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Research Article

Sports Monitoring Method of National Sports Events Based on Wireless Sensor Network

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Ethnic sports are various ethnic sports that have gradually evolved into various popular sports in the long-term life experience, according to different living habits and residential areas, in the hunting activities of similar sports in the past. Based on the use of wireless sensor networks, this paper monitors the traditional national sports activities, provides real-time feedback on the actual human body conditions in different sports, and finds out the pros and cons of traditional sports and makes improvements. The object proposes a national automated monitoring test, which uses several small sensors in the wireless sensor network to transmit information to monitor many real conditions in the human body during multisport, so as to find out that the national sports exercise is in real life. Experimental results show that in recent years, all ethnic groups have attached great importance to ethnic sports. The 11th Ethnic Minority Games held in 2019 will have 18 competitions, 17 individual events, 131 small events, and 55 ethnic minorities that participated in the joint participation of more than 7000 athletes participating in traditional sports of all nationalities and are the best inheritance and development of national sports.

1. Introduction

Wireless sensor network is a new technology that has developed rapidly in recent years, which could change the vision of technology on the Internet. The problem of developing wireless sensor networks means implementing some solutions to develop wireless sensor reference nodes, so that the controlled area or point is within the range of a specific reference point, and to achieve the purpose of communication or awareness of the area or checkpoint. The calculation of the advantages and disadvantages of the method development method should use local reports or tracking location reports. There are abundant researches on development issues at home and abroad, and related researches are more frequent. Therefore, according to different application objects, the development model is very different. Sports culture is a part of traditional culture. National sports events have evolved over a long period of time. They are full of ancient people's life wisdom and traditional culture and gradually developed into modern sports, but the shadow of traditional sports still exists. Some national sports are welcomed and inherited by more and more people. On this basis, wireless sensor networks are used to monitor ethnic sports, carefully analyze current ethnic sports, and combine real-time and location development to develop traditional custom games.

Wireless detection technology is used for detection procedures and detection equipment for various detection tasks. The most commonly used detection technology in industrial processes is temperature detection technology. In order to reduce the number of damaged components in the inspection and management process. This can effectively reduce production costs. In addition, wireless sensor networks can also be used for detection of various parts. For individuals, the main purpose of wireless sensing technology is for positioning, and positioning technology is a more widely used aspect of sensing technology. National sports have evolved with the development of the times since ancient times and have always been loved by people of all ethnic groups. After work and life, they can not only bring happiness to people

but also cultivate a healthy body, such as horse racing, boxing, archery, martial arts, swing competitions, and shuttlecock competitions, which are all traditional cultures formed by various ethnic groups in our country over the years. The use of wireless sensor network technology for the monitoring of traditional national sports events can not only monitor people's normal sports but also modify the way of sports and finally realize the inheritance and development of traditional sports.

As national fitness has become a national strategy, in recent years, with the formation of mobile social networks, using the Internet to recommend friends has become the most popular way to obtain sporting goods. Friend recommendation services help users through social relationships and user preferences. In terms of personalized sports recommendation on mobile social networks, Zhuan has applied a recommendation method based on friend graphs and sports interest graphs and obtained a system that uses mobile social networks for friend sports recommendation [1]. Wireless body sensors are increasingly used by clinicians and researchers in a wide range of applications, such as sports, space engineering, and medicine. Real-time monitoring of vital signs can significantly improve diagnostic accuracy and enable automatic treatment procedures, such as detecting and preventing seizures or narcolepsy. Elfaramawy et al. proposed a low-power wireless respiratory monitoring system with cough detection function to measure respiratory frequency and cough frequency [2]. In the era of big data, it is of great significance to use modern technology to promote the spread of traditional national sports. Xiao analyzes the plight and path selection of traditional national sports based on the background of big data. Traditional sports have distinct national cultural characteristics. Value orientation, aesthetic awareness, and changing needs determine the value of national sports. Analyzing the crisis of the development of traditional sports, we can see that modern sports games have an impact on the development of national sports [3]. The ubiquitous sensing and unique characteristics of wireless sensor networks (WSN) have led to an increase in applications such as smart parking, environmental monitoring, automotive industry, and sports. In recent years, WSN has gained more and more attention as the infrastructure of the Internet of Things (IoT). Abidoye and Obagbuwa proposed two energy-saving models for WSN in the Internet of Things environment: (i) service-aware cluster model; (ii) energy-aware cluster model [4]. Accelerometers, gyroscopes, and inertial measurement units (IMUs) play an important role in the analysis of human motion. In recent years, physical activity and health monitoring have received great attention, and the use of accelerometers for physical activity monitoring has become popular. Electromyography (EMG) is a popular technique for analyzing muscle activation in sports biomechanics. Since the devices were initially bulky and expensive, their widespread use was restricted, and Howard has added wireless capabilities to these devices [5]. In order to solve the economic burden caused by medical treatment, at the same time, it encourages a healthier lifestyle, darkens the collection of health data, and empowers patients with disease prevention and monitoring capabilities. Heiduk et al. proposed a wireless network of inertial sensors that can monitor body exercises to detect potential catastrophic events. A miniaturized wearable prototype is designed and implemented in hardware [6]. Improving the level of sports has always been a concern of my country's sports industry. With the continuous improvement of the computer level, how to effectively identify the motion trajectory has become a research hotspot in related institutions. Based on this, Baoshan studied the motion recognition method based on depth information and proposed a motion recognition method based on depth information. The results show that the motion recognition method based on depth information can effectively improve the motion recognition rate [7]. After many years of implementing family planning in our country, the aging of the population has advanced. Therefore, the development of national physical fitness must also adapt to the requirements of the times. The traditional national sports fitness can no longer fully adapt to the development of the times. To this end, Dongmei and Yanjun introduced the characteristics of population aging and the deployment and promotion of national and international sports and fitness development strategies. Aiming at the problem of population aging, analyze the development of national sports and fitness to solve the problem [8]. However, the above-mentioned research only stayed on one side and did not propose specific measures for the detection methods of ethnic sports, did not apply wireless sensor network technology to the detection of traditional ethnic sports, and did not carry out a large number of measures. Experiments led to research only at the theoretical level and did not integrate with the actual situation, lacking research significance.

Wireless sensor network is generally used in electrical and automation, monitoring work and positioning, and can play its role well. It is very useful nowadays to feed information back to back-end personnel through wireless network through many small sensors. It is the first time that this technology has been used in the monitoring of ethnic sports. Research on traditional sports is very important. Through many small sensors to monitor the actual situation of the human body in motion and use the wireless network to provide real-time feedback to the information, it can enable an individual to understand the effect on the human body during exercise and decide if to fix it exercise. It can save manpower and material resources to a large extent but systematically update the traditional sports of various nationalities.

