

Retraction

Retracted: Internet Football Training Teaching Data Analysis Based on an Embedded Sensor Network

Wireless Communications and Mobile Computing

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] M. Xue and Z. Liu, "Internet Football Training Teaching Data Analysis Based on an Embedded Sensor Network," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 2912262, 13 pages, 2022.

Research Article

Internet Football Training Teaching Data Analysis Based on an Embedded Sensor Network

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Football is recognized as the “first sport” with the largest number of players and the highest concentration in the world, and it also plays a pivotal role in the development of Chinese sports. Whether football can be fully developed is the key to reflecting the strength of the national sports industry. Based on the embedded sensor network, this article analyzes the internet football training and teaching data. This article is aimed at analyzing the effects of the combination of embedded sensor networks and various indexes of football sports and at making full use of this technology to provide guidance for the update of football players’ training concepts. The article first analyzes the parameters of the embedded sensor and analyzes the specific details of the football players’ actions, such as skill, strength, and continuity of the action, based on the structure of the captured image. Then, this article selects 40 football players from a certain place and analyzes their concepts of football sports competition education and training. With the help of sensor network technology to carry out experimental comparison, this article focuses on the analysis of the experimental group and the control group, respectively, around movement stretching and dynamic integration, athletes’ training willingness, etc. The experimental training data shows that the experimental group has more advantages in training results whether it is muscle activation or nerve activation. In terms of nerve activation, the maximum parameter of the experimental group members was 8.74, and that of the control group was only 7.03. The gap between the two shows that through the application of embedded sensor network technology, Internet football training and teaching can provide a significant auxiliary role for the development of football players in all aspects.

1. Introduction

Technological innovation is the core force that promotes social development. The innovation of science and technology is a powerful competition between productivity and culture, and school education is an important place to spread advanced cultural ideas and cultivate powerful cadres [1]. With the development of economy and the progress of the times, healthy physical fitness is the physical hardware foundation of innovative talents, and it is also the prerequisite physiological condition for the development of personality. The development of football is an important part of the development of sports. Through the development of football games, training, and other

measures, mass football projects have been well publicized and promoted in the society.

The current development of football in China has reached the bottom, and there is a huge shortage of reserve talents. The development of campus football is not only an important way to train young players and enrich the player reserve but also a key factor in determining the success of the development of the “football for all” road. According to the research results, many experts pointed out that the current coaching techniques and training methods of the national football team are largely unadvanced and unscientific, which will affect the development and progress of their sports skills. As a major part of football coaches, sports have a long way to go. The reform of the physical education

system and the scientific education system is changing with each passing day [2].

As sports develop in the direction of innovation, socialization, and global cohesion, technology is also playing an increasingly important role in competitive sports [3]. Although the application of some high-tech products under discussion has had an unexpected impact on football matches, there is no doubt that higher technology and more technology will enter the football field. For example, when football enters the high-tech era, "big data" is used to interpret the game. Driven by modern technology, big data has gradually penetrated into the sports field, and big data technology has been widely used in football, the world's largest sport. The application of data acquisition systems has only begun in recent years, thanks to the rapid development of high-tech fields such as wireless communication, sample recognition, and intelligent fusion data sensors. The data is completely in line with the intelligent temperature sensor set to the stadium and does not directly affect the training of ordinary athletes and the coaching procedures of coaches [4, 5].

At present, there are many studies on football planning and football selection, which hinder the development of football. The number of books for statistical analysis of the rules of international matches and home games at all levels exceeds the number of books on football training studies. The purpose of Williams et al.'s study is to assess the knowledge and attitude of British professional football players about concussions. Hybrid methods include the Rosenbaum Concussion Knowledge and Attitude Survey (RoCKAS) and semistructured interviews. RoCKAS contains separate knowledge (0-25) and attitude (15-75) scores, and then, it is a semistructured interview composed of concussion knowledge-, attitude-, and behavior-related questions. The average score of RoCKAS knowledge is 16.4 ± 2.9 (range 11-22), and the attitude score is 59.6 ± 8.5 (range 41-71) [6]. Rssler et al.'s study divided 12 football teams (age group younger than 9, 11 or 13 years old) into an intervention group (INT, $N = 56$ players) and a control group (CON, $N = 67$). Based on the inference of the amplitude and the linear mixed effect, they used the model to analyze the performance test results. They found potential parameter results in Y balance, falling jump response intensity index, falling jump height, and reverse motion [7]. Combined with the systematic review, Thorborg et al. analyzed the FIFA injury prevention plan and controlled randomized controlled trials among football players. Six cluster randomized controlled trials evaluated the impact of FIFA injuries. The experiment compares the prevention plan with the overall incidence of football injuries in recreational/subelite football. The results showed that the overall risk of injury was reduced by 0.75 (95% CI 0.57 to 0.98, $p = 0.04$), which is conducive to the FIFA injury prevention program [8]. The goal of Siegmund et al. is to quantify the collision detection rate and effectiveness of the orientation and peak kinematics of two wearable sensors, namely, the helmet system (HITS) and the mouth-guard system (X2). They used a linear impactor, a modified Hybrid III head shape, and a helmet model to perform 16 impacts on each system. They compared the peak linear

and angular accelerations (PLA, PAA), head injury criteria (HIC), and impact direction of each device with reference sensors in the head mold [9]. Sharma and Kumar proposed an energy-saving modified distance vector jumping algorithm based on teaching-based optimization and introduced the concept of collinearity to reduce the positioning error caused by the collinearity of anchor nodes. Hop size modification, anchor node optimization selection, location optimization, and location upgrade are all performed at the target node level. Thus, it greatly reduces the communication between nodes and reduces the energy consumption of nodes [10]. Aiming at the characteristics of real time, security, bandwidth dependence, and high transmission cost in the field of multimedia professional teaching, Nan and Zhang designed and implemented a cloud-based video surveillance platform. Cloud storage technology is used to solve the heterogeneity of video data. They use the H.264 video coding standard and RTSP video real-time transmission protocol to solve the bandwidth dependence and real-time problems. They proposed to build an embedded sensor network for identification and centralized control [11]. A WSN (wireless sensor network) test bench or remote laboratory is a WSN deployed in a controlled environment that allows users to perform experiments remotely. Users can remotely access WSN, configure and program nodes, and retrieve the results of experiments. There are a large number of WSN test benches used for scientific research, but the WSN test benches used for teaching goals have not yet been realized. Teaching test benches have different requirements for scientific research test benches. From the above research results, it can be seen that there are still many shortcomings. It can be seen that the scope of application of its research is relatively narrow, which means that the requirements of football training are getting higher and higher, and its research results are difficult to deal with. Godoy et al. propose a teaching goal-oriented WSN test platform for students with low WSN and programming knowledge [12]. It can be seen from the above research that these experiments for different research angles all provide the main source of argumentation on the data, and the experimental results have certain reference value. However, the research perspectives of these studies are too singular. It is necessary to combine and analyze the data of the embedded sensor network and football network teaching and training. It can maximize the advantages of the two and complement each other.

