Hindawi
Journal of Nanomaterials
Volume 2022, Article ID 2114377, 10 pages
https://doi.org/10.1155/2022/2114377

*Research Article*

# Optimization Design of Ferry Material Performance Test System Based on Artificial Intelligence

**Hui Zhai and Yujin Zhai**

*College of Modern Information Technology, Henan Polytechnic, Zhengzhou, 450046 Henan, China*

Correspondence should be addressed to Hui Zhai; hnxxgc666@163.com

Received 24 February 2022; Revised 2 April 2022; Accepted 19 April 2022; Published 29 April 2022

Academic Editor: Palanivel Velmurugan



Lead titanate in titanium-titanium mine and lead (solid solution optimized ferroelectric) is one of the most widely used multifunctional material systems, and they are outside the field (such as light, electricity, and heat) Structure, domain, and phase evolution characteristics are important for ferroelectric, piezoelectric, photoelectric, and memory applications. Functional materials are those high-tech materials with excellent electrical, magnetic, optical, and thermal functions, special physical, and chemical and biological effects, capable of completing functional interconversion, mainly used to manufacture various functional components and are widely used in various high-tech fields. This paper mainly analyzes iron and electrical materials and artificial intelligence technology by studying the characteristics of ferroelectric materials and research status at home and abroad and using artificial intelligence technology and the calculation of ferroelectric materials for artificial intelligence technology and Dexie optimization model. Artificial intelligence is a new technical science that studies and develops theories, methods, technologies, and application systems for simulating, extending, and expanding human intelligence. For artificial intelligence before the optimization of the hardware and software of the ferroelectric material performance test system, the optimized system is performed; the optimized system is subjected to safety testing; all test results show that the performance test of the ferroelectric material after optimization. The system data is well operating, and the artificial intelligence technology is suitable for optimization of the performance test system of ferroelectric material.

## 1. Introduction

In recent years, low-dimensional ray materials such as ferroelectric membranes, ferroelectric nanowires, ferroelectric nanum columns, and ferroelectric nanoparticles have a variety of special natural characteristics, such as dielectric, piezoelectric, and thermal release electrical characteristics. Recent experimental studies have shown that in addition to improving the physical properties of the ferroelectric material by applying electric fields, external force, etc., in addition to the traditional method, the performance and crystal orientation to low-dimensional ferroelectric materials such as iron can be improved. The physical properties of electrical films and ferroelectric nani are more pronounced [1, 2].Within a certain temperature, the ferroelectric material exhibits spontaneous polarization without an applied electric field, and when an electric field is applied, the polarization direction changes with the change of electric field. At present, expert scholars have studied the natural characteristics of ferroelectric materials, and the experimental and theoretical conditions have been very mature, but other crystals to study ferroelectric materials are still very lacking, basic belonging to qualitative experimental analysis, and lack of depth study [3, 4].

In the field of artificially intelligent ferroelectric materials, a large number of expert scholars have conducted research and achieve good results. For example, Liu et al. propose that the core problem of ferroelectric physics research is spontaneous polarization. In a certain temperature range, the positive and negative charge centers do not coincide within the unit cell, forming a dipole moment and presenting polarity, and this polarization phenomenon, which exists without the action of external electric field, is called spontaneous polarization. The configuration of the individuals in each battery is separated from each other in a particular direction, and the entire crystal is displayed in this direction, one end is positive, and one end is negative [5]. Glauner et al. proposed spontaneous polarization as a natural power bipolar moment in each crystal in the crystal, which is determined by the characteristics of the crystal structure itself and is spontaneously zero in this field [6]. The crystal structure, i.e., the microstructure of a crystal, refers to the specific arrangement of the actual masses in a crystal. The most essential difference between crystals and noncrystals is that the atoms, ions, molecules, etc., of crystals are regularly arranged, whereas in noncrystals, these masses are basically irregularly stacked together, except for the closest ones. Thrall et al. proposed in the 32nd group crystal point that only 10 elements have a specific polar direction and only materials belonging to these 10 elements can be spontaneously polarized [7]. Chen et al. interpreted that a ferroelectric material also has a piezoelectric energy and thermoelectricity, and the piezoelectric energy requires only a crystal having no symmetrical center, and thermoelectricity requires a crystal of spontaneous polarization [8]. Nasr et al. proposed the energy of the ferroelectric material not only requiring crystals to have spontaneous polarization but having more than two spontaneous polarization orientation [9]. Lemley et al. explain that the polarization direction can be changed in accordance with the operation of the external electric field [10]. Baum illustrates an important feature of the ferroelectric material, that is, the polarization intensity $P$ and the external electric field $E$, which constitute a circuit hysteresis [11]. Another important feature that Chatila et al. proposed is a crystalline architecture which is a temperature that exhibits changes in crystal structures. When the temperature is higher than $T$, spontaneous polarization disappears; the crystal is converted from the ferroelectric phase to a single electrode [12]. The ferroelectric crystal has a uniform polarization, which means that the surface of the crystal will generate a binding load, and the electric field generated by the binding load is opposite to the polarization direction of the crystal [13]. At the time of external force constraint, the strain accompanying the spontaneous polarization will increase the components of the crystal, and the state in which the uniform positive electrode is unstable; the crystal will be divided into thousands, and the electrode direction in each small region is different. These small areas are called sectors. The sector structure varies at an external electric field or pressure, mainly through the flow of the mobile wall and the direction of electrons in the direction.

