals to experience the deep-rooted heritage and characteristic appeal of classic Chinese customs.

In order to facilitate the fusion of traditional craftsmanship and modern innovation in Yixing Zisha, numerous potters are exploring the amalgamation of fresh materials, methods and design ideas into the conventional Zisha pottery. The integration of varied elements has enhanced both the expressive forms of Zisha pottery and infused it with a modern touch, enabling it to harmonize with contemporary living. The traditional method of designing Yixing Zisha pottery has limitations due to its innovative and diverse nature. Although a potter's experience and imagination are crucial, they can only contribute to a certain point. Therefore, there is a need to investigate new approaches to enhance the originality and productivity of Yixing Zisha pottery design.

Purple sand tea sets belong to the category of unglazed pottery. They not only preserve the natural plain and simple texture of the clay, but also possess superior physical and chemical properties compared to the original unglazed pottery. Due to the high firing temperature of zisha pottery, the carcass is relatively well sintered, resulting in a very low water absorption rate that prevents tea from leaking. Moreover, its smooth surface makes it easy to clean and distinguishes it from other unglazed pottery due to its exceptional life-like features. In daily life, zisha pottery proves both practical and visually appealing with its elegant colours, gentle texture, and adaptation to people's aesthetic preferences. The inheritance and development of Yixing purple clay pottery depend significantly on innovative design and market demand. Although the traditional design and production techniques of Yixing purple clay pottery have a long history and unique craftsmanship, they must address the challenge of meeting diverse demands in the modern market. On the one hand, the constraints on traditional Yixing purple clay pottery design arise from its distinctive craftsmanship and aesthetic style. Traditional ceramics techniques rely heavily on the ceramic artist's experience, creativity, and artistic perception. These methods prioritize the transfer of manual skills and the artistic creativity of bespoke object creation. They aim to emphasize the uniqueness of each piece and its emotional connection with the ceramic artist. However, these techniques pose certain



challenges in terms of mass production and meeting market demand. On the flip side, the contemporary market's requirement for Yixing purple clay is not restricted to conventional utilitarian ceramic pieces, but instead focuses on the amalgamation of individualisation, artistic appeal, and functionality. Buyers anticipate Yixing purple clay creations to have better appearance, innovative modelling, and expressive decorative features. Hence, to attain the fusion of tradition and modernity, the conventional Yixing purple clay design must blend with present-day aesthetic inclinations and market requisites. In this regard, the implementation of AIGC technology has introduced fresh prospects for Yixing Zisha design. Through the analysis of numerous Yixing Zisha works, AIGC technology can extract design elements, patterns, forms, and other information. This not only provides designers with creative inspiration but also generates novel design schemes, optimizes forms and decorations, and conducts aesthetic analysis and evaluation to offer guidance for creation. In another article of authors' own, the author (Pan et al, 2023) argues that Through technological intervention, the Yixing Zisha design industry can more effectively cater to the demands of the contemporary market, while maintaining an equilibrium between traditional cultural heritage and innovative developments.

When presented with this challenge, there are various paths to explore. One approach could be to advance new designs by experimenting and exploring with inventive forms, embellishments, and components, among professionals in the Yixing purple clay sector. This has the potential to imbue contemporary artistry and vitality into the field. The introduction of innovative design elements, techniques and ideas, stemming from experimentation and exploration with novel shapes, decorations and materials amongst Yixing purple clay industry experts, has the potential to inject modern creativity and vigour into the field. It is advisable to consider these new designs with the aim of opening up new possibilities for the art form. Throughout the design process, it is important to uphold the customary cultural and skillful aspects of Yixing purple clay, maintaining its distinctiveness and allure. Similarly, we should combine current artistic principles and patterns to confirm the appeal of our works to present-day market requisites. Striking a balance between tradition and novelty will result in creating art pieces that meet the anticipations of the current market. To cater to the current consumer demographic, it is crucial to prioritise the diversity and customisation of Yixing purple clay products. One way to achieve this objective is by providing an extensive variety of Yixing purple clay products in different sizes, shapes, functions, and decorative styles while promoting personalised customisation. Personalising Yixing purple clay products to suit individual preferences and requirements holds significant importance. Moreover, the incorporation of diverse materials and production techniques, such as the fusion of ceramics

with other mediums or the introduction of digital design and manufacturing technologies, has the potential to elevate the design and production proficiency of Yixing purple clay products to meet current market demands and trends. By carrying out and assessing the above-mentioned initiatives, it is conceivable to introduce innovative approaches to the long-established methods of designing and producing Yixing Zisha ceramics. Furthermore, it is possible to achieve a harmonious blend of tradition and modernity, whilst accommodating diverse market demands and preserving the distinctive cultural and artistic value of Yixing Zisha pottery.