2. Wireless Sensor Network and National Sports Exercise Detection Method

2.1. Wireless Sensor Network. Wireless sensor network (WSN) is a distributed sensor network [9]. It is a network form composed of independent organizations and tens of thousands of sensor nodes through wireless communication technology [10]. Like the transmission and reception of collected data, data processors usually handle routing and management protocols. The power supply unit of the node positioning device adopts the micro battery mode, which can reduce the space occupied

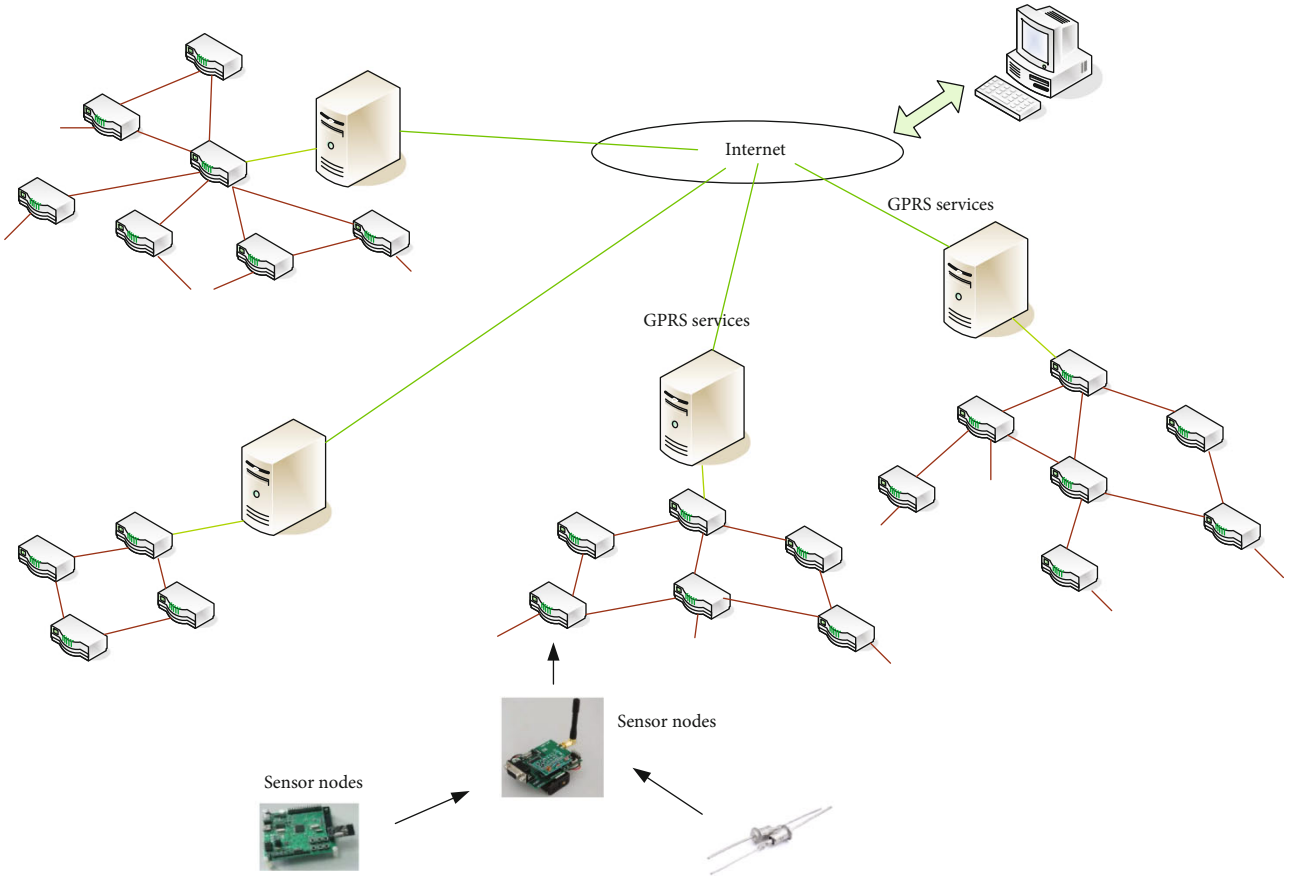

Figure 1: Overview of the wireless sensor network.

by the sensor node [11]. The synchronization node and the user node can directly communicate with the WAN or satellite to process the collected data. Figure 1 shows an overview of the wireless sensor network.

The structure of the wireless sensor network is shown in Figure 2. The three main ones are sensor nodes, sink nodes, and task management nodes [12]. The sensor node's own computing power is insufficient, and the storage space is not large, so the power source is generally a nonrechargeable battery, but this can be offset by its own low energy consumption. Sensor nodes are developed randomly and have network and routing functions. Generally speaking, the sensor nodes in the monitoring environment are responsible for the functions of data collection, storage, secure routing, and mutual cooperation [13, 14]; the sink node is a hub for communication with other networks and can implement specific gateway functions. By assembling nodes, wireless sensor network data can be loaded to a higher level, and advanced network monitoring commands can be forwarded. Therefore, synchronization nodes are more efficient than sensor nodes in storage, processing, and communication capabilities, but the corresponding power consumption will be much higher; task management the node is the highest level in the entire wireless sensor network. Its main function is to process the data from the sink node and then provide it to users through some later software processing, and it can also monitor and control the wireless sensor network [15].

In wireless sensor networks, target tracking technology is one of the more important ones. When the sink node communicates with other networks, the positioning of the target is a key part of it [16]. First, an initial cluster is created, and information is transmitted through the nodes, and a distance model is established to calculate the approximate orientation of the target. There are three methods for estimating a site's position: refresh, triangulation, and maximum likelihood.