The innovation point of this article is as follows: (1) illustrate the core theory of this paper, that is, the modulation principle of ferroelectric material and a mold model of one-dimensional photon crystal, and (2) the simulation of the radio comparative of titanium ceramic oxide defines the basis.

## 2. Artificially Intelligent Ferroelectric Materials

*2.1. Research Content of This Article.* This paper introduces the characteristics and development of artificial intelligence technology and ferroelectric materials, using artificial intelligence technology and two optimization algorithms (the algorithm of deh optimization model algorithm and the vibrator model); design the performance test system of ferroelectric materials based on titanium. The titanium-based zirconium-based film of titanium and terahertz spectrometer is used to obtain a line. There are two typical photonic plates and photonic crystal defects. Summarize the characteristics of the optimization based on the performance test of ferroelectric material materials, point out the lack of research phases, and plan for future work.

### *2.2. Artificial Intelligence*

(1) Artificial intelligence is a branch of IT, which is also a designed intelligent system, which has intelligent characteristics of human behavior, such as language understanding, learning, and solving problems [14]. At present, artificial intelligence is no longer limited to computers but infiltrated into social life. With the development of society, the growth rate of artificial intelligence has also risen rapidly. Enterprises around the world have entered the artificial intelligence area, bringing a new leap in the history of artificial intelligence [15].As social media sites replace television as the news source for young people, news organizations are increasingly relying on social media platforms for distribution, and major publishers are now using artificial intelligence technology to distribute stories more effectively and generate higher traffic

(2) Artificial intelligence has information collection functions, learning functions, entertainment functions, communication service functions, etc., and penetrates all levels of economic, political, cultural, and social. The economic significance of artificial intelligence is not allowed. The development of intelligent machines has almost encompassed all electronic products, and huge human, material resources, and financial resources have also been saved. All in all, the development of artificial intelligence has a very far-reaching significance in the history of human development; until today, the importance of artificial intelligence is still not fully excavated; it will continue to affect the development of society. Once humans develop artificial intelligence, it will take off on its own and redesign itself at an ever-increasing rate, and humans, limited by slow biological evolution, will be unable to compete and will be replaced

#### *2.2.1. Ferroelectric Material*

(1) Iron electricity means that in the ferroelectric material, since the crystal structure is generated in the crystal, the electrode is not equal to zero due to the crystal structure and can be spontaneously polarized into positive and negative. The direction of charge is reversed or redirected by the influence and force of an additional electric field [16]. Ferroelectric materials are materials with spontaneous polarization in

a certain temperature range, and the direction of polarization can be changed by the applied electric field. Spontaneous polarization is the basic nature of the ferroelectric material and refers to the ferroelectric material of the polarization intensity of the positive and negative load cells due to the bias without any additional electric fields. The ferroelectric material has two characteristics; one is a sorting ferroelectric material as a crystal polar group. When the crystal structure is not damaged, its polarity can be reversed, and these properties are similar to the ferromagnetic material, and the direction of flow of these crystal structures and electrical polarization is the same. Ferroelectric materials are not only capable of spontaneous polarization but also of spontaneous polarization in a certain temperature range where the dipole moment can change with the direction of the externally applied electric field

(2) Since the external electric field is increased, the exterior electric field is spontaneously extremely in the direction of the steering direction. When the external electric field reaches the maximum activation, the intensity of the external electric field of the electric field is increased, the ferroelectric material exhibits a single spontaneous state and polarization intensity, and the saturation of the ferroelectric material extends in the external electric field [17]. In the opposite direction, the resulting curve is referred to as an acceptable ferroelectric curve; the high delay of the ferroelectric material is one of the physical properties of the ferroelectric material and is considered to be one of the important standards. When the crystal structure is not damaged, its polarity can be reversed, and these properties are similar to the ferromagnetic material, and there are a certain amount of nodule in the crystal structure and its moisture electrical electrode in the same direction

(3) Compared with traditional fossil energy, electricity has more advantages, such as environmental, easy to use, and can be transmitted; even if it is now a new source of energy, it is also necessary to be converted into electrical energy. People's daily life is that electricity is not open, and the research on science and technology is also inseparable from the operation of electricity. Therefore, electricity is not only the companion of human development but also an important energy for industrial development. In some particular circumstances, it is best to compress the time of power operation to obtain a high energy pulse power source, which can achieve energy saving instead of the release of energy

(4) Capacitor is a device that holds an electric charge, consisting of two conductors close to each other with a layer of nonconductive insulating medium in between, usually referred to as its ability to hold an electric charge as capacitance. Although the supercapacitor has a high storage density standard and power density, its chemical safety is not too high, and the operating voltage and operating temperature are also low, so it is difficult to operate in high temperatures, high pressure, and other environments, in this respect. The use of medium capacitors will be better, and dielectric capacitors do not only have very high power densities, but also, the manufacturing process is not complex, high pressure. The dielectric is a charge between the electrodes. Before charging the capacitor, the two-pole plates do not charge; the distribution of the electrode in the dielectric is also messy. After charging, under the action of electric field power, the polar plate connected to the power supply positive electrode is positively charged due to the loss of electrons, and the other end and the negative electrode are negatively charged, so the electric field intensity between the two-pole panels increases in charge on the plate, the electrodes in the dielectric are slowly become oriented from the nonportable random distribution, and such a distributed electrode can play the energy, which will be discharged in the form of electrical energy. When released, the electrode will return to the original unrequited arrangement, unlimited process [18].