This research mainly uses research methods such as literature review, intelligent analysis, and mathematical calculations for scientific research and analysis. Integrate the data collection module to realize real-time transmission of wireless terminal conference data, and then, send relevant information to the terminal through the menu button to try to maximize the lifetime of the entire network. By rationally planning the routing of each node and maximizing the survival time of the entire network, this paper chooses a dual-threaded structure, and one thread is used to process functional functions, such as corresponding buttons or menus. Another thread is dedicated to showing the field and athletes. In the choice of digital filters, two factors need to be considered. On the one hand, it is necessary to meet the

actual needs of the project and try to keep the original signal characteristics while filtering out high-frequency interference. On the other hand, considering the computing power of the node, it is not suitable to choose a filter with higher complexity.

2. Embedded Sensor Network and Football

2.1. Football Training Network Teaching. Sports have their own law of development. In the process of development and progress, any sports training and competition must follow the characteristics and laws of the project and use progressive ideas and correct methods. Good management of the important characteristics of sports can achieve the improvement of sports performance and maintain the stable development of sports level [13]. The characteristics of football training are integrity, variability, confrontation, and ease of action. Football is a highly antagonistic collective competition event, and the overall comprehensive qualities such as adaptability to the social environment and competitiveness can be developed and improved. As a subject in school education, physical education can make good use of the practicality, competitiveness, and collaboration of the subject itself. In the practice of physical education, rules or disciplines are used to regulate, which greatly affects the thinking of students in exercise learning and gradually regulates the habits of students. Various new teaching methods are constantly emerging, and psychological training is recognized by people in the industry in physical education, especially football teaching. Since the most obvious feature of the physical health curriculum is the outdoor practice class which is different from other courses, the main means for students to learn physical methods and skills is to imitate the teachers' exercises intuitively. Teachers use various language, intuition, practice, and other teaching methods to impart new knowledge when teaching and get exercise through student-led practice [14]. Training concept occupies an important position in sports training. It is the basis for a macro grasp of the training direction and a strong evidence for the continuous improvement of the level of sports training. For example, in simulation training, the purpose of a simulation training method is to improve the athletes' adaptability in the competition, get used to the competition environment, and establish a reasonable power stereotype structure in their minds so that they can use their skills and tactics normally. In China, professional football and "campus football" projects have been launched. In order to learn the advanced technology and training methods of European and American strong teams, coaches or athletes have adopted the "invite in-send out" approach to strengthen cooperation with European and American football. However, football has not achieved substantive success in games and championships, which has to be explored for the reasons. Therefore, studying football training techniques and promoting advanced football training techniques are important practical applications for the development and progress of Chinese football. In the process of practice, athletes are the main body of practice, and coaches are the orientation of training. The coach's personal football practice

and training experience is the key to the athletes' football skills [15]. The concept of football training is the coach's judgment and thinking on training, which in turn has a direct impact on the training of football players. Because first-time practitioners are not familiar with the content of the exercises, the ability to visualize in their minds is relatively weak. When training for the first time, it mainly relies on the external appearance, and the outline of the appearance is relatively vague. The skilled person is more familiar with things, and the appearance ability is relatively stronger [16]. The situation in the ball game changes rapidly and is complicated and requires higher players' thinking, observation, judgment, and reaction abilities. It is worth mentioning that familiarity with movement skills by watching videos, pictures, etc. is an important way to enhance internal appearance. There is a big difference in the brain waves in the brain during motor presentation. Students with weaker presentation skills will use cognition more. After repeated practice to get acquainted with sports items, it can smoothly improve its presentation ability and motor skills [17]. Adding representational exercises to football teaching can stimulate students' enthusiasm, cultivate their interest, improve their understanding of football, and change their cognition of the role of football fitness. This has a positive effect on promoting learning [18].

2.2. Football Training System. In traditional sports fields such as football, the application of data acquisition systems began in recent years. This benefits from the rapid development of high-tech fields such as wireless communication, sample recognition, and intelligent data integration. In the study of training plans, people usually describe the technical system of sports training from two dimensions, horizontal and vertical [19]. The factors affecting the training plan generally include (a) the start and end time of the season, (b) the main opponent in the league, (c) the date of the cup match, (d) the date of rest and holiday, (e) the stage of technical and tactical development, and (f) the development of the physical fitness stage. There are many factors that affect training, and the comprehensive factors are extremely complex. Whether these relationships are properly handled will directly affect the effectiveness of the training. In a formal football game, the situation on the field often changes rapidly, and multidirectional movement shows the ability of nondirectional displacement change. It is specifically reflected in the sudden change of external conditions, and the body can quickly respond and move to the required angle or direction [20]. Assuming that a football player on the pitch is compared to a neural network, the kick-off player uses a formula to input information and locate the coordinates as

$$\begin{aligned}
 x_h^\varepsilon &= \sum_{\varepsilon=1}^{a-1} \delta_{i,h} \otimes y_i + m_h, \quad i = 1, 2, \dots, a; h = 1, 2, \dots, f, \\
 x_n^\varepsilon &= \sum_{i=1}^f \delta_{t,i} * m_t^1 + f_{t-1}, \quad t = 1, 2, \dots, f, n = 1, 2, \dots, p, \\
 z_{\alpha,m}(a)_h &= \bar{x}_h = t_h^\varepsilon = p(a_h^\varepsilon) h = 1, 2, \dots, p.
 \end{aligned} \tag{1}$$

The whole process of information is similar to the processing of signal x_h^e , transfer signal x_n^e , processing signal $z_{\alpha,m}$, and reaction signal $p(a_h^e)$ by the nervous system of the place. With the expansion of the network scale, users have put forward higher and higher requirements for the bandwidth and reliability of the backbone link. In traditional technology, the high-speed interface board is often replaced or the high-speed interface board is replaced. In the training process, by dividing the connection density of the hard network and the negative network, the positive and negative alternating training of the network density is realized, which is expressed as

$$R(\delta, m; a^i, n^i) = \frac{1}{\kappa} \|p_{\delta,m}(a^i) - n^i\|,$$

$$R = (\delta, m) = \left\langle \frac{1}{n} \right\rangle \sum_{i=1}^n r \cdot [(\delta, m; a^i, n^i) - (n^i - a_i^m)], \quad (2)$$

$$\gamma_i = \frac{\chi}{\chi t_i R(\delta, m; a^i, n^i)} = \frac{\chi}{\chi t_i} \cdot \frac{1}{m-1} \|t_{\delta,m}(a) - n\|^2.$$

The importance of sports training is an important subject of research training. Exercise is the most common form $R(\delta, m; a^i, n^i)$ in daily exercises. The different angles of the lower limbs κ also need to be adjusted according to the body part. Therefore, the stability γ_i of the important joint $p_{\delta,m}$ during exercise also plays a positive role. The data introduced in the video teaching is used to calculate the empirical transfer function, the relationship between the input and output of an object with linear characteristics is expressed by a function, a mathematical model describes the dynamic performance of the system, and the output response of the system can be obtained by solving the differential equation under the given external effects and initial conditions. That is,

$$g(\delta)(z+1) = \varphi \forall g(\delta)(z) + \phi(1-\varphi) \| \iota R(z) / \iota \delta(z) \|,$$

$$\varphi(a) = l(a_h) + l'(a_h)(a - a_h) + \frac{m}{n-1} l''(a_h)(a - a_h)^o. \quad (3)$$

Multiple joints are combined together to form a specific function, the central nervous system z plays a coordinating role, and muscle φ , joint ϕ , and bone ι coordinate and output the determined action posture. This process can generate a series of estimated values to form an n -dimensional function:

$$f(o) = f(o_i) \forall f(o_i)(o - o_i) + \frac{i}{o} (o - o_i)^i \{f(o_i)(o - o_i)\}^2,$$

$$f(o) = f(o_i) + \iint \frac{(o_i)(o - o_i) + 1}{(o-1)^{\phi} \phi k(o_i)(o - o_i)}. \quad (4)$$

Reasonable action mode can effectively avoid energy leakage $\iint (o_i)(o - o_i)$ during exercise, improve athletes' performance on the court and efficiency of muscle transfer i/o , and improve sports performance.