3.The development of AIGC technology and its application in the field of ceramic design

AIGC technology applies artificial intelligence to generative design, utilising machine learning, computer vision and generative algorithms to model and replicate human creation. By offering creative stimulus and supporting design choices, it aids designers in their efforts. The development of AIGC can be divided into three significant stages, as outlined by CICT: the early embryonic stage (1950s-1990s), the sedimentary accumulation stage (1990s-2010s), and the rapid development stage (2010s-present). (Li, et al,2022)In the study entitled "*Technical Characteristics and Evolution of Forms of Artificial Intelligence Generated Content (AIGC)*" authored by researchers from the Data Intelligence and Cross-Innovation Laboratory of Nanjing University and the School of Information Management at Wuhan University, Figure 3 presents a division of the internet's evolution into three stages.

	First Generation Internet (Web1.0)	Second Generation Internet (Web2.0)	Third Generation Internet (Web3.0)
Typical scenario	PC, information portal	Mobile Internet, social media, platform economy	Blockchain, metaverse, artificial intelligence, holographic holography
Content production	PGC	PGC+UGC	PGC+UGC+AIGC
Human-computer interaction	Keyboard and mouse operation	Touch control, spaced operation, voice recognition	Visual, olfactory and EEG multimodal interaction
Key features	Highly centralised portal	Platform centricity + user engagement, mobile convenience, e-commerce	Weak centralization, value sharing, privacy protection, virtual reality symbiosis
Resource organisation	Catalogue-based resource provision, search engine	Social networks, multi-source heterogeneous big data	Multimodal fusion, cognitive computing, virtual reality

Fig. 3. The evolution of the internet can be delineated into three distinct stages.

The development of the Internet displayed personal computers, information portals, and the File Transfer Protocol (FTP) as typical manifestations during the initial phase, commonly referred to as Web 1.0. The next stage, known as Web 2.0, emphasised standard scenarios

such as mobile Internet, social media, and the platform economy. The current version of the Internet, referred to as Web 3.0, exhibits blockchain, metaverse, artificial intelligence, and holographic technology as typical examples. Web 1.0 was marked by portals, forums, and other forms of media that produced PGC. The emergence of mobile internet and SNS marked the arrival of Web 2.0, and UGC became the major element of the content ecosystem. Web 3.0 is currently in its early stages, and we can observe the emergence of AI technology for creating, producing, and distributing content. Despite its infancy, AI innovations are already transforming the landscape of content creation, production, and distribution.