### *2.3. Optimize Ferroelectric Material Performance Test System according to Algorithm*

*2.3.1. DBE Optimization Model Algorithm.* In order to study the optimal design of the artificial intelligence of ferroelectric material performance test system, this paper uses the DBE Optimization Model Algorithm and the Data of the Vibrator Model Optimization Algorithm to optimize the ferroelectric material performance test system. For an orderly free ferroelectric, the dielectric response is generally attributed to the rotatable electrode set [19]. When the external electric field is withdrawn, the electrode has undergone an optimization process of polarization disappearance, which can add an $E\ xp\,(-S/V)$ factor to achieve this weakening process, such as

$$g(s) = \frac{\varepsilon_i(0) - \varepsilon_i(\infty)}{v} \exp\left(\frac{-t}{v}\right), \tag{1}$$

where $V$ is the optimization time, $\varepsilon_i(0)$ and $\varepsilon_i(\infty)$ are the real most material constant and the actual part of the optical ferroofer material.

The relationship between ferroelectric materials and system attenuated coefficients is

$$\varepsilon_i(\omega) = \varepsilon_i(\infty) + \int_0^\infty g(y) \exp\,(-\omega y) dy. \tag{2}$$

Winning the coefficient of formula (1) into the equation (2), calculate the dispersion equation of the iron and electrical material of the Dexie Optimization Model:0

$$\varepsilon_i(\omega) = \varepsilon_i(\infty) + \frac{\varepsilon_i(0) - \varepsilon_i(\infty)}{1 + \omega v}. \tag{3}$$

By (3), calculate the real and imaginary part of the ferroelectric material constant:

$$\varepsilon_i{}'(\omega) = \frac{\omega_0\omega_1\omega x}{\left(\omega_0^2 - \omega^2\right) + (\omega x)^2},$$
$$\varepsilon_i''(\omega) = \frac{\varepsilon_i(0) - \varepsilon_i(\infty)}{1 + (\omega v)^2}\omega v. \tag{4}$$

*2.3.2. Vibrator Model Optimization Algorithm.* For displacement type ferroelectric, most of this article is attributed to the damping resonator system. When the external electric field is withdrawn, the vibrator flows and the frequency $\omega 1$ are lower than the inherent frequency $\omega 0$, and an exp $(-X\ S/2)$ factor can be added to implement this weakening process, where $X$ is damping coefficient [20], like

$$\omega_1 = \left\{\omega_0^2 - \frac{x^2}{4}\right\}^{1/2}, \tag{5}$$

$$g(s) = \omega_0 \exp\left(\frac{-xt}{2}\right) \sin \omega_1 s. \tag{6}$$

Formula (5) is substituted (2), and the dispersion equation of the ferroelectric material of the damping resonator model is obtained:

$$\varepsilon_i(\omega) = \varepsilon_i(\infty) + \frac{\omega_0\omega_1}{\omega_0^2 - \omega^2 + \omega x}. \tag{7}$$

According to the formula (6), a solid and imaginary part of the ferrite material constant:

$$\varepsilon_i'(\omega) = \varepsilon_i(\infty) + \frac{\omega_0\omega_1\left(\omega_0^2 - \omega^2\right)}{\left(\omega_0^2 - \omega^2\right)^2 + \omega^2 x^2}, \tag{8}$$

$$\varepsilon_i''(\omega) = \frac{\omega_0\omega_1\omega x}{\left(\omega_0^2 - \omega^2\right)^2 + (\omega x)^2}. \tag{9}$$

Equation (7) and formula (8) apply to a variety of damping resonance systems. When studying the phonon system, $\varepsilon_i(0)$ represents the frequency of optical transverse molds [21]. If we simplify the original cell (i.e., only two ions in each of the arsence), under the action of the electric field, the vibration equation of the state is solved, and its ferroelectric material constant expression can be obtained:

$$\varepsilon_i(\omega) = \varepsilon_i(\infty) + \frac{mq^2}{\omega_0 T\omega_0^2}\frac{\omega_0^2}{\omega_0^2 - \omega^2 + \omega x}. \tag{10}$$

In the formula, $m$ represents the number of electrons in the unit volume, $Q$ represents the effective charge, and $\omega_0$ represents the current quality, indicating the frequency of the optical cross-mold. The coefficient $mq^2/\omega_0 T\omega_0^2$is constant, and the vibrator intensity $O$ is used, and the formula (10) is simplified:

$$\varepsilon_i(\omega) = \varepsilon_i(\infty) + \frac{o}{\omega_0^2 - \omega^2 + \omega x}. \tag{11}$$

Thus, a ferroelectric material expression of the damping resonant model is obtained.

## 3. System Optimization Experiment

*3.1. Experimental Background.* Through the trend of artificial intelligence, we can see that artificial intelligence technology has been connected to the current clinical medical, electronic communication, intelligent robot, unmanned, computer, Internet, flood control, education, etc., intelligent applications present, and intelligent development takes cutting-edge science and technology, supplemented in medium and low-end products, which reflects a variety of features. Artificial intelligence is a shift from multimedia data processed in different types to cross-media cognition, learning, and reasoning, where the "media" is not the news media but the interface or environment. It is from the pursuit of intelligent machineries to the high level of human-machine and brain-machine synergy and integration. This paper uses artificial intelligence technology, and the calculation results of the iron and electrical material of the deh optimization model and the calculation results of the vibrator model ferroelectric material are designed to optimize the performance test system of ferroelectric material.