2.3. Embedded Sensor Network and Video Teaching Design.

With the development of its technology, wireless sensor networks have become more and more widely used [21, 22]. Many European research companies are developing low-cost, high-performance help training programs that can also retrieve real-time game data and personalize a large amount of game data through platform software to identify coaches or spectators. It moves the program to the built-in device bar, making the device more portable and easier to operate. The embedded network video processing structure is shown in Figure 1.

When the embedded sensor kernel is running, the device driver will register the device driver in the corresponding global variable list. When a device needs to be operated in the application space, the kernel needs to find the corresponding device driver in the global variable linked list [23, 24]. Scope points and global variables are valid in the entire project file; static global variables are only valid in the file where it is defined; static local variables are only valid in the function that defines it, but the program only allocates memory once. Due to the random scattering of photons in the environment, the shot noise appearing in the image will theoretically be randomly distributed in the image, that is, uniformly and randomly distributed on a two-dimensional plane [25, 26]. After the short-wavelength electromagnetic radiation enters the material and is scattered, in the scattered wave, in addition to the original wavelength wave, there will also be a wave with an increased wavelength. The larger the atomic number of the scattered object, the greater the intensity of the scattered wave. The ratio of the intensity of the original wavelength is smaller. The main advantage is that it is based on wireless sensor networks. Part of these routes are selected for review and analysis and then sent to the training receiving terminal. By controlling the light to calibrate the measured object, the image sensor captures the characteristic image displayed on the surface of the measured object, transmits it to the computer for processing, and calculates the visible characteristic of the three-dimensional coordinate of the precise positioning of the center [27]. Some of them can join or leave the network at any time without affecting the performance of the entire network and have a strong endurance capability. By adjusting multiple display fields, such as adding multiple data displays, the normal operation is

$$a' = \frac{[\alpha, \beta] + (k-h)(a - a_{\min})}{a_{\max} - a_{\min}}, \quad (5)$$

$$R(\delta, m) - R_m = \sqrt{\frac{1}{o-1}} \sum_{o=1}^n \|\alpha^o - \beta^o\| - \sum_{o=1}^r \frac{1}{a(a-1)}.$$

In order to reduce the complexity of the network, a method to reduce the delay of the input data structure is proposed. Use the maximum delay time to compare the delay time corresponding to each rigid body data in the linked list queue one by one, and output the rigid body data whose delay time is less than the maximum

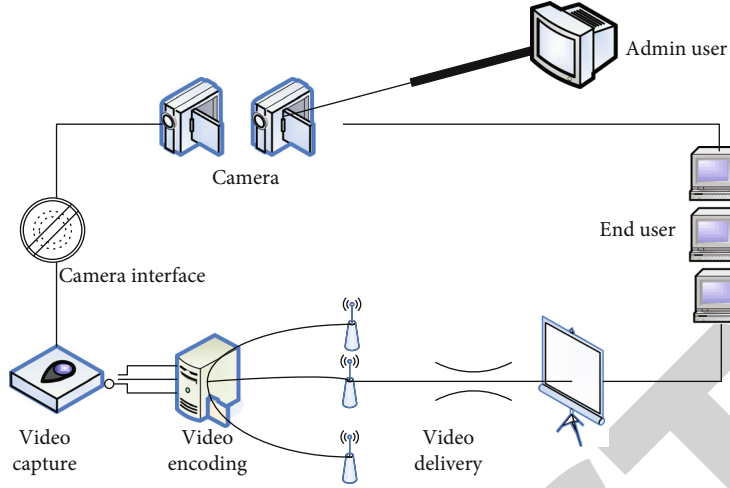


FIGURE 1: Embedded network video processing structure.

delay time among each rigid body data, and/or output the last one that satisfies the delay time greater than or equal to the maximum. The rigid body data corresponds to the delay time. By reducing the data size R_m , the impact of data overload r can be eliminated, thereby reducing the complexity of the neural network:

$$\sum_{i=1}^l s_i^k + \frac{1}{3} \sum_{i \rightarrow j} \eta_i^2 = \sum_{i=1}^l s_i^k + \frac{k}{k-2} \|\eta\|^2, \quad (6)$$

$$\sum_y^{1-y} \mu_{i-1}^i + \alpha \frac{\sum_{j=1} \beta_j^2 / \beta_{i-1}^2}{((1 + \beta_i^2) / \beta_{i-1}^2)}.$$

Reduce network complexity by reducing the number of connections in the network, thereby improving the generalization ability of the network; among them, $\sum_y^{1-y} \mu_{i-1}^i$ represents the weight item, and $\sum_{j=1} \beta_j^2 / \beta_{i-1}^2$ is the complexity. The calculation of the relationship between the number of network iterations and the sample for the initialization weight [28] is expressed by the following formula:

$$\frac{r_x}{R} = \frac{(g(p_x) - q_x)^2}{(1/a) \sum_{j=1}^a r_x},$$

$$\omega_x(l+1) = \omega_x(l) + b \{ \delta r_x - \delta \omega_x \sqrt{r_x} \}, \quad (7)$$

$$r(l+1) = r(l) + (b-1) \nu (R - \omega) \frac{1}{R} \sum_i^r g(p_x - q_x).$$

Due to the difference of data and the influence of noise, there is density disturbance when the weight $\omega_x(l+1)$ is updated to the density, which is easy to cause the network ν to move, and it does not support network integration. To solve this problem, rearrange the order of the samples:

$$T_l = \vartheta_{l-1}(l+i) = \vartheta_l(i) + \|\alpha - \beta\|(i+1)^s,$$

$$f \vartheta_1 = m \vartheta_{i+1}^s \Leftarrow F^{p+q} M \vartheta_2 = Q \vartheta_i^s \in Q^{p,q}, \quad (8)$$

$$f_i(s+1) = \frac{\vartheta_m(s)}{\sum_{p=q}^1 [f(p_i) - q_{l-1}] \cdot \vartheta_{p-q}}.$$

Since the mutual learning neural network training method T_l is not suitable for the regression task $\|\alpha - \beta\|$ of this many-to-one mapping mode, therefore input multiple target values for the negative network training and compare the standard positive F^{p+q} to achieve the effectiveness and feasibility of the regression.

