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Design of automatic cooking pot

Hao Feng*, Chen Xi, Yin Hanyu, Guo Wenxiang

University of Science and Technology Liaoning, Anshan, China
1920161449@qq.com
**Corresponding author*

Abstract: *This paper discusses the design principle, functional characteristics and future development trend of automatic wok. Based on mechatronics technology, sensor technology and intelligent control technology, the automatic stir-frying pot realizes the automatic stir-frying process by precisely controlling the heating temperature, time and stir-frying speed. Its functional characteristics include diversified cooking programs, intelligent control, safety and reliability, energy saving and environmental protection, and convenience. With the continuous development of science and technology, the future of the automatic wok will move towards a higher degree of intelligence, multi-functional integration, Internet connectivity and green development, bringing users a more convenient and efficient cooking experience.*

Keywords: *automatic wok, mechatronics technology, sensor technology, intelligent control technology*

1. Introduction

With the rapid development of modern science and technology, technology is gradually penetrating into all corners of our daily life, the kitchen is no exception. Kitchen as the core area of family life, the level of intelligence and automation of its equipment directly affects people's quality of life and efficiency. In modern families, with the accelerated pace of life, more and more people are looking for a more efficient and convenient way of cooking. Automatic frying pan as a new type of kitchen equipment, by virtue of its automation, intelligent features, and gradually become a must-have choice for modern family kitchens[1].

The emergence of automatic stir-frying pan not only changes the traditional way of cooking, but also greatly improves the efficiency and convenience of cooking. It uses mechatronics technology, sensor technology and intelligent control technology to realize the precise control of heating temperature, time and stir-frying speed, thus realizing the automated stir-fry process. This automated cooking method not only saves people's time and energy, but also ensures the quality and taste of cooking[2].

The purpose of this paper is to discuss the design principle of automatic stir-frying wok, analyze its functional characteristics in detail, and look forward to its future development trend. Through the comprehensive study of automatic wok, we hope to provide useful references for the research and development of related fields, promote the continuous progress and popularization of automatic wok technology, and enable more people to enjoy the convenience and fun of automated and intelligent cooking[3].

2. The design principle of the automatic frying pan

The design principle of automatic stir-frying pan is mainly based on mechatronics technology, sensor technology and intelligent control technology. The integration of these technologies enables the automatic stir-frying pot to realize the precise control of heating temperature, time and stir-frying speed, thus realizing the automatic stir-frying process.

First of all, the mechatronics technology provides strong power support for the automatic stir-frying pan. Through the motor-driven stir-fry device, the automatic stir-fry pan can realize the automatic stir-frying of ingredients, so that the ingredients are evenly heated during the cooking process, to improve the cooking effect[4].

Secondly, sensor technology is the key to realize the precise control of automatic wok. Automatic wok is integrated with a number of sensors, such as temperature sensors, weight sensors and position

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sensors. These sensors can monitor the temperature, weight and stir-fry position of the ingredients in real time, and feedback this information to the intelligent control system[5].

Finally, the intelligent control system is the brain of the automatic wok. It is based on the sensor feedback information, combined with the preset cooking program or user-defined instructions, by adjusting the power of the heating element, stir-fry device speed and angle and other parameters, to achieve the automatic control of the stir-fry process. Intelligent control system can also adaptive adjustment according to the type and quantity of ingredients, to improve the accuracy and efficiency of cooking.

3. Functional characteristics of the automatic frying pan

1) Diversified cooking programs: automatic frying pan built-in a variety of cooking programs, such as stir-fry, stew, frying, etc., to meet the user's different cooking needs. Users just need to select the appropriate program and put the ingredients, can realize one-touch cooking.

2) Intelligent control: the automatic stir-frying pan has intelligent control function, which can automatically adjust the heating temperature, time and stir-frying speed and other parameters to ensure that the ingredients are cooked in the best state. At the same time, the intelligent control system can also adaptive adjustment according to the type and quantity of ingredients, improve the accuracy and efficiency of cooking.

3) Safe and reliable: the automatic frying pan adopts multiple safety protection measures, such as overheating protection, overload protection and anti-dry burning protection, etc., to ensure the safety of users in the process of use. In addition, the automatic frying pan also has a splash-proof cover design and non-slip base and other humanized design to improve the convenience and safety of use.