The first is a positioning method in terms of geometric calculations. Set the coordinates (x_a, y_a), (x_b, y_b), and (x_c, y_c) of A, B, and C, and the coordinates of the node D to be positioned are (x, y), and the node is to A, B, and C. The distance is d_a, d_b, d_c. From these three distance values, a nonlinear equation system can be obtained.

$$\begin{aligned}\sqrt{(x-x_a)^2+(y-y_a)^2} &= d_a,\\ \sqrt{(x-x_b)^2+(y-y_b)^2} &= d_b,\\ \sqrt{(x-x_c)^2+(y-y_c)^2} &= d_c.\end{aligned} \tag{1}$$

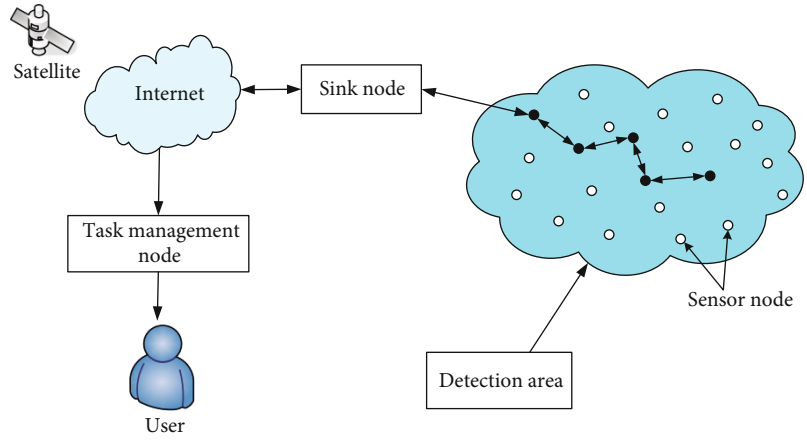

Figure 2: Wireless sensor network system structure.

Using the sorting method for solution, the coordinates of meeting D to be obtained can be obtained as

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2(x_a - x_c) & 2(y_a - x_c) \\ 2(x_b - x_c) & 2(y_b - x_c) \end{bmatrix}^{-1} \begin{bmatrix} x_a{}^2 - x_c^2 + y_a^2 - y_c^2 - d_a^2 + d_c^2 \\ x_b{}^2 - x_c^2 + y_b^2 - y_c^2 - d_b^2 + d_c^2 \end{bmatrix}. \tag{2}$$

In the second method, the coordinates of the three nodes A, B, and C are (x_a, y_a), (x_b, y_b), and (x_c, y_c), the angle between the nodes A, B, and C and the node to be located is $\angle ADB, \angle ADC, \angle BDC$, and the coordinate of D is (x, y). The following relationship exists:

$$\begin{aligned} &\sqrt{(x_{01} - x_a)^2 + (y_{01} - y_a)^2} = r_1, \\ &\sqrt{(x_{01} - x_b)^2 + (y_{01} - y_b)^2} = r_1, \\ &(x_a - x_c)^2 + (y_a - y_c)^2 = 2r_1{}^2(1 - \cos\alpha). \end{aligned} \tag{3}$$

The third method determines the coordinates of the nodes $(x_1, y_1), (x_2, y_2), (x_3, y_3), \cdots, (x_n, y_n)$, and their distances at the intersection D are $d_1, d_2, d_3, \cdots, d_n$, respectively. Assuming that the coordinates of the meeting D are (x, y), the following equations are

$$\begin{cases} (x_1 - x)^2 + (y_1 - y)^2 = d_1{}^2, \\ (x_2 - x)^2 + (y_2 - y)^2 = d_2{}^2, \\ \cdots \\ (x_n - x)^2 + (y_n - y)^2 = d_n{}^2. \end{cases} \tag{4}$$

Subtract the nth equation from the first $n-1$ equations of the above formula, and get

$$\begin{cases} 2x(x_1 - x_n) + 2y(y_1 - y_n) = x_1{}^2 - x_n{}^2 + y_1{}^2 - y_n{}^2 + d_n{}^2 - d_1{}^2, \\ 2x(x_2 - x_n) + 2y(y_2 - y_n) = x_2{}^2 - x_n{}^2 + y_2{}^2 - y_n{}^2 + d_n{}^2 - d_2{}^2, \\ \cdots \\ 2x(x_{n-1} - x_n) + 2y(y_{n-1} - y_n) = x_{n-1}{}^2 - x_n{}^2 + y_{n-1}{}^2 - y_n{}^2 + d_n{}^2 - d_{n-1}{}^2. \end{cases} \tag{5}$$

The linear equation expression obtained by formula (5) is $AX = b$, where

$$A = \begin{pmatrix} 2(x_1 - x_n)2(y_1 - y_n) \\ 2(x_2 - x_n)2(y_2 - y_n) \\ \cdots \\ 2(x_{n-1} - x_n)2(y_{n-1} - y_n) \end{pmatrix},$$

$$X = \begin{pmatrix} x \\ y \end{pmatrix},$$

$$b = \begin{pmatrix} x_1{}^2 - x_n^2 + y_1^2 - y_n^2 + d_n^2 - d_1^2 \\ x_2{}^2 - x_n^2 + y_2^2 - y_n^2 + d_n^2 - d_2^2 \\ \cdots \\ x_{n-1}{}^2 - x_n^2 + y_{n-1}^2 - y_n^2 + d_n^2 - d_{n-1}^2 \end{pmatrix}. \tag{6}$$