3. Data Processing of Football Training Teaching

3.1. Application of Embedded Sensor Network Processing Football Training Data. In recent years, the computing and storage capabilities of embedded systems have been continuously enhanced, and communication technologies have changed with each passing day, making the transmission of big data no longer a problem. Combined with sensing technology, wireless sensor networks have been widely used in military, industry, and agriculture. With the further research and development of embedded systems and the rapid progress of computer technology, embedded devices will become more networked and intelligent, which will bring more and more colorful experiences to our lives. Various information home appliances, such as digital TVs, set-top boxes, digital cameras, VCDs, DVDs, audio equipment, video phones, home network equipment, washing machines, refrigerators, and smart toys, widely use microprocessors/microcontrollers and embedded software. With the demand of the market and the development of technology, traditional mobile phones have gradually developed into smartphones that integrate features such as PDA, e-commerce, and entertainment. The embedded acceleration sensor can detect the vibration signal to calculate the vibration amplitude of the

person and then identify the state of the human body movement or the specific action produced. The types of football actions in different scenes are shown in Figure 2.

Combining sensors, signal protection circuits, and a single microcomputer on a single chip can develop highly scalable sensors. The received sensor information is transmitted to the sensor information at the receiving end, and finally real-time monitoring is performed at the receiving end, or the sensor information is guaranteed to be remotely transmitted to the control center at the receiving end. The combination of the information of each sensor can detect the remote transmission of the Ethernet. Interference occurs between the wireless network and other radio systems, causing signal transmission interruption or bit errors during data transmission. When it discovers multiple access beacons during the process of connecting to the network, it needs to calculate the energy intensity of all access beacons to select the point with the best signal. Based on the fast acquisition speed of the embedded device, the handheld device continuously adjusts the pose in the gap width to ensure that the image where the gap is perpendicular to the line laser can be collected. The minimum data calculated by the user program in one measurement is the gap width information. Generally, the access point with the best signal should be the closest access point. The structure of the moving image collection system with embedded sensors is shown in Figure 3.

On the one hand, the embedded sensor responds to changes in movement frequency and intensity. On the other hand, the embedded sensor can detect the azimuth angle and individual movement at the same time. With the development of microelectronics technology, sensors are often used to detect and recognize human movements, and they can be tied to any part of the human body. Research on falls using embedded sensors can be divided into two aspects: risk estimation before a fall and recognition after a fall. Prefall risk estimation is based on factors that may cause falls, such as human strength, balance, and gait defects. Collect movement data and extract feature vectors such as body swing, lower limb strength, and reaction time. According to the model, estimate the possibility and risk of a fall in the future. Figure 4 shows a schematic diagram of players dribbling on the court.

In the design of embedded systems, the choice of a microprocessor is very important. Using hardware encoding for compression can reduce the encoding quality and the load of the installed processor. When a person is running, the point of maximum acceleration amplitude corresponds to the moment when the foot touches the ground. The upward reaction pressure applied by the ground to the human body causes the value of acceleration to increase in an instant. The data collected by each sensor node is a discrete sequence. The fall motion detector is obtained by analyzing the collected data, extracting the features, and training the calibrated training samples, and then, the fall motion judgment is made by the detector. Digital image acquisition and processing are to extract useful or important two-dimensional data from the original three-dimensional information of the real object to complete the task of conversion



FIGURE 2: Types of actions of football in different scenarios.

and measurement. When the computer processor processes the data, it is transferred to the memory before proceeding to the next step. Then, considering the data interaction with the device, the device must have an independent memory buffer; obviously, it must also have an independent data format. A digital image is an image that is obtained by digitizing an analog image with pixels as the basic element and can be stored and processed by a digital computer or digital circuit. Sampling is to transform a spatially continuous image into discrete points. The higher the sampling frequency, the more real the restored image. The relevant parameters of the embedded sensor selected in this experiment are shown in Table 1.

Because the embedded server not only completes the server system but also completes some control settings, the system is more complicated. The application retrieves frames containing video data from the video output queue and processes the video data in the frame memory, such as storage or compression. After the image frame is read out, the unit that stores the image frame in the queue is added to the queue again to start the next round of image frame storage; the whole process continues in a loop. The performance is analyzed from three levels of data acquisition, data transmission, and data processing, and the results are shown in Figure 5.

3.2. Technical Design of Football Training Teaching Innovation. Football is a multitasking sport. Each activity in the game is coordinated by individual players and multiple individuals, which focuses on their understanding and decision-making abilities. Therefore, how the players decide before and after passing is the basis for determining the outcome of football. How to improve the technical development level of football players and how to play a better ball in a fierce game have become a major problem faced by coaches and athletes. With the gradual alleviation of the shortage of talents in universities and research institutes and the improvement of social development and production levels, for more than ten years, college football has experienced a growing football league and the introduction of foreign technical skill training. This makes colleges and universities continue to use the original training methods to become more and more inefficient, unable to meet the highest requirements of football training in the game. Its requirements for sports competitiveness are getting higher and higher. Query

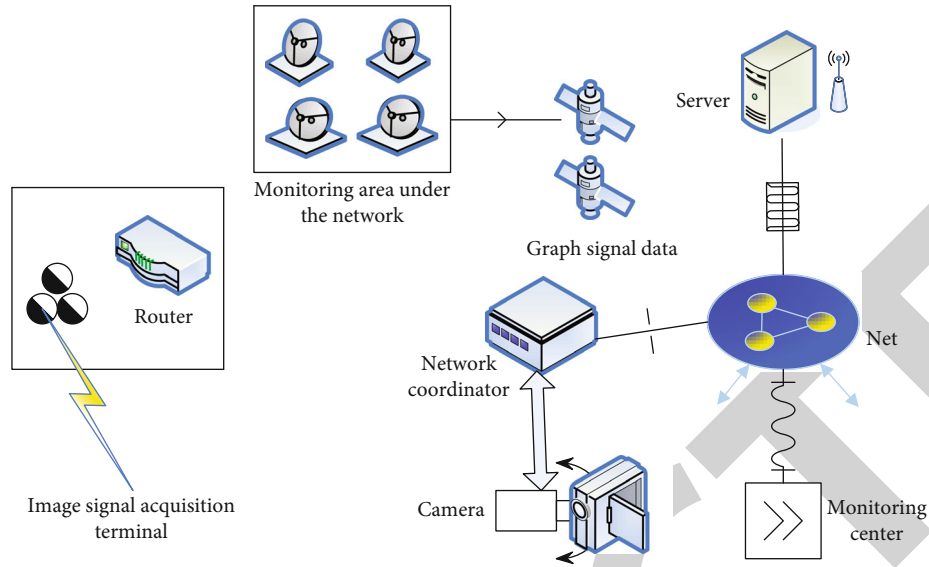


FIGURE 3: Motion image acquisition system.



FIGURE 4: Players on the court dribble.

TABLE 1: Relevant parameters of embedded sensors.

Operating voltage	DC15V
Working current	20 mA
Frequency range	200-9500 Hz
Frequency response	2.45 dB
Output impedance	550 Ω
Output level	-4 till 10 upp
Sensitivity	250 mA
Working current	2-20 mA
Maximum output voltage	2.65 V-upp

the literature on football research in the past five years, and investigate the main factors affecting the development of national football, as shown in Table 2.