4) Energy-saving and environmentally friendly: automatic wok adopts energy-efficient heating elements and intelligent control system, which can ensure the cooking effect while reducing energy consumption. In addition, the automatic frying pan can also effectively reduce the production of fumes, in line with the requirements of green environmental protection.

5) Convenience: the operation of the automatic frying pan is simple and convenient, the user only needs to carry out simple settings and operations to realize automated cooking. At the same time, the automatic frying pan also has the characteristics of easy cleaning, reducing the user's cleaning burden.

4. Automatic frying pan components detailed

As a highly integrated modernized kitchen equipment, the design of automatic stir-frying pan combines cutting-edge technologies such as mechatronics, sensors and intelligent control. The following is a detailed analysis of the components of the automatic wok.

4.1 Pot body

Wok body, as the foundation and core component of automatic wok, carries all the ingredients and seasonings in the cooking process. Its design and manufacturing quality is directly related to the cooking effect and safety.

Material Selection.

In order to ensure that the pot can withstand high temperature cooking, resist acid and alkali corrosion in food and maintain good thermal conductivity, manufacturers usually choose high-quality stainless steel or aluminum alloy materials. The stainless steel pot has excellent corrosion resistance and high temperature stability, while the aluminum alloy pot is famous for its portability and good thermal conductivity.

Shape & Design.

The shape of the wok body is usually round or oval, which is not only aesthetically pleasing, but more importantly ensures that ingredients are evenly distributed during the stir-frying process, avoiding dead spots or uneven heat. The interior of the wok is carefully polished and kept smooth to minimize the possibility of ingredients sticking to the walls of the wok during stir-frying.

Heating method.

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The bottom of the pot is the key heating area. Depending on the model and technical requirements, electric heating elements or electromagnetic coils are installed here. The electric heating element provides stable and even heating for the wok body by directly converting electric energy into heat energy. Electromagnetic coils, on the other hand, utilize the principle of electromagnetic induction, whereby the magnetic field generated when the electric current passes through the coil generates an inductive current with the bottom of the wok body, thus realizing heating. This heating method has the advantages of high efficiency, energy saving and environmental protection, Pot Structure as shown in Figure 1.

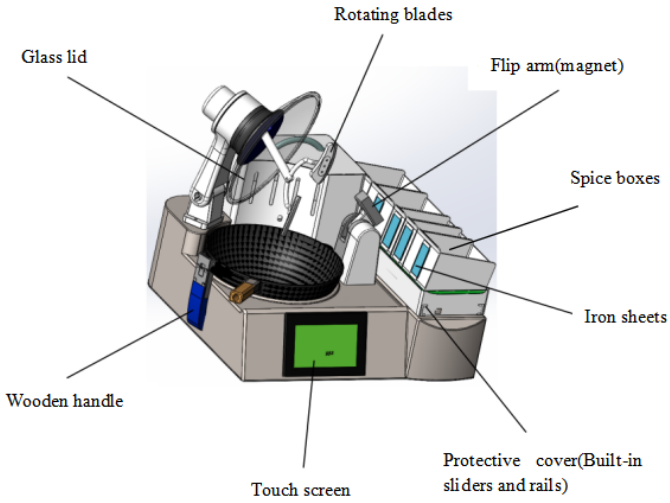

Figure 1: Pot Structure

4.2 Tossing system

Stir-fry system as the core part of the automatic wok to realize automated cooking, its design and operation is directly related to the quality and efficiency of cooking. The system is mainly composed of motor, reducer and stir-fry blade (or stir-fry arm), these three work together to ensure that the ingredients in the cooking process to get uniform and just right treatment.

The motor is the power source of the whole stir-fry system, and its quality and performance directly determine the rotation stability and strength of the stir-fry blades. In order to ensure the efficient operation and long life of the motor, we usually choose the motor with low noise, low energy consumption and high torque characteristics. Such a motor can not only provide stable power output, but also reduce energy consumption to a certain extent, improve the overall efficiency of the automatic stir-fry pan.

The speed reducer plays a vital role in the stir-fry system. It is responsible for reducing the high speed of the motor to a lower speed suitable for stir-frying, while increasing the torque to ensure that the stir-frying blades are able to stir and turn the ingredients in the pan in a smooth and powerful manner. By adjusting the speed reducer, the stir-fry blades can achieve different speeds and strengths at different stages of cooking to meet the stir-frying needs of a wide range of ingredients.