*3.2. Optimization Design of the Performance Test System of Artificial Intelligence*

*3.2.1. Accuracy.* The optimization design of the system should be based on the accuracy and system accuracy of the artificial intelligence detection data information, accurately transmitting data to the computer, and the system can configure the temperature parameters, including the upper limit and the lower limit and the management and damage correction of temperature through artificial intelligence technology.

*3.2.2. Real Time.* The system needs to maintain the environmental factor real-time monitoring during the ferroelectric test during artificial intelligence. When the system starts, water quality data can be obtained, and the ecological monitoring data on the computer is sometimes effective. The test system can display the water tank temperature, showing pH and electrical conductivity data, and display transfer data in real time. In order to facilitate operation and use testing, the system optimization design requires the implementation of engine control, cutting the top and bottom of the contact material, and realizing an electronic balance computer to implement online information.

The overall function of the ferroelectric material performance test system optimized in this paper is shown in Figure 1. The system mainly includes reaction control functions, environmental factor monitoring functions, automatic weighing functions, login function, and data storage. Artificial intelligence is transmitted by ferroelectric signals through ferroelectric sensors, and the transfer of the reaction solution is achieved using a ferroelectric horizontal solenoid

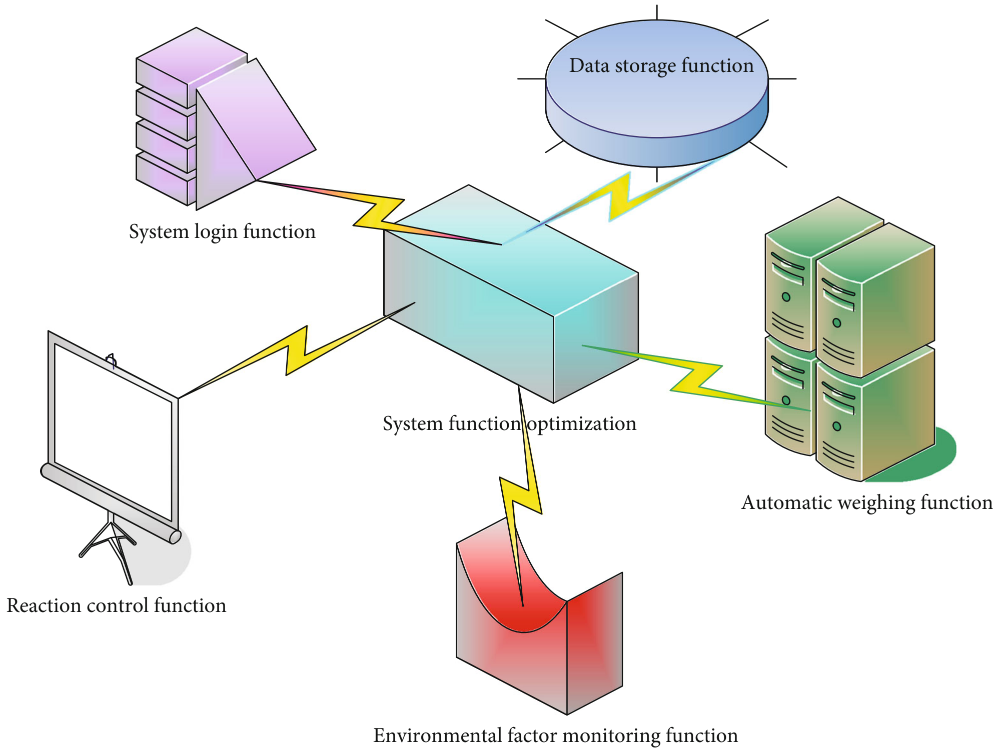


Figure 1: Artificial intelligence-based ferroelectric material performance test optimization system.

valve. The operation of the ambient metal exchange includes data acquisition cards, temperature, pH, and conductive sensors. First, the host configures the basic parameters of the redemption card to apply communication. Then, from the real-time monitoring sensor to change the water quality factors under different experimental conditions, and converted to the data exchange card to identify the digital signal of the host, the host appears in the form of a waveform map. The characteristics of ferroelectric material can be carried out at different temperatures, pH, and conductivity. The stepper engine is driven by the discharge controller, and the stepper controller is controlled by the pulse and steering wheel given by the host computer.

*3.3. Ferroelectric Material System Optimization after Performance Test.* The following is the specific simulation data operation table for artificial intelligence to be applied to the optimization of the ferroelectric material performance test system, and the experimental data is shown in Table 1.

Table 1 is the specific simulation parameter table for artificial intelligence applications after optimization of ferroelectric material performance test system. From the table, we can see artificial intelligence to apply parameter types optimized by the performance test system of ferroelectric material: Reaction control functions run data for 0.915659, the environmental factor monitoring function runs 0.835148, the automatic weighing function runs to 0.851545, the login function runs to 0.715245, and the data storage function is running data to 0.6324545. The test results are normal, and the artificial intelligence is applied to the optimization of ferroelectric material performance test system.

*3.4. Body Material Performance Test System Optimization before and after Comparison.* The following is a data type analysis diagram of the functional test of artificial intelligence application to the system function test system optimization, and experimental data is shown in Figure 2.