Traditional teaching methods must have their unique effects. However, with the implementation of the new curriculum reform, it is necessary for physical education teachers to explore new methods and innovate teaching practices to meet the requirements of students. In terms of training content and methods, it breaks the traditional learning pattern, strives to develop new courses, new content, and new

methods, and has the spirit of innovation and practice. As the conditions for training athletes are closer to the implementation of specialized training methods, the level of team competition depends to a large extent on the updating of the training process and the improvement of methods. The basic elements of the curriculum are educators, learners, and courses. The views of 15 teachers from a football school on the characteristics of football training concepts were investigated, as shown in Figure 6.

Football is a kind of antagonistic sports. All the techniques and tactics used during the game are used and changed with shooting as the ultimate goal. Through observations in teaching and testing, it is found that many problems that students have during football training or competitions are not taken seriously, such as unscientific running posture, inefficient acceleration and deceleration, and wrong action patterns. These problems not only seriously hinder the progress of technology but also greatly increase the risk of damage. It has a huge impact on students' sports career and physical health. Select 40 football players to make statistics on the experience of Internet football training and teaching, respectively, 20 people in the control group and 20 in the evaluation group. The basic situation is shown in Table 3. The technical indicators are compared after data analysis and adjustment training test, as shown in Table 4.

Goal shooting in modern football games is a three-dimensional maneuver, which is the most obvious feature of football. Strength quality is the basis of other physical fitness factors, and it is the key to improving football players' specific sports performance and movement skills. As athletes become more motivated to compete, they will increase their breathing rhythm, heart rate, blood circulation throughout the body, and blood supply capacity of muscle tissue. It needs to overcome the body's physiological inertia. Athletes often face a series of objective environmental problems when playing games, including the playing field, spectators, and opponents' competitive appearance, which will have a

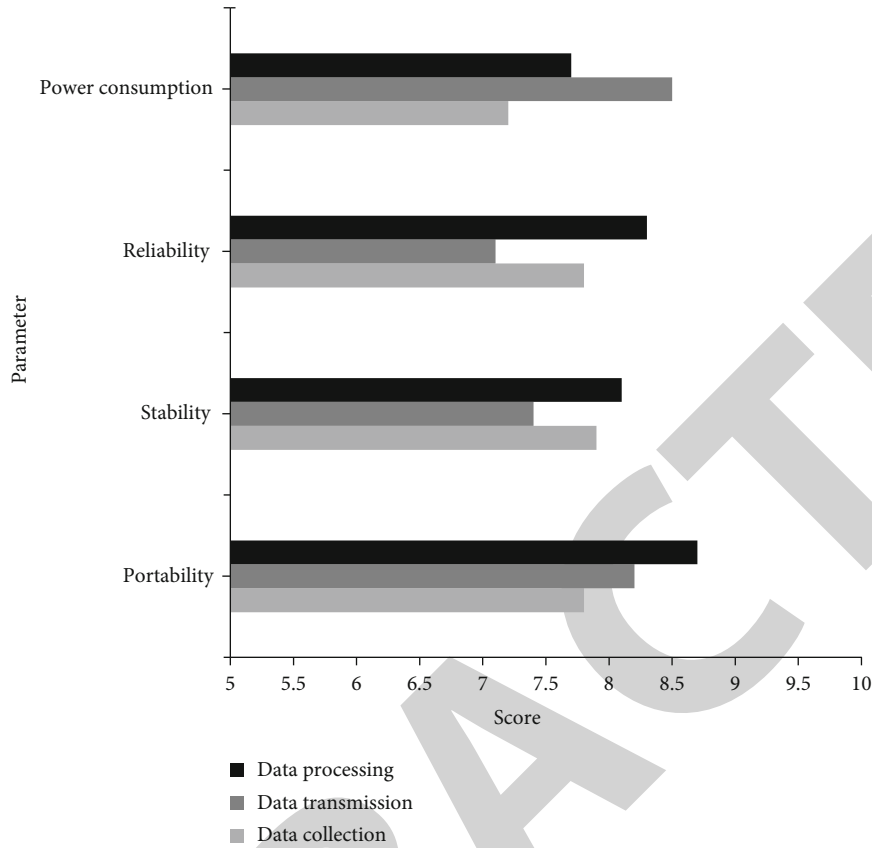


FIGURE 5: Embedded sensor image acquisition performance.

TABLE 2: Factors affecting the development of football (N = 40).

Influencing factors	Frequency	Percentage (%)
Training concept lags	7	17.5
The degree of scientific training	19	47.5
The influence of traditional culture	22	55
Football philosophy	15	37.5
Talent training	11	27.5
Lack of innovation in theoretical research	16	40
Management system and training mechanism	22	55
Professionalization process	8	20

certain psychological impact. Analyze the application of Internet football training and teaching to athletes' movements, and the overall evaluation before and after is shown in Figure 7.

The football technique is the general term for the smart technical movements used by athletes in the game. It is developed with the development and perfection of competition practice and sports training. The ultimate goal of physical training is to serve the game. Physical training is football training. The physical training of football players is not physical training in track and field, let alone physical training. It must be combined with football sports. Practice physical stamina and skills that meet the requirements of the

competition. In the teaching of technology, it is necessary to combine the technology without the ball and the technology with the ball organically. This needs to focus on the development of ball technology. In the mind, the familiar technical movements are represented, and the correct skills and motivation are stereotyped. Analyze the athletes' willingness to learn, as shown in Figure 8.

In the evaluation process, it only pays attention to the evaluation of the results of the students and ignores the evaluation of the students learning the football process, which is not conducive to guiding the students to establish a correct learning attitude and form a good value concept. From the detailed data, the embedded sensor network is used for

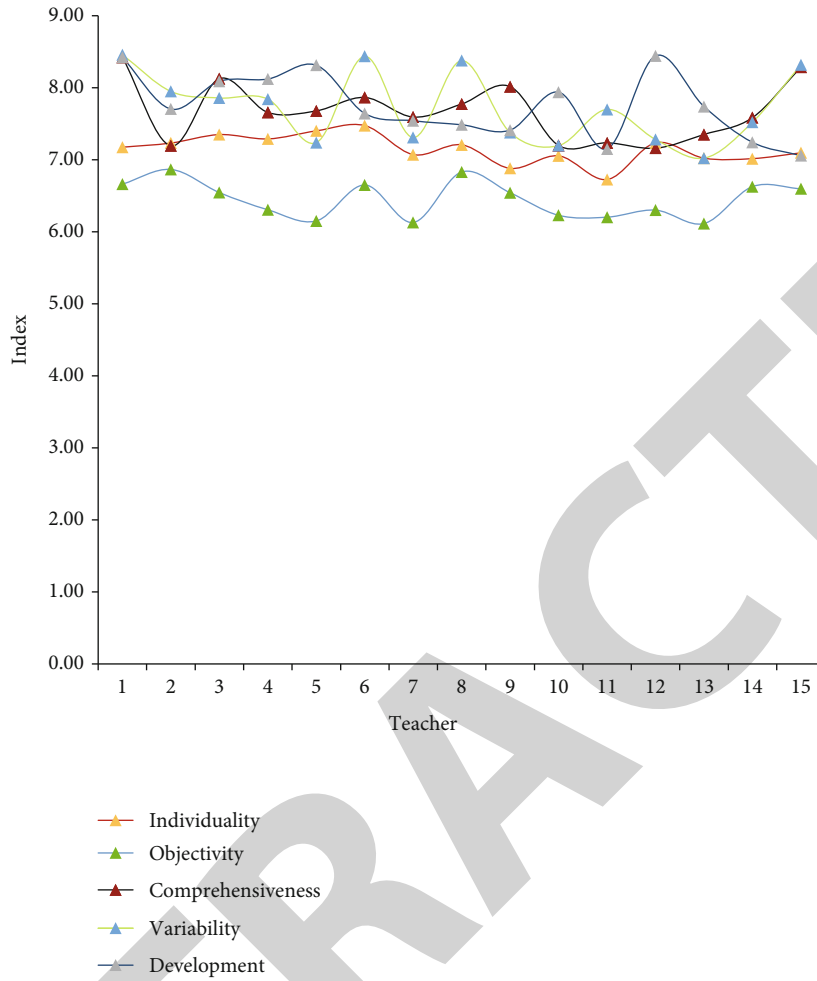


FIGURE 6: The characteristics of the football training concept.