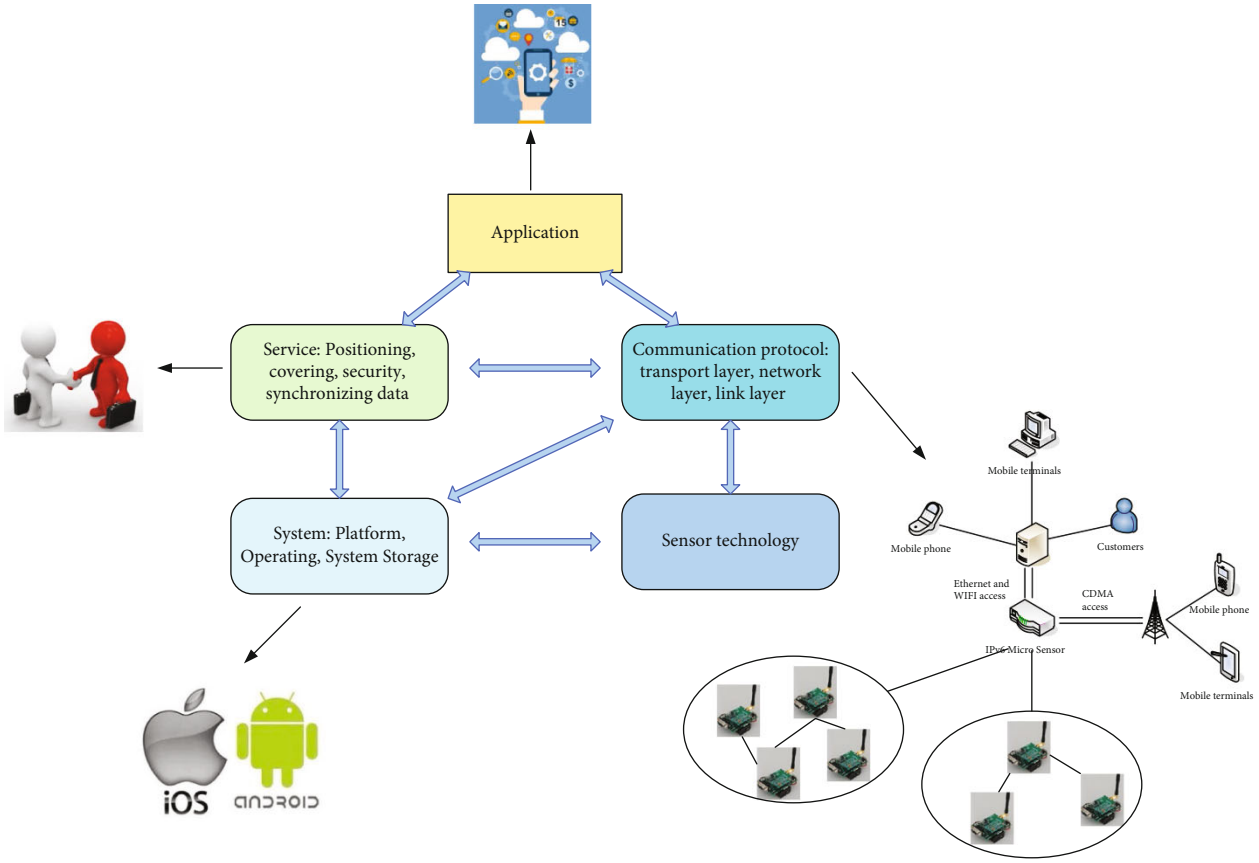

Figure 3: Key technologies in wireless sensor networks.

Using the standard minimum mean square error estimation method, the coordinates of node D can be obtained as

$$\widehat{X} = \left(A^T A\right)^{-1} A^T b. \tag{7}$$

The most critical technology in the research process of wireless sensor network can be divided into three types, namely, system, communication protocol, and service [17]. In the wireless sensor network, each sensor node is an independent subsystem, they can meet the basic needs of the network application, so that the wireless sensor network has a good foundation, and on top of this, they can provide the most basic for other levels. Application: the communication protocol is the most basic guarantee for wireless communication between each sensor node. In addition, it also provides communication means for the upper applications and other functions to ensure the normal function, and the service is the entire wireless sensor the purpose of the network; the network can improve the overall efficiency of the system, improve the network, and enhance the level of practical application [18, 19]. Figure 3 shows the key technologies in wireless sensor networks.

2.2. Sports Monitoring Methods for National Sports. Sports culture is also an indispensable part of my country's traditional culture, and national sports are a part of sports culture. From this point of view, national sports are also my country's excellent traditional historical culture [20]. National sports events flow in the long river of historical development, and traces of current sports events can be seen from ancient hunting activities. With the progress and development of society, people's hunting skills have gradually improved, increasing the difficulty of this sport, and they can also get more benefits in the hunting process. This ancient way of hunting sports has gradually evolved into modern sports, but some of the essence of traditional sports has been retained. Some ethnic sports are welcomed and inherited by more and more people [21]. Among them are archery, dragon boating, martial arts, lion dance and dragon dance, and a large number of traditional Chinese sports. Figure 4 shows the national sports of our country. Archery, or archery, today means the use of flexible bows and arrows to provide matching shooting sports within a distance of 10,000 years ago in the Stone Age. People invented bows and arrows for hunting and fishing [22]. Later, bows and arrows became one of the weapons used in wars. Nowadays, archery has long been a favorite sport of many people; dragon boat racing comes from China and is a popular non-governmental event in East Asia and Southeast Asia. A dragon boat is a boat painted or made into a dragon shape. Dragon boat racing is a traditional Chinese water sports and entertainment project. It is mainly held in various festivals. It is a multiperson rowing competition. The origin of the dragon boat competition can be traced back to the Han Dynasty; it has always been a symbol of the Chinese nation; it has the power to stop wars and maintain peace. According

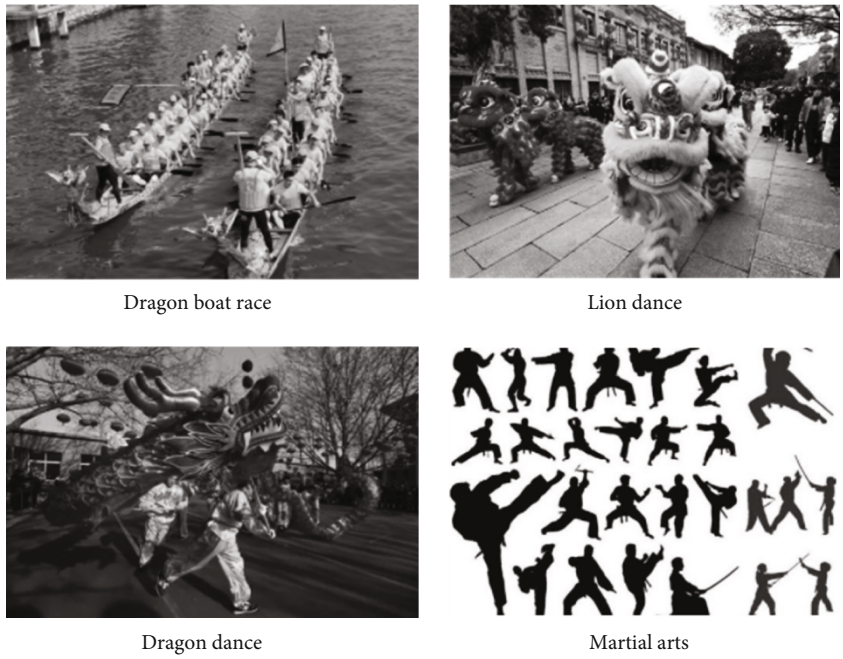

Figure 4: My country's traditional national sports events.

to the survival techniques of the people of Canada, Chinese military systems have gone through ups and downs for thousands of years. With the development of Chinese history and culture, it has cultivated the spirit of supporting the survival and development of this nation, and the spirit of creating the composition of Chinese children and Wu genes is to safeguard their own safety [23].

In all parts of the world, there are their unique national sports. Different sports will be produced according to different living environments, but therefore different detection methods and means will also be produced [24]. Compared to other worlds, people in the tropics are more prone to warmer climates, which leads to the very strong operation of the heating system, therefore produces long-distance running, long jump, and other projects, which leads to the detection time to pay attention to speed and athletes' cardiopulmonary conditions; while the people in the cold zone, their sports are to drive the cold and hunt, so they are very adaptable to cold weather and are more good at sports on ice, which makes it necessary to consider the athlete's body temperature when testing. Situation: people living near water sources, most of their daily food sources come from the water, which leads to their very good water quality, and they are more talented in swimming, diving, and other sports than other places [25].