Figure 2 is a data type analysis diagram of functional testing system functional testing before and after the optimization of ferroelectric material performance test system. From the figure, we can see artificial intelligence to apply to the first 19 group function groups for the optimization of ferroelectric material performance test system. There are 14 groups below 0.6, indicating that the functional data of the ferroelectric material performance test system is low, and the system performance is poor; and the artificial intelligence is applied to the 18 groups of iron-electrical material performance test system. Functional data is higher than 0.6, indicating that the functional data of the ferroelectric material performance test system is good, and the problem of poor performance in the system is improved.

## 4. System Hard Software Optimization Design and Performance Test

### *4.1. System Hardware Optimization Design*

*4.1.1. Ferroelectric Material Performance Test System Hardware Optimization Design.* The design of the ferroelectric material performance test system mainly focuses on economic and practical operation, considering the performance test of laboratory ferroelectric material performance during research and development. The hardware structure of the

Table 1: After optimization of ferroelectric material system.

| Type | Operating data | Test results |
|---|---|---|
| Reaction control function | 0.915659 | Operating normally |
| Environmental factor monitoring function | 0.835148 | Operating normally |
| Automatic weighing function | 0.851545 | Operating normally |
| Login function | 0.715245 | Operating normally |
| Data storage function | 0.6324545 | Operating normally |

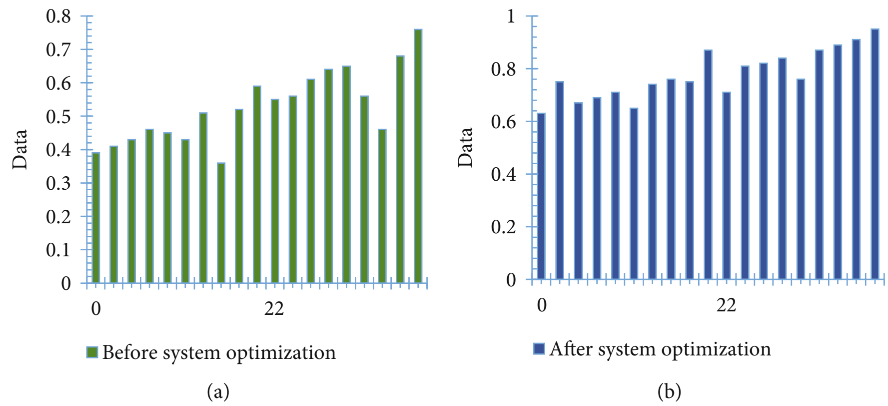


Figure 2: Comparison test before and after optimization of ferroelectric material performance test system.

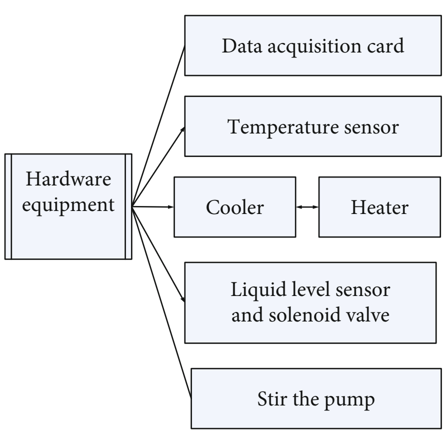


Figure 3: Ferroelectric material hardware optimization system.

ferroelectric material of this paper is shown in Figure 3, including environmental factor monitoring system, reaction control system, automatic weighing system, and ingredient system. The environmental factor monitoring system of the ferroelectric material properties test system is specific to pH, conductivity, and temperature monitoring. The reaction control system of the ferroelectric material performance test system includes heating, cooling portion, liquid level sensor, and a heat sink. The automatic weighing system of the ferroelectric material performance test system mainly includes a motor pacemaker and a recombined component. The reaction control system of the ferroelectric material performance test system includes a heating tube and a semiconductor cooler and fluid level sensor having a resistance line. By serial port and cable, the computer will connect to the data exchange card, stepper controller motor, and balance resolution.

*4.1.2. Ferroelectric Material System Hardware Optimization Postperformance Test.* The following is a simulation data operation table for artificial intelligence applications to ferroelectric material performance test system hardware optimization, and experimental data is shown in Table 2.

Table 2 is an optimized simulation parameter table for artificial intelligence to use in hardware (environmental factor monitoring system, reaction control system, automatic weighing system, and ingredient system); we can see artificial intelligence applications from the table. Parameter type optimization of ferroelectric material performance test system: the environmental factor monitoring system operates 0.87571, the reaction control system operates 0.825644, the automatic weighing system is 0.765656, the ingredient system operation data is 0.645455, and the test results are operating normally.

*4.1.3. Ferroelectric Material Performance Test System Hardware Optimization before and after Comparison Test.* The following is a data type analysis diagram of the functional test of the system function test before and after the performance test system of the artificial intelligence application, and the experimental data is shown in Figure 4.