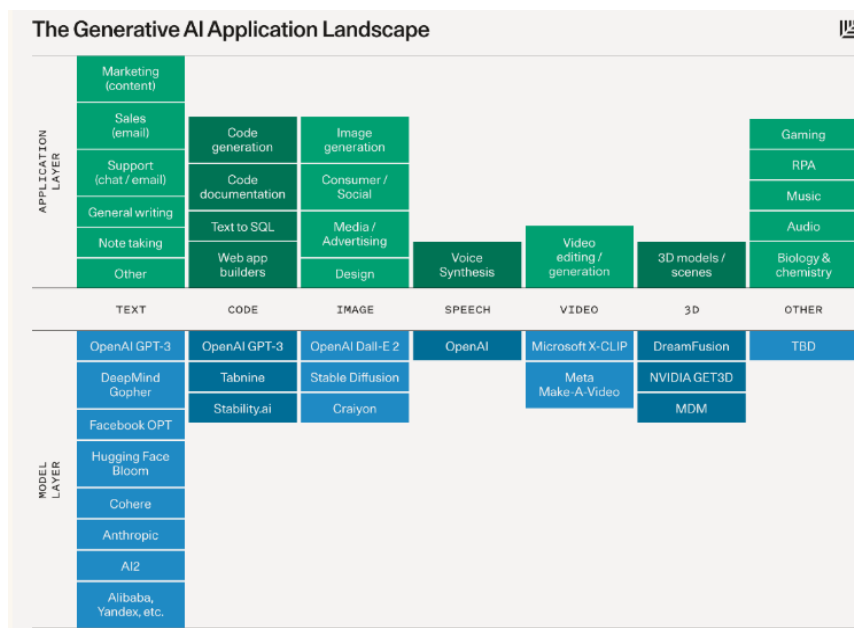


Fig. 4. The Generative AI Application Landscape

Sonya Huang and Pat Grady, both partners of Sequoia Capital, recently published an article titled "*Generative AI: A Creative New World*". The article outlines the application pattern of AIGC, which is categorised into text, code, image, voice, video and 3D fields. The article posits that the domain where AI-generated text is the most advanced is presently encountered, nonetheless, AI necessitates further strengthening for accurate recognition of natural language. AI-generated code is expected to have a considerable influence on developer productivity in the near future, and enable non-developers to utilise code more creatively. AI speech synthesis has been available for some time, but commercial applications are just beginning to emerge. Despite the potential for AI speech integration into video and 3D models, these technologies are currently lagging behind in terms of practical applications. Basic 3D and video models are expected to emerge within the next 1-2 years. Figure 3

illustrates the current generative AI application landscape. With this in mind, integrating AIGC into image and 3D design could greatly benefit Yixing Zisha.

Formlabs, a company specialising in technology for creating three-dimensional objects, has created a software named 'Formware'. It uses cutting-edge artificial intelligence and machine learning algorithms to enable users to design and customise ceramic products. Formware possesses an STL analysis and repair function that is built-in and potent. A simplified version of this tool is readily available online for free, and it is very user-friendly. Additionally, Formware's repair capabilities are swift and efficient.

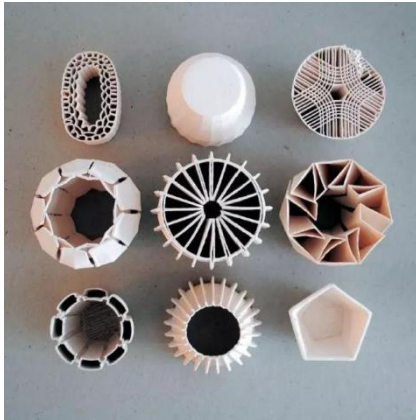


Fig. 5. Ceramic art pieces created by Jonathan Keep

Jonathan Keep is an experienced British potter with over twenty years of experience. He employs traditional techniques and has acquired a diverse range of skills. Keep's work explores the geometric patterns and laws of nature, highlighting a state of equilibrium between order and disorder. Figure 5 displays a collection of Jonathan Keep's ceramic art pieces. Jonathan Keep utilises AIGC techniques during the design phase, but eschews their use in production. He utilises Generative Design software, employing procedural algorithms to emulate natural laws and establish rules for generating forms, resulting in intricately complex designs not achievable through conventional 3D modelling. The 3D printer receives the programmed forms as a code, which is then used to print the pottery. (Sun et al,2022)This is followed by the traditional process of glazing and firing to obtain the final product.

Through the aforementioned examples, it is evident that AIGC technology can stimulate progress and invention in the realm of ceramic design by acting as a helpful tool for designing and a source of artistic inspiration.



4. Research on Yixing Purple Sand Design Innovation Based on AIGC Technology

Don Ihde's phenomenology of technology highlights the connection between human beings, technology, and the world. It emphasizes the influence of technology on human perception and understanding of the world. In the context of modern Yixing Zisha pottery development, individuals, such as designers and potters, play a crucial role as human subjects. Through their creative thinking and aesthetic concepts, they can merge traditional Yixing Zisha pottery with contemporary design ideas, resulting in unique works. Yang Zifan(2014)proposes in their article "*The Implications of Purple Sand: A Study of Yixing Purple Sand Craftsmanship*" that the progression of purple sand pottery craftsmanship is defined by its life-long evolution. The enhancement and merging of present expertise and abilities, exploration of fresh avenues for growth and progress, establishment of novel craft methods and formal frameworks, and constant cultivation of innovative thought during design conceptualization and artisanship are all amplified based on real-life circumstances. The development of zisha craft is founded upon the inheritance of traditional pottery-making skills. It strives to cater to the diverse needs of people's lives by constantly innovating. This goal is achieved through two factors - promoting the importance of functional utility alongside form and style. As a result, a wide range of distinctive zisha pottery models and styles featuring unique characteristics have been created. By utilizing AIGC technology, I was able to extract valuable design information from a vast collection of images of Yixing Zisha works. The technology enabled me to identify various design elements, patterns, and forms, which can serve as a source of inspiration for designers seeking to explore new design possibilities.

