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Research Article

The Role of Wireless Sensors in the Quality Monitoring of Students' Physical Fitness Tests under the Background of National Fitness

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With the continuous development of Chinese economy and the continuous improvement of national living standards, the country's emphasis on students' physique has also increased. This has greatly breakthrough the conditions for health testing of students' physique in our country. With the assistance of wireless sensors, students' physical health quality monitoring has accurate data statistics and research. Hop positioning algorithm, compressed sensing matching tracking algorithm, and RSSI technology have been analyzed from the perspectives of students' ideas, life, and learning, and school sports support. It is found that nearly 50% of students in a college are not very health-conscious, while only 26% have a good knowledge of health. In the 50 m running test, the average score for boys is $807 + 124$ s, and the average for girls is 914 ± 108 s. The data is accurate to 0.01% with the help of wireless sensor technology. At the same time, combined with the testing data of sports events, we found that the physical fitness of students is generally low. This has a lot to do with the living habits of the students and the physical exercises in the school.

1. Introduction

Student physical health evaluation is an important part of school physical education work and an important part of the school education evaluation system. In today's high-tech development, physical fitness monitoring should also keep pace with the times.

The establishment of a monitoring network and the development and utilization of high-tech systems such as data collection systems have greatly reduced the monitoring workload. The use of wireless sensors has also made a great breakthrough in the quality monitoring of students' physical fitness tests.

For the role of sensors, experts at home and abroad have done a lot of research. Musa et al. has developed a strategy that optimizes the typical deployment of sensors in the field and distributes the energy consumption of wireless sensor networks (WSN). This strategy focuses more on collecting information from the sensor, rather than the precise positioning of the sensor. Therefore, it is measured based on the distribution or density of sensors in the area rather than their geographic location. Using this strategy, the lifetime of the network can be maximized under the constraint of maintaining connectivity [1]. Kaleem and Rehmani stated in the article that UAVs or microdrones equipped with sensors are becoming increasingly popular in various commercial, industrial, and public safety applications. However, uncontrolled deployment of drones poses challenges to highly security-sensitive areas such as the presidential palace, nuclear power plants, and commercial districts, as they may be used illegally. It discusses existing routing schemes for detection, tracking, and positioning and puts forward the limitations of these schemes as further research challenges [2]. Flores et al.'s study discusses the role of parents in monitoring student academic performance in the new learning system. To achieve this goal, the researchers used a descriptive correlation design [3]. Vituk et al. studied the formation process of the spelling ability of future teachers in the new Ukrainian school. He introduced that higher education

institutions use students' spelling skills as an integral part of language and communication skills. In the context of the current professional training requirements for experts in the new Ukrainian school, as a way to diagnose and control the spelling and punctuation literacy of higher education students, it can objectively evaluate the spelling skills of students, and improving educational activities is the main science of the research results [4]. Sugilar believes that the return rate of students can be used as one of the indicators of the service quality of educational institutions and student loyalty. Students who register for one semester will reregister in the next semester. He pointed out that there are many related variables that affect students' reentry. These variables mainly include monitoring the service quality, management of distance education, student characteristics, student academic performance, and the availability of student learning support services. He used a post hoc method to sample 3539 students and used the statistical technique of binary logistic regression to determine the factors related to the reentry of students at Terbuka University in Indonesia. The results show that students' reentry is affected by the adjustment factors of service quality management level: (1) personal characteristics of students, (2) success level of the previous semester, and (3) learning participation support services [5]. Hsu et al. study the important role of college students' physical activities and cultivate the concept of independent health management. At present, what kind of learning attitude do Taiwanese college students face in physical education? What motivations of students affect their attitudes towards physical education? What is the relevance? The above are the goals of this research. The research method adopts the questionnaire survey method, and the survey data adopts descriptive statistical analysis, independent sample test, one-way analysis of variance, LSD postcomparison method, and canonical correlation analysis method. Relevant practices have been adjusted in combination with data analysis. With scientific, reasonable, and efficient measures, the rate of student repetition has increased [6]. Грошева et al. explored the basic background, carrying capacity and effectiveness monitoring of problem solving based on the knowledge gained from the university preparatory training. The integrity of professional activities is related to the holistic, comprehensive, and systematic use of professional training processes. During the education process, the ability of students in the subject of "Descriptive Geometry and Engineering Graphics" was monitored. Monitoring is carried out through core lines such as problem discovery, goal setting, work planning and evaluation, and curriculum control. According to the results of the research, additional courses are organized for those students who have difficulties in the study of certain topics in the course [7].

School education should establish the guiding ideology of health, first, earnestly strengthen the spirit of "physical work," promote students to actively participate in physical exercise, develop the habit of regular physical exercise, and improve self-care ability and physical health. This has important practical significance and long-term social significance.

2. Past Students' Own Initiative and School Support

2.1. Students' Own Health Awareness. Consciousness governs behavior and correct consciousness, guides practice to give full play to subjective initiative, and promotes the development of things. Students' consciousness will directly affect their own behavior. If students think that health is not that important, then there will be no exercise behavior, and physical health cannot be guaranteed. Therefore, students must establish correct health awareness. A health awareness questionnaire was conducted for students from a certain university, as shown in Table 1.