TABLE 3: Basic situation of athletes.

Test items	Test group	Control group	Variance	Significance
Age	21.23 ± 0.58	21.09 ± 0.81	0.988	0.31
Height	174.21 ± 4.83	176.29 ± 5.01	-0.412	0.56
Weight	65.97 ± 6.81	66.98 ± 7.47	-0.379	0.67
50 m	6.97 ± 0.88	7.01 ± 0.78	-0.716	0.51
Standing long jump	201.07 ± 21.46	203.97 ± 17.03	0.687	0.62

TABLE 4: Comparison of technical indicators after adjusting training.

Technical index	Test group	Control group	Significance
Bump the ball	7.28 ± 3.01	5.47 ± 2.98	0.051
Dribble around	8.17 ± 0.77	9.41 ± 0.94	0.708
Set shot	3.29 ± 1.68	2.37 ± 1.37	0.158

teaching and analysis. The first is the football players’ muscle activation and nerve activation parameters, as shown in Figure 9.

The data in Figure 9 shows that the experimental group has more advantages in training results whether it is muscle activation or nerve activation. This can greatly shorten the adaptation time of football players before and during the game. As far as nerve activation is concerned, the maximum parameter of the experimental group members is 8.74 and that of the control group is only 7.03, and there is a significant gap between this value and that of the other 19 athletes. The development and breakthrough of football events require us to carefully analyze and study every aspect of training, to find out the strengths and weaknesses of players, and to make targeted improvements, enhancements, and

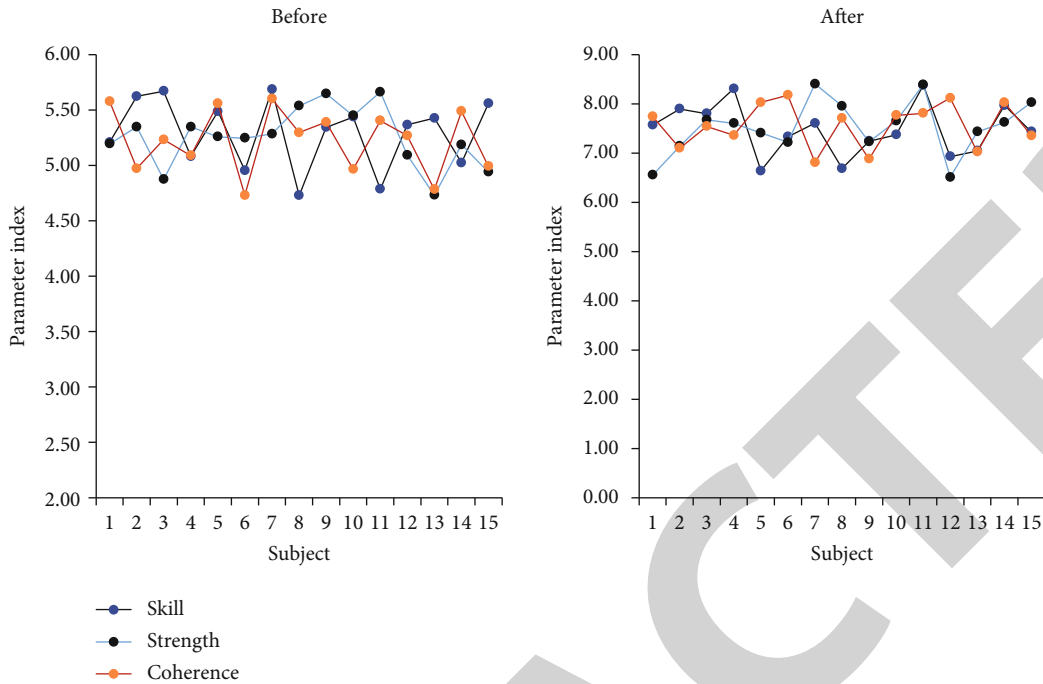


FIGURE 7: Action satisfaction comparison.

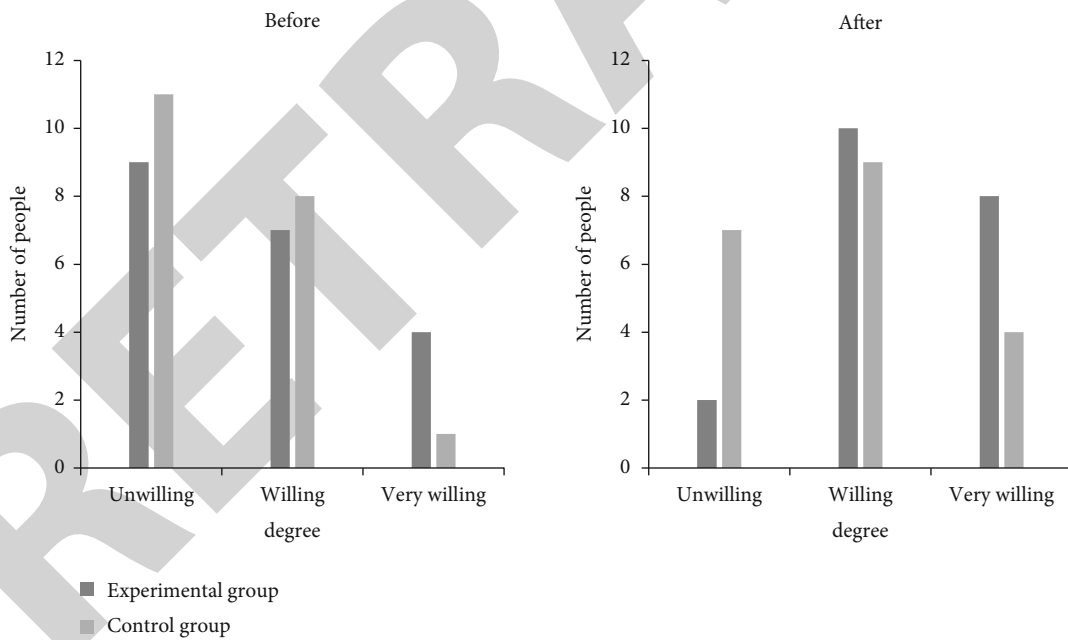


FIGURE 8: Comparison of athletes' learning intentions.

perfections. The agility of football players plays a very crucial role in training and games. It runs through the training and competition. Therefore, in football training and games, players must respond to unexpected conditions from the surrounding environment with or without the ball. The results of a test on the movement of athletes in different groups are shown in Figure 10.