Midjourney is a very popular AI image generation tool that is flexible and easy to use. We can see Figure 6, which is an image generated by the author using Midjourney for Yixing Zisha pot design, where the author set a very simple command - to design a Yixing Zisha pot with bamboo elements as the theme. From the point of view of modelling, the modelling of Yixing Zisha pots has been developed to a limited extent due to the limitation of the tea-drinking function, and its modelling is largely stable. The teapot is composed of the body, lid, lid knob, handle, spout and other components, each of which has its own function, but also forms a coordinated and complementary relationship with the whole. We can clearly see that the product produced in Figure 6 does not have the characteristics and functions of a Zisha pot, and can hardly be called a true "Yixing Zisha pot". In this instance, comprehensive information about the software is crucial to guiding the generation of the final product. This includes a detailed list of desired characteristics for the teapot, a physical description, cultural or artistic references, and other relevant details. Multiple design solutions can then be attempted to meet the product requirements. In every situation, it is essential to take into

account distinct design aspects including form, texture, embellishment, and hue. This guarantees a variety of design concepts are possible. When examining the Yixing Zisha pots produced by midjourney, as shown in Figure 7, it becomes evident that they meet the design criteria more effectively than those shown in Figure 6. During the process, we can mark the elements we like, elements we don't like, and areas that need to be changed in the design generated by AIGC, and based on the feedback, AIGC can further adjust the design. We can keep fine-tuning in the iteration of design generation and human evaluation until we generate a satisfactory design solution. Once the final design has been determined, we can translate it into actual design drawings for the manufacture or customisation of your tea set. At this stage you can work with a professional tea set manufacturer or craftsman to realise the final product.



Fig. 6. Works drawn by Midjourney





No.	Sample image	Software instructions
1		<p>Chinese red clay pot, bamboo handle, light purple light brownish red, insect made, dark brown, deep amber, simple structure, combined with natural and artificial elements, limited color gamut, dark red, light green</p>
2		<p>Chinese red clay teapot with bamboo handle and design, in the style of light violet and light maroon, made of insects, dark brown and dark amber, carving, combining natural and man-made elements, limited color range, dark red and light green</p>
3		<p>A handmade tea pot designed in China, square, with Chinese bamboo elements, nostalgic painting style, brown and light brown, simple structure, natural scenery, William Nicholson, solid color, using Impasto technology, eye-catching label</p>
4		<p>A teapot with Chinese writing and bamboo leaves on it, in the style of soft, dream-like quality, gongbi, dark beige and yellow, meticulous pointillism, li shuxing, pure color, barthel bruyn the elder</p>

Fig. 7. Example images generated by Midjourney

Figure 8 shows the main steps of design conception of traditional Zisha pots and the main steps of AIGC-assisted design of Yixing Zisha pots. The AIGC technology serves as a tool to assist designers in expanding their creative space and sources of inspiration, which allows

them to enhance their creative expression.(Zhang et al,2020)It is worth noting that although AIGC can provide many benefits, the involvement of professional potters and craftsmen is still required in the final product design and manufacturing stages to ensure the quality, craftsmanship and practical manufacturability of the product. AIGC is only one part of the design process, providing the initial inspiration and direction for the design.

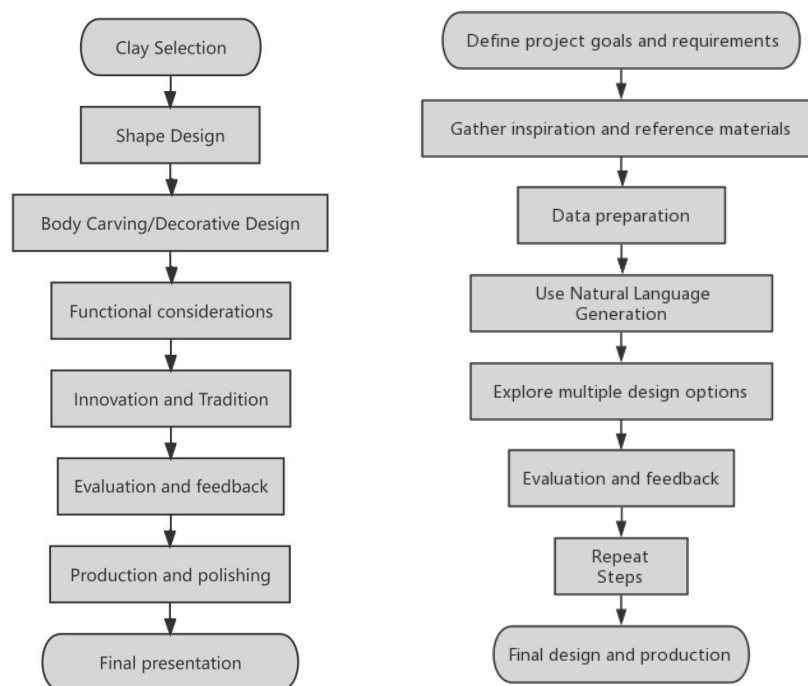


Fig. 8 The main steps of design conception of traditional Zisha pots and the main steps of AIGC-assisted design of Yixing Zisha pots