2.3. Application of Wireless Sensor Network. The sensor network composed of wireless sensors and wired sensors has been very popular in our daily life and has a very promising market. It is loved by everyone and will have a very important impact on all aspects of our daily life, such as production, consumption, and work [26, 27]. Wireless sensor network has a very wide range of applications and has great use value in industry, agriculture, production, military, medical care, education, etc. As shown in Figure 5, wireless sensor applications are ubiquitous and have been integrated into us.

The so-called wireless sensor network is composed of many miniature sensors deployed in the monitoring range, plus a multihop self-organizing network system formed by wireless communication. With the continuous updating of current microelectronics and other technologies, the integration of chips used in wireless sensor networks has increased significantly, coupled with the current wireless communication technology update, wireless sensor protocol improvement, and low cost; the development of high-efficiency chips has made wireless sensor networks more and more widely used in our daily lives. However, a combination of wireless sensor networks and national sports is also in the testing phase. Wireless sensor networks often monitor nonhuman objects; it takes a long way to apply this technology to human sports monitoring [28].

When the wireless sensor network detects other events, the Top-k detection algorithm is usually used, where $\Pr_f(F_h)$ is the failure probability of filter F_h and $\Pr_r(F_h)$ is the probability that the sink node sends a detection query to node i_h. Setting the optimal filter threshold can minimize the expectation of domestic communication overhead.

$$\min \sum (c_u + c_d)\ \Pr_f(F_i) + \sum (c_u + 2c_d)\ \Pr_r(F_i). \tag{8}$$

The positive perturbation rate of node i's perception data is defined as the frequency of $[t_{-n+1}, t_0]$ within time $\Delta_i(t_h) \geq 0$.

$$r^+(i) = \frac{|\{h \mid \Delta_i(t_h) > 0, h \in \{-n+1, \cdots, 0\}\}|}{n} + \frac{1}{2}\frac{|\{h \mid \Delta_i(t_h) = 0, h \in \{-n+1, \cdots, 0\}\}|}{n}. \tag{9}$$

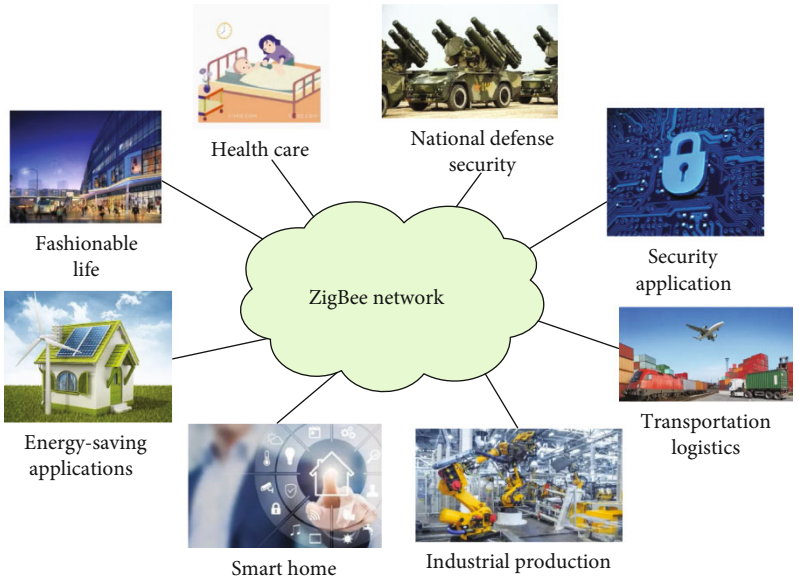

Figure 5: Schematic diagram of wireless sensor network application.

The negative perturbation rate of node i's perception data is defined as the frequency of $[t_{-n+1}, t_0]$ within $\Delta_i(t_h) \le 0$ time.

$$r^{-}(i) = \frac{|\{h \mid \Delta_i(t_h) < 0, h \in \{-n+1, \cdots, 0\}\}|}{n} + \frac{1}{2}\frac{|\{h \mid \Delta_i(t_h) = 0, h \in \{-n+1, \cdots, 0\}\}|}{n}. \tag{10}$$

The positive perturbation rate of the sensed data of node i is defined as the average positive perturbation amplitude of the sensed data in time $[t_{-n+1}, t_0]$.

$$v^{+}(i) = \frac{\sum_{\Delta_i(th)>0}\Delta_i(th)}{r^{+}(i)n}. \tag{11}$$

The negative perturbation rate of the sensed data of node i is defined as the average negative perturbation amplitude of the sensed data in time $[t_{-n+1}, t_0]$.

$$v^{-}(i) = \frac{\sum_{\Delta_i(th)<0}\Delta_i(th)}{r^{-}(i)n}. \tag{12}$$

Since the positive and negative disturbance rates of node i are $r^{+}(i)$ and $r^{-}(i)$, respectively, the frequency at which the node's perception data exceeds the threshold range, that is, the calculation formula of the filter failure probability is as follows:

$$\Pr_f(F_i) = \frac{r^{+}(i)v^{+}(i)}{F_i \cdot u - di(t_0)} + \frac{r^{-}(i)v^{-}(i)}{di(t_0) - F_i \cdot l}. \tag{13}$$

The failure probability of the filter of non-Top-k perception data can be calculated according to

$$\Pr_f(F_h) = \frac{r^{+}(h)v^{+}(h)}{F_k \cdot l - dh(t_0)}. \tag{14}$$

3. Experiment of Wireless Sensor Network System for National Sports Monitoring

3.1. Hardware Design. The hardware design of wireless sensor network requires low cost, strong scalability, good stability, and high security. The hardware system of wireless sensor network is mainly composed of aggregation nodes, gateway nodes, and ordinary sensor nodes. The most important thing is the ordinary sensor node, which is the core component of the entire wireless sensor network system. The main task of this component is to collect data, process data, fuse information, and cooperate with each other. Therefore, sensor nodes include information sensors, processing the four main functions of the device, energy supply, and wireless communication shown in Figure 6 for the functional module diagram. Information sensor is a kind of sensor module for information transmission. It adopts detachable component design; passes can be used flexibly. The processor is the basic unit of the entire sensor assembly. The whole system can modify, assemble, manage, and other functions. Power supply is the source of every system; this module provides energy for all other modules and can provide different supply methods for different working methods in the system to adapt to their differences. Wireless communication is a way of using wireless spectrum for sensing information, which can be transmitted on the corresponding frequency band, can also receive information transmission from different nodes in the network, and can communicate with base station nodes and provide real-time feedback.