4. Discussion

Although the presentation ability will be greatly improved through practice, learners should also follow the general development law of things and cannot overly expect to obtain the ideal training effect in a short time. The change and development of football training concepts are based on

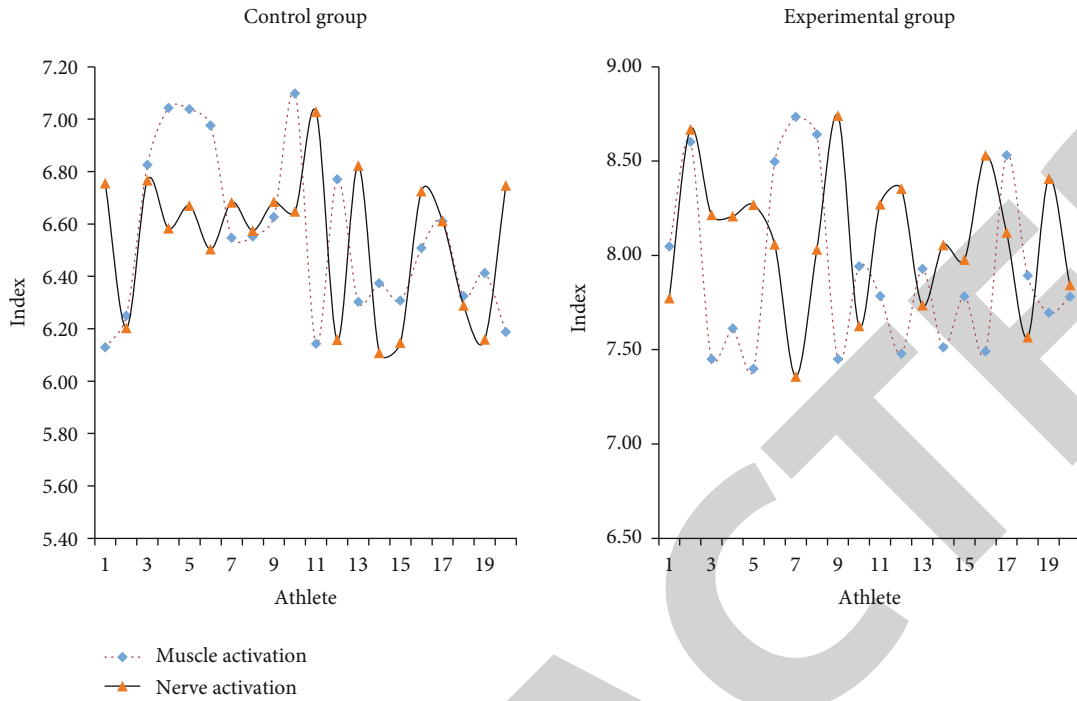


FIGURE 9: Muscle and nerve activation.

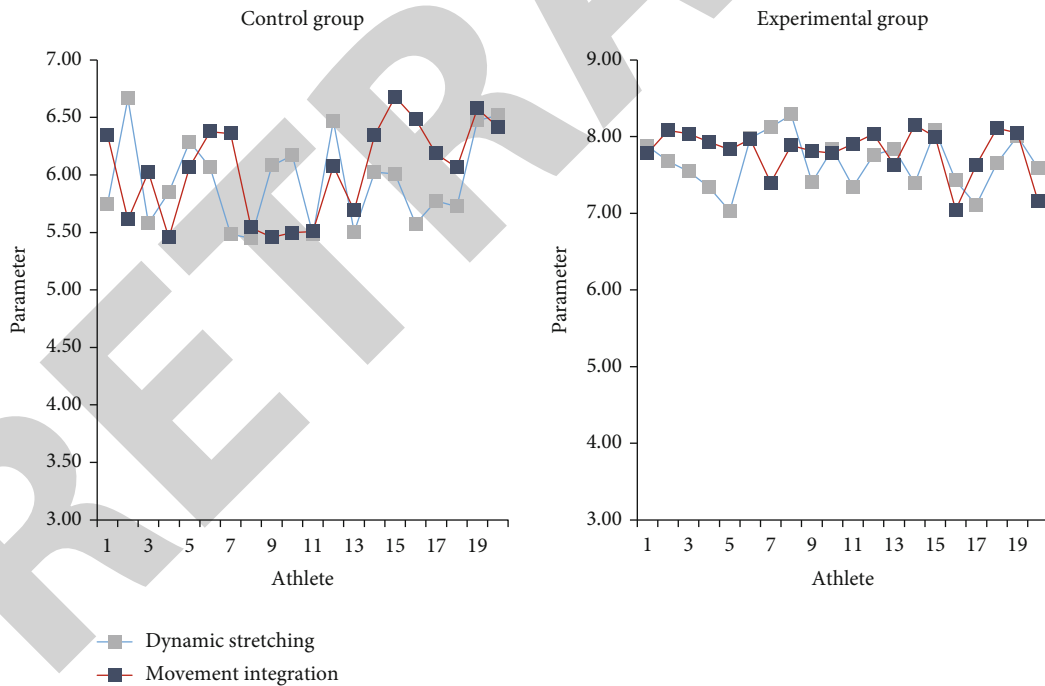


FIGURE 10: Dynamic stretching and movement integration.

the constant denial of existing training concepts. It is not a simple knowledge update problem, but to a certain extent, it is a denial of the original football training concept. Therefore, the change of football training concept is a very difficult and repeated process, which cannot be completed in one step. Multidisciplinary sports training, as a kind of physical

exercise training project, has begun to be promoted and applied to many projects in China in the early stage, but related research results are few and it is still in the development stage. The embedded operating system has a structure and function similar to that of a desktop operating system. Through the events provided by the operating system to

achieve communication and resource sharing between tasks or between underlying drivers, it can effectively manage system software and hardware resources and provide a development platform and operating environment for applications. At the same time, it also contains a complete underlying hardware driver and network protocol. Developers only need to focus on the development of upper-level applications, without the need for heavy design of the underlying hardware and network drivers.