Figure 4 is a data type analysis diagram of the functional test of the system function test before and after the performance test system of the ferroelectric material; from the figure, we can see artificial intelligence application to ferroelectric material performance test system hardware

Table 2: Ferroelectric material system hardware optimization after performance test.

| Type | Operating data | Test results |
|---|---|---|
| Environmental factor monitoring system | 0.87571 | Operating normally |
| Reaction control system | 0.825644 | Operating normally |
| Automatic weighing system | 0.765656 | Operating normally |
| Batching system | 0.645455 | Operating normally |

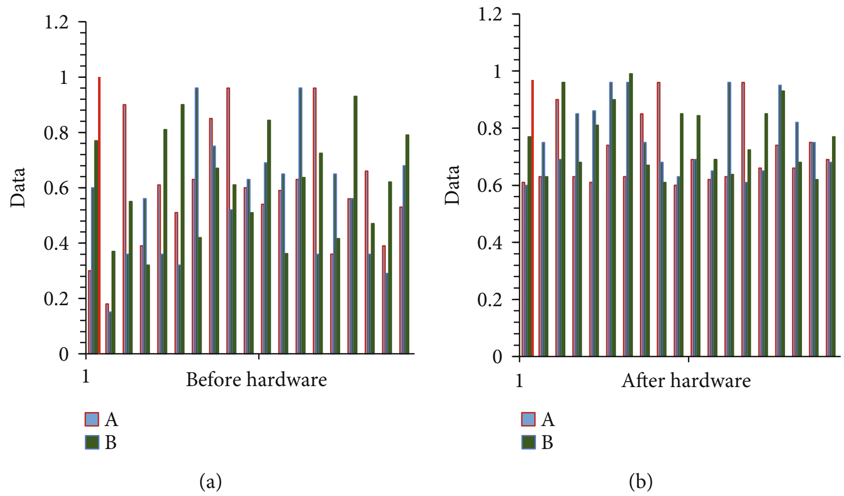


Figure 4: Comparison test before and after hardware optimization of ferroelectric material performance test system.

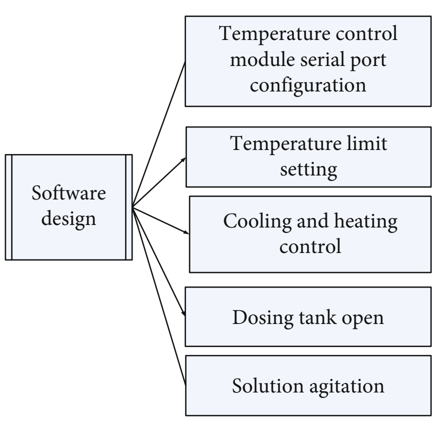


Figure 5: Ferroelectric material software optimization system.

(environmental factor monitoring system, reaction control system, automatic weighing system, and ingredient system) optimization of all system function module data in three types of tests in three tests in less than 0.6, indicating that before optimization, system performance is low, and manually intelligent application of ferroelectric material performance test system hardware optimization, all performance data is higher than 0.6, indicating that after optimization, system hardware performance has become good.

*4.2. System Software Optimization Design*

*4.2.1. Ferroelectric Material Performance Test System Software Optimization Design.* This paper optimized the design of the ferroelectric material performance test system using functional modular design idea for the overall design of the system host. The software system of the ferroelectric material performance test system includes a system login module, a data acquisition display module, a reaction control module, and a data storage module, and each module is shown in Figure 5. The ferroelectric material performance test system is realized by a real-time conductivity monitoring through the host, and automatic temperature control is performed by artificial intelligence technology. The data processing function is primarily applied to articulation design and data processing with multiple data. Data display features and display the refresh multiple parameters real-time refresh resumption. In data storage mode, each screen selectively stores the experimental data in a graphic form on your computer.

*4.2.2. Ferroelectric Material System Software Optimized Postperformance Test.* The following is an artificial intelligence application to the performance test system software optimization of the system software optimization specific simulation data operation form, and the experimental data is shown in Table 3.

Artificial intelligent used in ferroelectric material performance test system software (data acquisition display module, temperature alarm control module, stepper motor control module, automatic weighing module, and data storage module) optimized specific simulation parameter shown in Table 3; from the table, we can see artificial intelligence to apply to parameter type optimization of ferroelectric material

Table 3: The specific simulation data operation of the online English speech interactive recognition system.

| Type | Operating data | Test results |
|---|---|---|
| Data acquisition display module | 0.95531 | Operating normally |
| Temperature alarm control module | 0.85644 | Operating normally |
| Stepper motor control module | 0.66279 | Operating normally |
| Automatic weighing module | 0.95745 | Operating normally |
| Data storage module | 0.67528 | Operating normally |

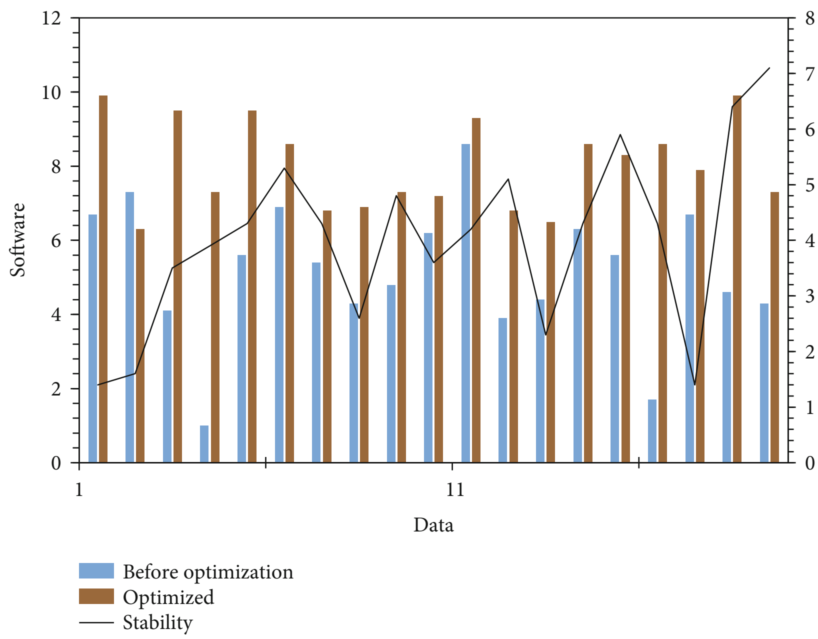


Figure 6: Compare test before and after optimization of ferroelectric material performance test system software.

performance test system: data acquisition display module runs 0.95531, temperature alarm control module runs data 0.85644, and stepper motor control module runs 0.66279 automatic. The weighing module runs data from 0.95745. The data storage module runs data is 0.67528. The test results are operating normally, and it means that artificial intelligence is suitable for ferroelectric material performance test system hardware optimization, its data is accurate, and running is normal.