At present, the core components used for information acquisition and processing in wireless sensor networks are FPGA, DSP, and ARM, which are the core of information acquisition in the entire network. FPGA is further developed from traditional PAL, GAL, etc. It is manufactured as a solution to the shortcomings of custom circuits. Under normal circumstances, it uses programming languages such as VHDL and Verilog for performance. It has very strong

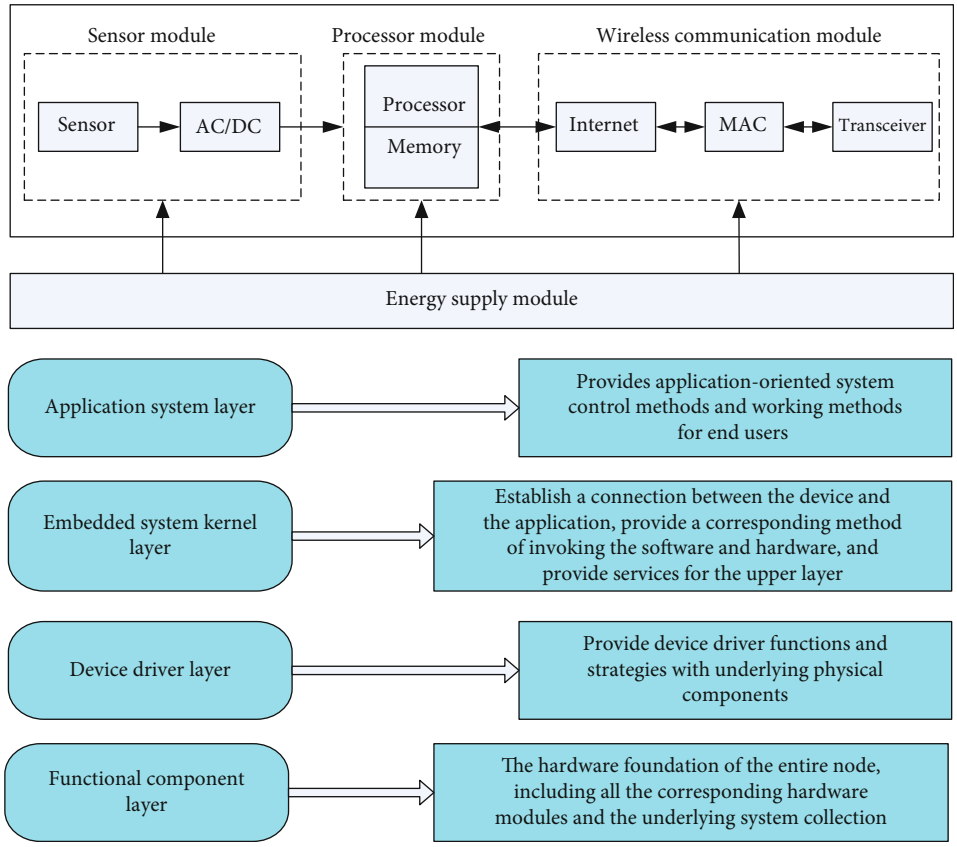

Figure 6: Node structure of wireless sensor network.

Table 1: Collective parameters of FPGA components.

Device	Logic	Configurable logic blocks (CLBs)			DSP48A1
		Slices	Flip-flops	Max RAM	
XC6SLX4	3950	510	4510	66	16
XC6SLX9	9262	1540	11350	81	32
XC6SLX16	15589	2188	18134	127	64
XC6SLX15	25061	3668	29974	220	48
XC6SLX45	44671	6732	54486	392	68

flexibility and vitality, and its unparalleled performance capabilities can be used from time to time. Table 1 shows the specific parameters of FPGA.

DSP is the digital signal processing technology, and it is the DSP chip that is used in the wireless sensor network. It is a chip that can use the digital signal processing technology and is widely used in pipeline work. It is mainly used for calculation, has very high processing speed and processing capacity, and can quickly realize the desired functions. The disadvantage is that it will be more complicated in real development and it is difficult to realize the conceived functions. Table 2 shows the DSP chip-specific parameters.

The ARM processor is a low-cost, low-power, and high-efficiency RISC microprocessor. It is a 32-bit design and retains the advantages of a 32-bit system. The Jazelle technology in it will make the performance of Java acceleration better than JVM which is much higher, compared to traditional non-Java accelerated power consumption which will be reduced by 80%. It has strong control capabilities and transaction management functions, but it will be relatively simple in the actual development process and will bring a lot of convenience to developers. Table 3 shows the basic parameters of the ARM processor.

Sending, receiving, idle, and sleeping are the four working states of the wireless communication module in the wireless sensor network. When the node is in the idle state to monitor the node, check the received data in the channel, but in the sleep state, you need to turn off the corresponding wireless communication function. Figure 7 shows the energy consumption of different parts of the wireless sensor network.

Because the energy storage of the nodes in the wireless sensor network is very limited, according to the different

Table 2: Specific parameters of the DSP chip.

Chip type	2017 Q4	2018 Q1	2018 Q2	2018 Q3
Standard logic	86.76	110.28	111.67	105.17
Microcontroller	1496.30	1858.10	1880.78	1774.95
Analog IC	2276.32	2570.68	2601.61	2457.25
I/O device	96.51	105.97	107.31	100.05
Discrete components	2243.43	2503.69	2533.85	2393.11
ASIC	169.76	183.78	185.13	175.56

Table 3: Basic parameters of the ARM processor.

Signal	Peak-to-peak (mV)	Average value (mV)	Cycle	Frequency
YSYN	533	7.65	177.2 mS	5.542 Hz
HREF	547	338	566.0 μS	1.866 KHz
PCLK	557	266	0.9997 μS	1.5201 MHz
Y0	587	248	3.0000 μS	343.2 KHz

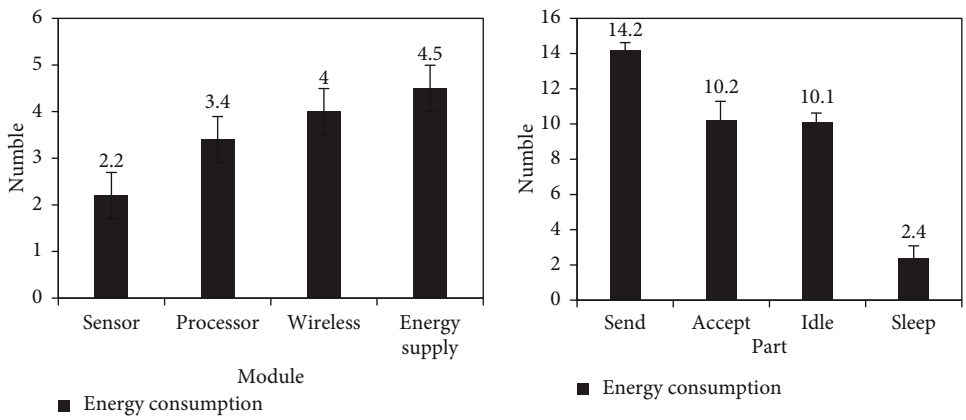

Figure 7: Energy consumption of each part of the wireless sensor network node.