And if the flat display of Zisha pots is not enough, we can use Stable Diffusion, a powerful image processing software that can quickly convert 2D images into realistic 3D images, giving designers better control over details. And with the support of ControlNet, it allows designers to have better control over details. Although it cannot completely replace the 3D modelling software on the market, it can be a powerful tool in our work, and its judicious use can greatly improve our work efficiency. This process serves as an advantageous point of initiation for designers seeking to refine subsequent designs and modifications. The resulting 3D models facilitate experimentation and visualization within a virtual environment, enabling designers to observe and evaluate the effects of their designs from multiple perspectives, which in turn, assists in capturing and expressing their design intentions with greater precision(Chen et al,2021)



With the assistance of the generated models and intelligent algorithms, AIGC has the capability to optimize and enhance the design of Yixing Zisha. The analysis of the model's structure, proportions, and proportional relationships allows AIGC to offer suggestions for morphological adjustments and optimization to enhance the design's artistic expression and effectiveness(Zhang et al,2019).

The AIGC technology has the capability to create fresh designs of ornaments by acquiring knowledge on the pattern characteristics of Yixing Zisha pieces. By using this technology, different styles and patterns of ornamentation can be automatically produced based on the features and patterns of the initial pattern, resulting in a diverse and innovative decoration for Yixing Zisha. This process of generating ornaments aids designers in promptly creating options for a variety of ornament styles, which can be further customized and altered as necessary.

Furthermore, the AIGC technology employs computer vision and image recognition methodologies to scrutinize and assess the aesthetic attributes of ceramic artifacts. This facilitates designers in comprehending the features, categories, and patterns of various design styles, thereby guiding and directing their design choices. By means of AIGC's analysis and evaluation, designers can acquire a more profound understanding of their designs' aesthetic capabilities and influence, thereby enabling them to make specific alterations and enhancements to augment the artistic excellence and visual appeal of their creations.

In brief, the utilization of AIGC technology has a wide range of applications in the Yixing Zisha design field. It helps to enhance creativity and increase the creative space, create 3D models for visualization and modification, optimize design and morphological adjustments, generate innovative ornamental designs, and provide a reference for aesthetic analysis and evaluation. The integration of AIGC technology in the design process opens up new possibilities for creativity and provides designers and potters with efficient and precise tools and methods. However, it is important to note that traditional hand skills and experience continue to play a pivotal role in Yixing Zisha production. The combination of AIGC technology and traditional skills has contributed to the modernization and commercialization of Zisha pottery.



5 Conclusions

The functionality of AIGC is undoubtedly very powerful, as it provides comprehensive assistance for the design, shaping, and decoration of Yixing purple clay. Through its functions such as generating 3D models, design optimization, innovative patterns, simulating materials, and visual representation, it provides designers with more efficient and accurate tools and methods, helping to translate creativity into actual design outcomes.

As Oscar Wilde said, "Art is the fruit of technology." There is a mutual influence and promotion between technology and art. From the perspective of the development of technology and the innovation of traditional manual Yixing purple clay, technological progress and innovation provide new forms of expression and tools for Yixing purple clay. The development of this technology has provided art creation with a broader space and richer means of expression, while injecting new vitality and innovation into traditional art. Traditional art forms have undergone a long history of accumulation, but with the progress of technology, traditional art can be combined with new technology, giving rise to new vitality. As we all know, whenever a new tool appears, it is bound to go through a period of growth and evolution. In the initial stage, due to the disruptive impact of new tools on traditional systems and processes, they are often questioned and doubted, with only a few people optimistic about their prospects (Fan, 2017). However, among these few people, there are some who can see the potential and opportunities that the new tool holds. Over time, the new tool gradually improves and gains acceptance from more and more people, eventually becoming the new "standard". However, the key to this process is the people who first use the new tool, they are also the ones who first try to "abuse" the new tool. This "abuse" is actually an exploration of the limits of tool application. The challenge and transcendence of the limitations of new tools is the driving force behind their continuous improvement. In the context of the global digital age, with the power of artificial intelligence, we have the opportunity to explore new possibilities in Yixing Zisha design, while preserving the unique charm of traditional pottery. Furthermore, this research can contribute to providing empirical evidence for the digital transformation of the ceramics industry and serve as a reference and inspiration for design innovation in other areas of ceramic art.