*4.2.3. Ferroelectric Material Performance Test System Software Optimization before and after Comparative Test.* The following is a data type analysis diagram of functional testing before and after artificial intelligence application to the performance test system software optimization, and experimental data is shown in Figure 6.

Figure 6 is a data type analysis diagram of functional testing of system-intelligence application before and after hardware optimization of ferroelectric material performance test system. From the picture, we can see artificial intelligence to apply to ferroelectric material performance test system software (data acquisition display module, temperature alarm control module, step motor control module, automatic weighing module, and data storage module) optimization. The module data is less than 0.6 in the pretest, indicating that the system performance is low before optimization. Manually intelligent application of ferroelectric material performance test system hardware optimization is higher than 0.6 and close to 1, indicating that the software performance of the ferroelectric material performance test system has become good after optimization.

*4.3. Analysis of Types of Safety Test after Optimization of Ferry Material Performance Test System.* As shown in Figure 7, the following is the type of security test of three group (reaction control function, environmental factor monitoring function, automatic weighing function, login function, and data storage function) security test system for artificial intelligence applications diagram.

Figure 7 is a type analysis diagram of three group (reaction control functions, environmental factor monitoring functions, automatic weighing functions, login function, data storage function, automatic weighing function, login function, and data storage function) security test system. It can be seen from the figure that the reaction control function safety data of the artificial intelligence application in the performance of the ferroelectric material performance test system is 0.73, the environmental factor monitoring function

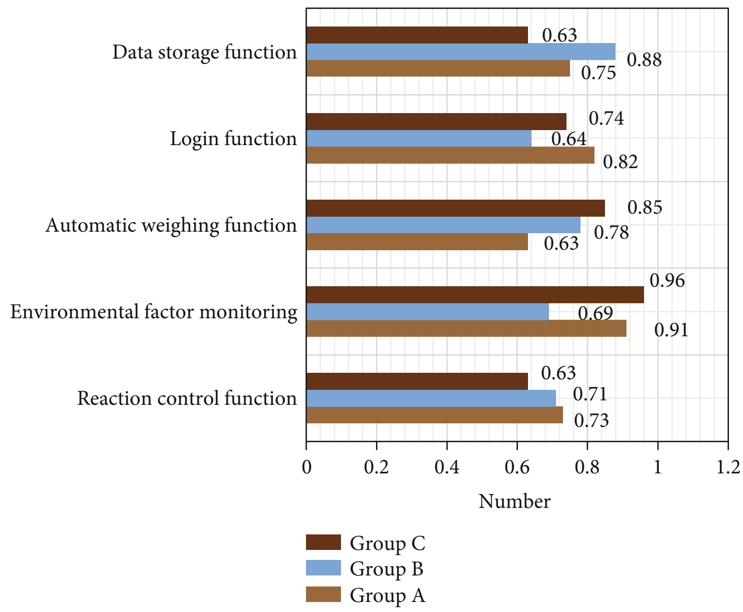


FIGURE 7: Parameters of $K$-means clustering algorithm in online English speech interactive recognition system.

security data is 0.91, and the automatic weighing function security data is 0.63. The login function security data is 0.82; data storage function security data is 0.75; manual intelligence application to the ferroelectric material performance test system optimization after B group reaction control function safety data is 0.71; environmental factor monitoring function safety data is 0.69; automatic weighing function security data is 0.78; the login function security data is 0.64; data storage function security data is 0.88; artificial intelligence application to the reaction control function of the C group after the optimization of the ferroelectric material performance test system sexual data is 0.63; the environmental factor monitoring function security data is 0.96; the automatic weighing function security data is 0.85; the security data of the login function is 0.74; the data storage function security data is 0.63; the higher the data, the closer to 1 and the stronger the security of the system.

## 5. Conclusions

This paper analyzes the status quo of the performance test technology of current stage of ferroelectric material and proposes an optimized design plan for using artificial intelligence technology to the performance test system of ferroelectric material. This paper is described in detail from both hardware and software. The main conclusions are as follows: build a ferroelectric material performance test system, which includes environmental factor monitoring, reaction control functions, automatic weighing function, and data storage. When the actual temperature is less than or higher, heat can be automatically started. The system is transmitted and frequency transmission function with balance checkpoint. The system implements the pilot process and improves the difference in measurement and electricity when the steel and electrical materials are completed. The system realizes the automatic control of the experiment, reducing error, and improvement experimental accuracy. Although some conclusions were made in this paper, there are still shortcomings. The experiments in this paper were not verified for different ferroelectric materials due to the limitations of the conditions, resulting in data that are not generalized.

## Data Availability

No data were used to support this study.

## Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

## Acknowledgments

This work was supported by the Competition Projects of Excellent Open Online Courses in Colleges and Universities of Henan Province in 2018 (Project No. 2018JPKC-GZ017), the Bidding Project in Research and Practice of Education and Teaching Reform of Henan Polytechnic in 2019 (Project No. 2019JZ012), and Science and Technology Innovation Team of Henan Polytechnic (No. 2020-KJCXTD-02).

## References

[1] N. Barrett, J. E. Rault, J. L. Wang et al., "Full field electron spectromicroscopy applied to ferroelectric materials," *Journal of Applied Physics*, vol. 113, no. 18, pp. 136–240, 2018.

[2] C. Liu, P. Lu, Z. Z. Gu, J. Yang, and Y. Chen, "Bidirectional tuning of thermal conductivity in ferroelectric materials using e-controlled hysteresis characteristic property," *The Journal of Physical Chemistry C*, vol. 124, no. 48, pp. 26144–26152, 2020.

[3] N. A. Shvetsova, S. A. Shcherbinin, M. A. Lugovaya, A. N. Reznichenko, and A. N. Rybyanets, "Method of electromechanical

characterization of ferroelectric materials," *Ferroelectrics*, vol. 561, no. 1, pp. 100–105, 2020.

[4] R. Li, Z. Zhao, X. Zhou et al., "Intelligent 5G: when cellular networks meet artificial intelligence," *IEEE Wireless Communications*, vol. 24, no. 5, pp. 175–183, 2017.

[5] R. Liu, B. Yang, E. Zio, and X. Chen, "Artificial intelligence for fault diagnosis of rotating machinery: a review," *Mechanical Systems & Signal Processing*, vol. 108, pp. 33–47, 2018.

[6] P. Glauner, J. A. Meira, P. Valtchev, R. State, and F. Bettinger, "The challenge of non-technical loss detection using artificial intelligence: a survey," *International Journal of Computational Intelligence Systems*, vol. 10, no. 1, pp. 760–775, 2017.

[7] J. H. Thrall, X. Li, Q. Li et al., "Artificial intelligence and machine learning in radiology: opportunities, challenges, pitfalls, and criteria for success," *Journal of the American College of Radiology*, vol. 15, no. 3, pp. 504–508, 2018.

[8] 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.

[9] M. Nasr, A. Mahmoud, M. Fawzy, and A. Radwan, "Artificial intelligence modeling of cadmium(II) biosorption using rice straw," *Applied Water Science*, vol. 7, no. 2, pp. 823–831, 2017.

[10] J. Lemley, S. Bazrafkan, and P. Corcoran, "Deep learning for consumer devices and services: pushing the limits for machine learning, artificial intelligence, and computer vision," *IEEE Consumer Electronics Magazine*, vol. 6, no. 2, pp. 48–56, 2017.

[11] S. D. Baum, "On the promotion of safe and socially beneficial artificial intelligence," *AI & SOCIETY*, vol. 32, no. 4, pp. 543–551, 2017.

[12] R. Chatila, K. Firth-Butterflied, J. C. Havens, and K. Karachalios, "The IEEE global initiative for ethical considerations in artificial intelligence and autonomous systems [standards]," *IEEE Robotics & Automation Magazine*, vol. 24, no. 1, pp. 110–110, 2017.

[13] E. Burton, J. Goldsmith, S. Koenig, B. Kuipers, N. Mattei, and T. Walsh, "Ethical considerations in artificial intelligence courses," *AI Magazine*, vol. 38, no. 2, pp. 22–34, 2017.

[14] S. Price and P. A. Flach, "Computational support for academic peer review," *Communications of the ACM*, vol. 60, no. 3, pp. 70–79, 2017.

[15] A. Agrawal, J. S. Gans, and A. Goldfarb, "What to expect from artificial intelligence," *MIT Sloan Management Review*, vol. 58, no. 3, pp. 23–26, 2017.

[16] D. L. Labovitz, L. Shafner, M. Reyes Gil, D. Virmani, and A. Hanina, "Using artificial intelligence to reduce the risk of nonadherence in patients on anticoagulation therapy," *Stroke*, vol. 48, no. 5, pp. 1416–1419, 2017.

[17] P. Mamoshina, L. Ojomoko, Y. Yanovich et al., "Converging blockchain and next-generation artificial intelligence technologies to decentralize and accelerate biomedical research and healthcare," *Oncotarget*, vol. 9, no. 5, pp. 5665–5690, 2018.

[18] E. J. Lee, Y. H. Kim, N. Kim, and D. W. Kang, "Deep into the brain: artificial intelligence in stroke imaging," *Journal of Stroke*, vol. 19, no. 3, pp. 277–285, 2017.

[19] H. Lee, F. M. Troschel, S. Tajmir et al., "Pixel-level deep segmentation: artificial intelligence quantifies muscle on computed tomography for body morphometric analysis," *Journal of Digital Imaging*, vol. 30, no. 4, pp. 487–498, 2017.

[20] V. Dignum, "Ethics in artificial intelligence: introduction to the special issue," *Ethics and Information Technology*, vol. 20, no. 1, pp. 1–3, 2018.

[21] M. Kermadi and E. M. BeRkouk, "Artificial intelligence-based maximum power point tracking controllers for photovoltaic systems: comparative study," *Renewable & Sustainable Energy Reviews*, vol. 69, no. 3, pp. 369–386, 2017.