busy and idle states of the queue, it can send work in the dynamic busy queue of the information packet. The strategy of limiting the service can not only avoid the query of the idle queue but also very well. This guarantees the fairness of the system, reduces the delay of the system to a large extent, and enhances the control efficiency of the system. As shown in Figure 8, the delay, cycle period, and throughput increase as the system load increases. This is because the data packet arrival process is positively correlated with the arrival rate, which will increase cycle time, performance, and system-wide delay.

3.2. Software Design. Embedded systems are generally used in existing wireless sensor networks, which are composed of hardware and software, and are a device that can run independently. The software content only includes the operating environment and operating system of the software. The hardware content includes many aspects, including signal processors, memory, and communication modules. The driver layer can initialize peripherals such as cameras of various sensors, including operations such as management and control of other devices. In the device driver layer, a program that runs before the execution of the operating system is the boot loader. After it runs, it initializes external hardware devices, establishes the corresponding software and hardware environment, and lays the foundation for subsequent operations, as shown in Table 4 for embedded specific parameters of the single-chip microcomputer of the type system.

National sports are a symbol of a nation, representing the life habits and overall style of a nation. As the so-called nation is the world, any nation's sports deserve to be respected and learned. The Olympic Games, held every four years, is a worldwide sport that attracts worldwide attention. It not only carries the dreams of countless athletes all over the world. It is also a place where every nation in the world showcases its own national sports. Each nation has its own characteristics and strengths. They have all their strength to prove their own nation's outstanding sports career and outstanding sports talents. Since the opening of the first Olympic Games, many events have been added. They all evolved step by step from national sports and began to be

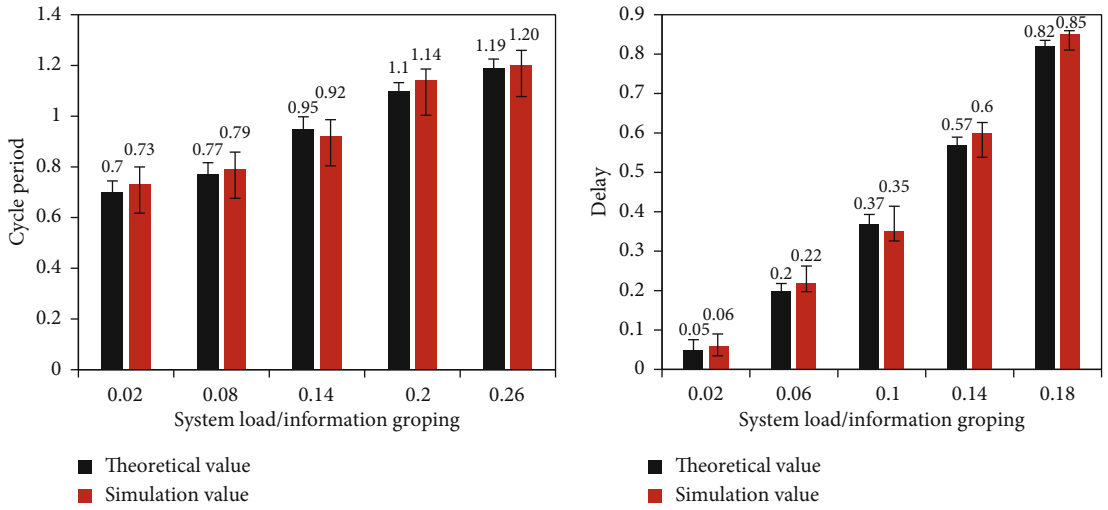

Figure 8: Cycle time and delay change with load.

Table 4: Embedded system MCU-specific parameters.

Model	Memory		Timer/counter	I/O	Serial port	Interrupt	Speed
	ROM	RAM					
AT80F51	5 K	256	3	64	2	4	—
AT87F51	5 K	256	—	—	—	—	—
AT89C51	5 K	256	3	64	2	4	29
AT89LV51	5 K	256	3	64	2	4	25
AT89F51	5 K	256	3	64	2	4	—

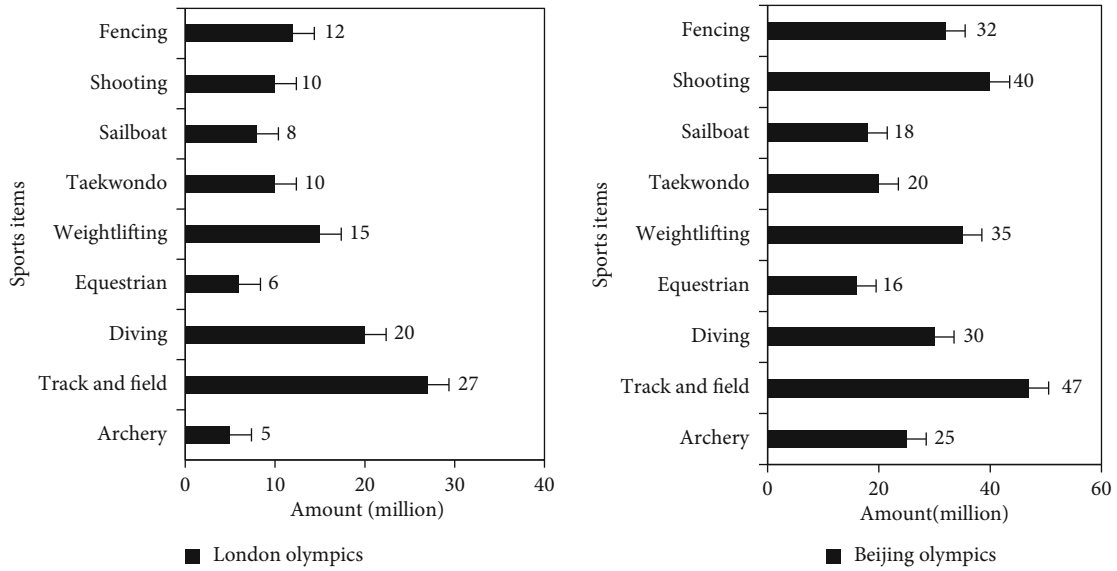

Figure 9: The amount of funds allocated to various sports by my country for the two Olympic Games.

accepted by people of all ethnic groups in the world. Taking football as an example, it originated from the Chinese Cuju invented in the Song Dynasty. It is now one of the official events of the Olympic Games. In each Olympic Games, all countries have gone all out, with sufficient funding and personnel preparations. Figure 9 shows the funding for various national sports in the Olympic Games in recent years.