5. Conclusions

The key to the successful implementation of mobile learning is design. The design must be practical and innovative. Design includes learning environment design, learning activity design, technical service design, operating environment design, and so on. Research on mobile learning at home and abroad has gradually increased the awareness and attention to design. Some are from a technical point of view, some are from an educational point of view, and some are measured from the needs of society. The quality of wireless communication transmission continues to improve, the computing power of embedded systems is expanded, and the application of sensor network technology is becoming more widespread. The development of embedded technology has greatly promoted the technological upgrading, product upgrading, automation, and productivity improvement in all walks of life. In order to achieve in-depth research on wireless sensor network positioning, networking, routing, and energy management technologies, it is necessary and feasible to design a wireless sensor network using embedded system technology. The design of Youxian sensor network nodes should be based on their special application fields and functional requirements. Considering the requirements of software and hardware comprehensively, it should choose the software and hardware system architecture suitable for the node. The system design adopts the software and hardware cooperative development method, and the characteristics of software and hardware are considered in the cooperative phase. The software and hardware codesign is carried out for the modules, and the various modules are finally integrated into the system. In this way, problems can be found and solved more effectively, and the development process of the system can be accelerated.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

- [1] M. Kelly, P. B. Gastin, D. B. Dwyer, S. Sostaric, and R. J. Snow, "Short duration heat acclimation in Australian football players," *Journal of Sports Science and Medicine*, vol. 15, no. 1, pp. 118–125, 2016.
- [2] S. Malone, M. Roe, D. A. Doran, T. J. Gabbett, and K. Collins, "High chronic training loads and exposure to bouts of maximal velocity running reduce injury risk in elite Gaelic football," *Journal of Science and Medicine in Sport*, vol. 20, no. 3, pp. 250–254, 2017.
- [3] A. Ujifusa, "States collaborate in pursuit of fresh accountability ideas," *Education Week*, vol. 35, no. 16, pp. 20–22, 2016.
- [4] E. L. Abel, "Football increases the risk for Lou Gehrig's disease, amyotrophic lateral sclerosis," *Perceptual and Motor Skills*, vol. 104, Supplement 3, pp. 1251–1254, 2007.
- [5] H. Song and M. Brandt-Pearce, "A 2-D discrete-time model of physical impairments in wavelength-division multiplexing systems," *Journal of Lightwave Technology*, vol. 30, no. 5, pp. 713–726, 2021.
- [6] J. M. Williams, J. L. Langdon, J. L. McMillan, and T. A. Buckley, "English professional football players concussion knowledge and attitude," *Journal of Sport and Health Science*, vol. 5, no. 2, pp. 197–204, 2016.
- [7] R. Ressler, L. Donath, M. Bizzini, and O. Faude, "A new injury prevention programme for children's football – FIFA 11+ Kids – can improve motor performance: a cluster-randomised controlled trial," *Journal of Sports Sciences*, vol. 34, no. 6, pp. 549–556, 2016.
- [8] K. Thorborg, K. K. Krommes, E. Esteve, M. B. Clausen, E. M. Bartels, and M. S. Rathleff, "Effect of specific exercise-based football injury prevention programmes on the overall injury rate in football: a systematic review and meta-analysis of the FIFA 11 and 11+ programmes," *British Journal of Sports Medicine*, vol. 51, no. 7, pp. 562–571, 2017.
- [9] G. P. Siegmund, K. M. Guskiewicz, S. W. Marshall, A. L. DeMarco, and S. J. Bonin, "Laboratory validation of two wearable sensor systems for measuring head impact severity in football players," *Annals of Biomedical Engineering*, vol. 44, no. 4, pp. 1257–1274, 2016.
- [10] G. Sharma and A. Kumar, "Modified energy-efficient range-free localization using teaching-learning-based optimization for wireless sensor networks," *IETE Journal of Research*, vol. 64, no. 1, pp. 124–138, 2018.
- [11] R. Nan and H. Zhang, "Multimedia learning platform development and implementation based on cloud environment," *Multimedia Tools and Applications*, vol. 78, no. 24, pp. 35651–35664, 2019.
- [12] P. D. Godoy, R. Cayssials, and C. Garcia Garino, "A WSN testbed for teaching purposes," *IEEE Latin America Transactions*, vol. 14, no. 7, pp. 3351–3357, 2016.
- [13] J. Ekstrand, M. Waldén, and M. Häggglund, "Hamstring injuries have increased by 4% annually in men's professional football, since 2001: a 13-year longitudinal analysis of the UEFA Elite Club injury study," *British Journal of Sports Medicine*, vol. 50, no. 12, pp. 731–737, 2016.
- [14] F. Robert, P. Marques, and F. L. Roy, "Coopetition between SMEs: an empirical study of French professional football," *International Journal of Entrepreneurship & Small Business*, vol. 8, no. 1, pp. 23–43, 2009.
- [15] D. L. Carey, P. Blanch, K. L. Ong, K. M. Crossley, J. Crow, and M. E. Morris, "Training loads and injury risk in Australian football—differing acute: chronic workload ratios influence match injury risk," *British Journal of Sports Medicine*, vol. 51, no. 16, pp. 1215–1220, 2017.
- [16] K. Hill, "Concussion symptoms and return to play time in youth, high school, and college American football athletes,"

- Journal of Emergency Medicine*, vol. 51, no. 5, pp. 618-619, 2016.
- [17] M. Waldén, M. Hägglund, H. Magnusson, and J. Ekstrand, "ACL injuries in men's professional football: a 15-year prospective study on time trends and return-to-play rates reveals only 65% of players still play at the top level 3 years after ACL rupture," *British Journal of Sports Medicine*, vol. 50, no. 12, pp. 744-750, 2016.
- [18] D. C. Viano, C. Withnall, and D. Halstead, "Correction to: impact performance of modern football helmets," *Annals of Biomedical Engineering*, vol. 46, no. 1, pp. 208-210, 2018.
- [19] M. Makdissi and G. Davis, "Using video analysis for concussion surveillance in Australian football," *Journal of Science and Medicine in Sport*, vol. 19, no. 12, pp. 958-963, 2016.
- [20] G. Boshnakov, T. Kharrat, and I. G. Mchale, "A bivariate Weibull count model for forecasting association football scores," *International Journal of Forecasting*, vol. 33, no. 2, pp. 458-466, 2017.
- [21] I. Butun, P. Österberg, and H. Song, "Security of the Internet of things: vulnerabilities, attacks, and countermeasures," *IEEE Communications Surveys & Tutorials*, vol. 22, no. 1, pp. 616-644, 2020.
- [22] D. Parnell, S. Buxton, D. Hewitt, M. J. Reeves, E. Cope, and R. Bailey, "The pursuit of lifelong participation: the role of professional football clubs in the delivery of physical education and school sport in England," *Soccer & Society*, vol. 17, no. 2, pp. 225-241, 2016.
- [23] J. B. Mann, K. R. Bryant, B. Johnstone, P. A. Ivey, and S. P. Sayers, "Effect of physical and academic stress on illness and injury in division 1 college football players," *Journal of Strength & Conditioning Research*, vol. 30, no. 1, pp. 20-25, 2016.
- [24] B. Wang, B. F. Zhang, X. W. Liu, and F. C. Zou, "Novel infrared image enhancement optimization algorithm combined with DFOCS," *Optik*, vol. 224, article 165476, 2020.
- [25] S. Jager, T. Jungebloud, R. Maschotta, and A. Zimmermann, "Model-based QoS evaluation and validation for embedded wireless sensor networks," *IEEE Systems Journal*, vol. 10, no. 2, pp. 592-603, 2016.
- [26] Y. Sun, H. Song, A. J. Jara, and R. Bie, "Internet of things and big data analytics for smart and connected communities," *IEEE Access*, vol. 4, pp. 766-773, 2016.
- [27] Y. Wan, H. Yang, Y. Yuan et al., "Low-velocity impact damage localization of GF/epoxy laminates by the embedded sensor network," *Journal of Materials Research and Technology*, vol. 9, no. 4, pp. 9253-9261, 2020.
- [28] A. Forster, "Introduction to wireless sensor networks," *Embedded Systems Handbook Second Edition*, vol. 16, no. 3, pp. 1-18, 2016.