The stir-fry blade (or arm) is the part of the stir-fry system that comes into direct contact with the ingredients, so its design is critical. The shape, size and material of the stir-fry blades will affect the stir-frying results. Generally, the stir-fry blade is designed in such a way that it can fully contact and stir the ingredients to ensure that the ingredients are evenly heated and seasoned during the stir-frying process. At the same time, the material of the stir-fry blades also needs to be resistant to high temperature and corrosion to ensure that they will not be deformed or damaged during a long cooking process.

In addition to the above main components, the design of the stir-fry system also needs to consider the synergy with other systems. For example, the cooperation with intelligent control system can realize the automatic adjustment of stir-frying speed, precise control of cooking time and other functions, so as to further improve the cooking effect and user experience of the automatic stir-frying pan.

To summarize, the stir-fry system, as the key part of the automatic stir-fry wok, its fine design and powerful functions are directly reflected in every part of the cooking process. Through the cooperative work of the motor, reducer and stirring blade, the automatic stir fryer can realize efficient and even stirring effect, and bring convenient and delicious cooking experience for users, Stir-frying System as shown in Figure 2.

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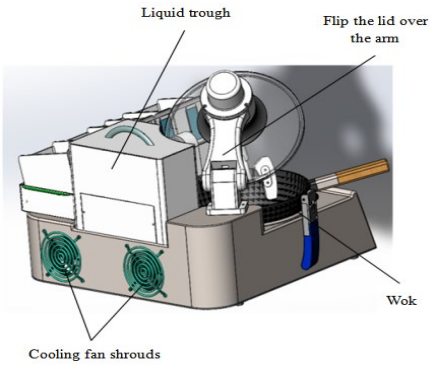

Figure 2: Stir-frying System

4.3 Sensor arrays

The wok is equipped with a series of sensors to monitor various parameters of the cooking process in real time. The temperature sensor is responsible for accurately measuring the temperature of the wok to ensure that the heating is controlled within the set range. The ingredient status sensor detects the doneness and color change of the ingredients by optical, weight or other means, so that the stir-fry speed and heating power can be adjusted in time. In addition, there are safety sensors, such as overheat and dry-heat protection, to prevent safety accidents.

4.4 Intelligent control system

Intelligent control system is the "brain" of automatic wok, responsible for receiving and processing data from sensors and controlling the stir-fry system and heating device according to the preset cooking program or user instructions. The system usually consists of a microprocessor, memory, input/output interfaces and other components, with powerful computing and storage capabilities, can perform complex cooking algorithms to ensure the accuracy and repeatability of the cooking process. The user interacts with the intelligent control system through the operator panel or mobile apps to easily set cooking parameters, select cooking programs or customize personalized cooking modes.

4.5 Human-computer interface

Human-computer interface is the window for interaction between the automatic wok and the user. It usually consists of a touch screen or an LCD display, which is used to display information such as cooking status, remaining time, temperature setting, etc. The user can select the cooking mode or adjust the parameters or view the recipe by touching or pressing the keys. Users can select cooking mode, adjust parameters or view recipes by touching or pressing buttons. Some humanized designs, such as voice prompts and graphical operation interface, further enhance the user experience.

4.6 Power supplies and electrical systems

The power supply and electrical system provides power for the automatic wok and ensures its safe operation. The power supply part includes power cord, power switch and protection device to ensure the electrical safety and stable operation of the equipment. The electrical system is responsible for converting electrical energy into mechanical and thermal energy to drive the stir-frying system and heating device to work normally. At the same time, the system also has overload protection, leakage protection and other functions to ensure the safety of users and equipment.

4.7 Enclosure and heat dissipation system

The casing of an automatic wok is usually made of strong metal materials to protect the internal components from damage and to ensure safe operation for the user. The cooling system is designed to efficiently dissipate the heat generated during operation of the equipment to prevent it from overheating and affecting performance and service life. This typically includes components such as cooling fans, heat sinks and temperature controls.

In summary, the components of the automatic stir-frying wok involve a number of technical fields,

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and each part works in concert to realize an automated, intelligent and efficient cooking process. With the continuous advancement of technology and the emergence of innovative applications, we can expect the future of the automatic wok to reach a higher level in terms of performance, functionality and user experience.

5. The functional characteristics of the automatic frying pan

As a revolutionary product for modern kitchens, the automatic wok has a series of unique features designed to provide users with a more convenient, efficient and personalized cooking experience.