3.3. Overall Design. When using a wireless sensor network to monitor human movement, a three-axis acceleration sensor is used to collect changes in the vibration intensity of the

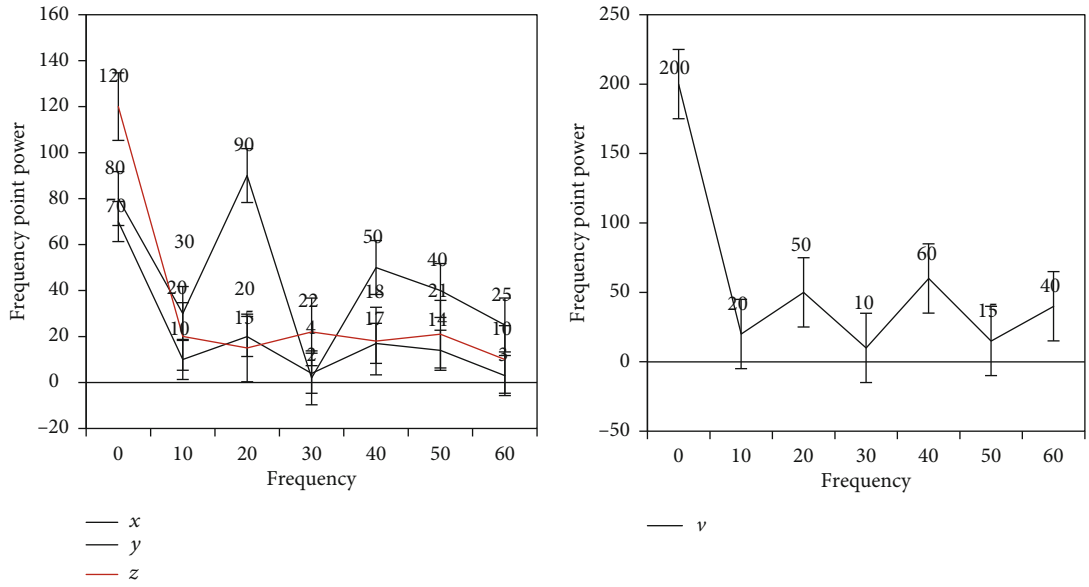

Figure 10: FTT transformation of three-axis acceleration data and its root mean square value.

Table 5: Number of delegates in recent national games.

	Sixth	Seventh	Eighth	Ninth	Tenth	Eleventh
Total number of representatives	4987	5384	5502	6000	6280	7009
Total number of minority representatives	14.5	15.8	13.69	15.47	14.89	12.29
Number of represented ethnic minorities	55	55	55	55	55	55

human body during movement. Using a three-axis square, the intensity of vibration can be used to distinguish the movement of the body. Because different sports are very different, the actions and habits in the exercise process are different, which makes the perception of the actual behavior of the human body complicated, and simple standard segmentation methods are difficult to be widely used. In order to solve this complicated problem, neural network is used to create a neural network state classifier to recognize and distinguish the motion behavior of the human body. Create a multilayer neural network identifier to recognize and perceive the movement of the human body. The output data of the three-axis acceleration sensor needs to be preprocessed to extract feature vectors. Then, using the neural network automatically generated by the neural network pattern recognition tool in the Matlab software, the identifier installation process is divided into three steps: window and frame editing, property value calculation, and training to create a neural network classifier. The Fourier transform (FTT) can be used to transform the three-axis acceleration data to obtain the spectral value. As shown in Figure 10, the different movements of the human body can be classified by the difference of the spectral value.

National sport is very necessary for research in our country, which includes 56 ethnic groups. China's vast land and resources include 56 ethnic groups including the Han nationality. They all have their own cultural heritage and ethnic traditions, because of the differences in living areas. National sports are also different. For example, the Mongolian Naadam Conference is their most lively festival each year. Their traditional sports include wrestling, horse riding, and archery; the Kazakhs are also a very wild nation, and horse racing is also theirs since ancient times. The tradition has always existed; the Uighurs have always been well-known throughout the country for their ability to sing and dance, but their dangling competition is also a long-standing national sport, full of vitality and passion. The number of representatives of the national games held each year is shown in Table 5.

4. Discussion

The wireless sensor network is based on various sensor nodes. Sensor nodes with detection, calculation, and communication capabilities are deployed in designated monitoring areas. These nodes form a self-organizing wireless sensor network through wireless communication. The wireless sensor network collects and processes the data of objects detected in the monitoring area. The detection data is sent to the base station node, and the wireless sensor network naturally integrates the data and the physical world in the form of multihop wireless communication. It has become an indispensable tool for people to observe and perceive the complex and changeable physical world. A three-axis acceleration sensor is used for real-time monitoring of human motion behavior. The content includes the introduction of short-term energy and zero-percent short-term energy classification algorithms of neural network

recognition algorithms used for motion detection. The software introduces the FFT classification algorithm, including software design and management. The technology is used to monitor national sports, monitor different human sports, and record data for real-time feedback. According to the number of participants and competition items in my country's national games in recent years, the development of my country's national sports will be with the progress of the times, vigorously develop traditional national sports.

5. Conclusions

National sports are a part of traditional culture and an indispensable part of our entire national history. It runs through the long history of the development of the entire nation. From ancient hunting, sports, and other activities, we can see that current sports are the beginnings of it can be traced back to the Stone Age. With the continuous development of the times, the traditional hunting method has evolved to the present sports. It has always been combined with the newly emerged technology, and the traditional sports can also be updated to achieve more in line with the human body. Wireless sensor network is a kind of physical network composed of many common and small sensor nodes, which can carry out wireless communication among these numerous sensor nodes. Using this technology to monitor the national sports events can monitor the actual situation of human movement, extract the behavior characteristics of the athletes, and feed them back to the athletes in real time, so that it can be judged whether the exercise conforms to the actual conditions of the human body. According to the feedback data, we can improve the national sports and find the most suitable sports under different conditions. In this way, we can start from tradition and combine the latest science and technology to vigorously develop traditional national sports.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there is no conflict of interest with any financial organizations regarding the material reported in this manuscript.

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