Acknowledgements

I would like to thank my two supervisors for their valuable and constructive comments and suggestions on my thesis, which helped us to greatly improve the article.



References

1. Ministry of Culture et al. (2017, March 27). China Traditional Crafts Revitalization Plan [China]. http://www.gov.cn/xinwen/2017-03/27/content_5182931.htm
2. Chinese Academy of Information and Communications Technology & JD Exploration Research Institute. (2022). Artificial Intelligence Generated Content (AIGC) White Paper [China], 1-3.
http://www.caict.ac.cn/sytj/202209/t20220913_408835.htm
3. Synthetic media. (2023, June 23). In Wikipedia.
https://en.wikipedia.org/wiki/Synthetic_media
4. Gan, W., Ye, Z., Wan, S., & Yu, P. S. (2023, May 4). Web 3.0: The Future of Internet. In Companion Proceedings of the ACM Web Conference 2023 (WWW '23 Companion) ,10
<https://doi.org/10.1145/3543873.3587583>
5. He, X. (2022). Research on Design-Driven Creative Methods of Traditional Arts and Crafts: Yixing Zisha Pot as an Example. *Journal of Shandong Academy of Arts and Crafts*, 4-11.
https://kns.cnki.net/kcms2/article/abstract?v=qMv6CFc_riagAKCY1Qd7pDI5X0wGgmIj1jLH0KhoF2RBq0DJYSQmHGfG5yQj6VdrVog1YAnrrqQF2ILbrsvfQSmkpIICeWdR1dy2FrrqeQR6bs71JIpYZfV-A38nN-d42ssO-TpRcng=&uniplatform=NZKPT&flag=copy
6. The State Council of China. (2006). Representative List of National Intangible Cultural Heritage [China]. <https://www.ihchina.cn/>
7. Pan, S., He, Y., & Yu, T. (2023, June). Analysis of the Promotion and Application of New Technologies in Yixing Purple Clay Ceramic Design. *China Ceramic Industry*, 30(3).
8. Extraordinary Industry Research. (2023, January 10). Industry Insights: In-Depth Analysis of How AIGC Revolutionizes Content Marketing for Remarkable Efficiency.
<https://mp.weixin.qq.com/s/8UWwiABWqehamRWusJUIKg>
9. Li, B. Y., Bai, Y., Zhan, X. N., & Li, G. (2022, November 29). Technical Characteristics and Morphological Evolution of Artificial Intelligence Generated Content (AIGC).
<https://kns.cnki.net/kcms/detail/42.1085.G2.20221128.1005.002.html>
10. Huang, S., & Grady, P. (n.d.). Generative AI: A Creative New World. Sequoia Capital.
<https://www.sequoiacap.com/article/generative-ai-a-creative-new-world/>
11. Sun, Y., Lyu, Y., Lin, P.-H., & Lin, R. (2022). Comparison of Cognitive Differences of Artworks between Artist and Artistic Style Transfer. *Applied Sciences*, 12, 5525.
<https://doi.org/10.3390/app12115525>
12. Yang, Z. (2014). The Implications of Purple Sand: A Study of Yixing Purple Sand Craftsmanship. China Book Council, 51-54.



13. Zhang, J., Wang, Y., & Wang, L. (2020). Application of Artificial Intelligence in Ceramics Design. In 2020 International Conference on Artificial Intelligence and Computer Science (ICAICS). DOI: 10.1109/ICAICS49961.2020.9245642
14. Chen, Z., & Lin, C. (2021). A Comparative Study on the Aesthetic Evaluation of Ceramic Design Based on Artificial Intelligence. In 2021 IEEE International Conference on Electronics and Mechanical Engineering (ITEME). DOI: 10.1109/ITEME52643.2021.9502017
15. Zhang, M., & Wang, Y. (2019). Study on the Application of Artificial Intelligence in Ceramic Design. In 2019 International Conference on Information Science and Education (ICISE). DOI: 10.1109/ICISE47769.2019.00027
16. Fan, K. (2017). Creates like a philosopher and works like a craftsman: Adapt to the "new craftsman concept" and design talent training mode of "made in China 2025". In Proceedings of the first Chinese design theory and the first national "Chinese craftsman" cultivation Summit Forum,191-198.