1) Diversified cooking modes: the automatic frying pan is built-in a variety of preset cooking programs, such as stir-frying, stewing, baking, etc., to meet the needs of different ingredients and tastes. Users just need to simply select the appropriate mode, you can easily complete a variety of delicious food production.

2) Intelligent and precise control: with the help of advanced sensors and intelligent control system, the automatic stir-frying pan can monitor and precisely control the heating temperature, time and stir-frying speed and other key parameters in real time. This intelligent control not only ensures the nutrition and taste of the ingredients, but also avoids the problems that may occur in traditional cooking, such as inaccurate fire, burnt.

3) Safety and reliability: automatic frying pan in the design of the user's safety needs, with overheating protection, dry burning protection and other safety features. At the same time, the design of the stir-fry device has been carefully optimized to ensure that the ingredients in the cooking process evenly heated and will not splash out, thus effectively avoiding the occurrence of safety accidents.

4) Energy saving and environmental protection: Compared with traditional gas cookers, the automatic wok uses electric heating, which has a higher energy efficiency ratio and lower emissions. In addition, due to its precise control ability, the automatic wok can minimize energy waste during the cooking process, to achieve a more environmentally friendly way of cooking.

5) Convenience of operation: automatic frying pan operation is simple and easy to understand, the user only needs to put the ingredients and seasonings into the pot, select the appropriate cooking mode, you can easily complete the entire cooking process. This convenience not only saves the user's time and energy, but also reduces the threshold of cooking, so that more people can enjoy the fun of food production.

6. The future development trend of automatic frying pans

With the continuous progress of science and technology and the increasingly diversified needs of consumers, automatic frying pan in the future will usher in a broader development prospects. The following are some of the main development trends.

1) Highly intelligent and personalized: the future of the automatic wok will pay more attention to the development of intelligence and personalization. Through the introduction of more advanced artificial intelligence technology, the automatic wok will be able to more accurately identify the ingredients, determine the cooking state, and according to the user's taste and nutritional needs for intelligent adjustment. At the same time, the user can also through cell phones, tablets and other devices remote control automatic wok, to achieve a more personalized cooking experience.

2) Multi-functional integration and modular design: in order to meet the diversified cooking needs of users, the future of the automatic frying pan will move towards the direction of multi-functional integration. In addition to the basic frying function, but also will be integrated steam, boil, stew, fry and other cooking methods. At the same time, the modular design allows users to freely combine and disassemble functional modules as needed, thus realizing a more flexible and efficient kitchen cooking experience.

3) Internet connection and smart home integration: the future of the automatic frying pan will be more closely connected with the Internet to achieve a seamless connection with the smart home system. Users can remotely control the automatic frying pan through the smart home system switch, cooking mode and other parameters, and other intelligent equipment at home to realize the linkage. This integration will bring users a more convenient and intelligent home life experience.

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4) Green environmental protection and sustainable development: with the growing awareness of environmental protection, the future of the automatic frying pan will pay more attention to environmental design and sustainable development. The use of more efficient heating methods, the use of renewable materials, optimize the use of energy and so on are the future development of automatic frying pan is an important direction. At the same time, through a reasonable recycling and disposal mechanism to reduce the impact of the product on the environment is also an important measure to achieve sustainable development.

7. Conclusions

With the continuous development of science and technology, the future of the automatic frying pan will move towards a higher degree of intelligence, multi-functional integration, Internet connectivity and green direction.

1) A higher degree of intelligence: the future of the automatic frying pan will pay more attention to the development of intelligence, through the introduction of artificial intelligence technology and big data analysis technology, to achieve more accurate cooking control and personalized cooking experience.

2) Multi-functional integration: the future of the automatic frying pan will realize more multi-functional integration, such as intelligent recipe recommendations, voice control, remote control, etc., to provide users with a more convenient, intelligent cooking experience.

3) Internet connection: with the development of Internet of things technology, the future of the automatic frying pan will realize the seamless connection with the smart home system, remote monitoring, remote control and other functions, to bring users a more intelligent life experience.

4) Green: the future of the automatic frying pan will continue to focus on the development of environmental protection and energy saving, the use of more environmentally friendly materials and technologies to reduce energy consumption and emissions of pollutants.

In summary, as a new type of kitchen equipment, automatic wok has broad market prospects and development potential. With the continuous progress of science and technology and consumer demand continues to improve, the future of the automatic frying pan will continue to realize technological innovation and functional upgrades, to bring users a more convenient, efficient and intelligent cooking experience.

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