In the health awareness questionnaire, it will be found that students still attach great importance to their own health, but their awareness of health-related knowledge is low, and the two are extremely incompatible. Schools should strengthen health and hygiene publicity and improve students' health awareness.

2.2. The School's Support for Student Health. School is a necessary place for students to study and live. Physical activity is an effective way for students to exercise. To improve the health of students, we need to ensure that students have a well-equipped environment (sports equipment) and software [8]. For the real situation of school facilities support, we have made corresponding investigations, as shown in Figure 1.

According to the distribution of school physical education teachers and the use of physical equipment statistics, it can be seen that the school's support for students' healthy exercise was still relatively lacking, which has a lot to do with the fact that students' health did not receive the attention of society at that time.

As of July 2002, since the Ministry of Education promulgated and implemented the "Students' Physical Health Standards," the Ministry of Education has paid increasing attention to the health of students. With the development of time and the advancement of science and technology, scientific and efficient testing techniques have been available for students' physical health. In the context of the knowledge-based electronic health and medical communication service, intelligent system National Fitness, wireless sensors have played a large role in the quality monitoring of students' physical fitness tests [9].

3. Wireless Sensor Technology Supports Students' Physical Fitness Test

3.1. The Composition and Structure of the Sensor. The component part of the wireless sensor is connected to the shell and is powered by a battery or a vibrator during operation, forming a wireless sensor network node system structure. After a large number of neurons are scattered, they are randomly distributed in or near the control area, and each node forms a network through self-regulation. The sensor node monitors the monitored object, and after the initial configuration of the monitoring data, it uses multiple relays for transmission according to its own protocol. In

Table 1: Questionnaire of students' own health awareness ($m = 200$).

Student's own health awareness survey form (m200)			
Investigate subject	Options	Result statistics	Percentage of total
Do you care about your health?	Very concerned	59	29.5
	Care	70	35
	Does not care	63	31.5
	It does not matter	11	5.5
Do you know health knowledge?	Learn	55	27.5
	Do not know much	89	44.5
	Do not understand	65	32.5
Think it is necessary to participate in physical exercise	Very necessary	55	27.5
	Is necessary	87	43.5
	Unnecessary	59	29.5
Are you satisfied with your current health?	Very satisfied	46	23
	Satisfy	69	34.5
	Generally	60	30
	Dissatisfied	30	15

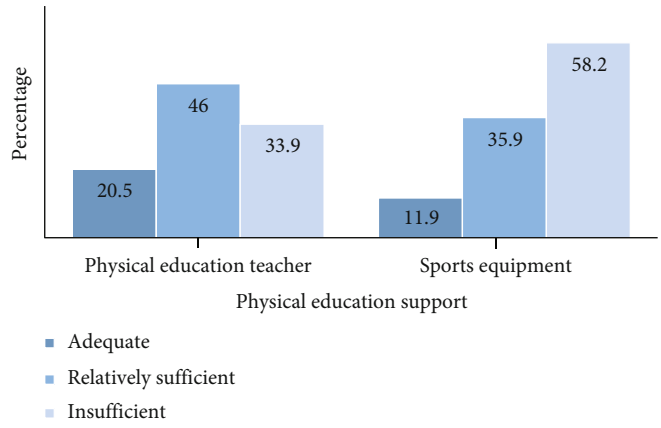

Figure 1: The school's support for students' healthy exercise.

the transmission system, the monitoring data is effectively processed by multiple nodes, and then through the pipeline, the control node is transmitted through satellite, Internet, and mobile communication network. End users efficiently configure and manage sensor networks through management nodes, release monitoring functions, and collect monitoring data [10], as shown in Figure 2.

Wireless sensors are widely used. The most commonly used technologies are 802.11, 802.15, Bluetooth, Wifi, Zigbee, etc., Each has its own technical advantages, but there are still disadvantages such as high energy consumption, poor interference from the power distribution wall, large volume, and the need to have multiple memory source. To this end, TI has introduced a low-power RF system suitable for simple RF networks and small SimpliciTI network protocols [11].

3.2. The Network Protocol of the Sensor

(1) The SimpliciTI network protocol includes six main functional modules, namely, battery-only network, encryption, range extender, frequency agility, access point, and network management module [12], as shown in Figure 3

The main function of the SimpliciTI network application layer is to provide network layer management, including some PINGS for external nodes to access and many interfaces for developers, as shown in Table 2.

This is a data-based communication protocol whose goal is to resolve protocol defects through a negotiation process between nodes. Before sending data, each node negotiates to determine whether other nodes need data; nodes use "metadata" (that is, to describe the characteristics of data collected by neurons to determine whether the obtained data contains duplicate information [13]). The working process of the agreement is shown in Figure 4.

LEACH protocol is the most representative routing protocol among hierarchical routing protocols [14]. The cluster head nodes are randomly selected in a circular manner, and the energy load of the entire network is evenly distributed to

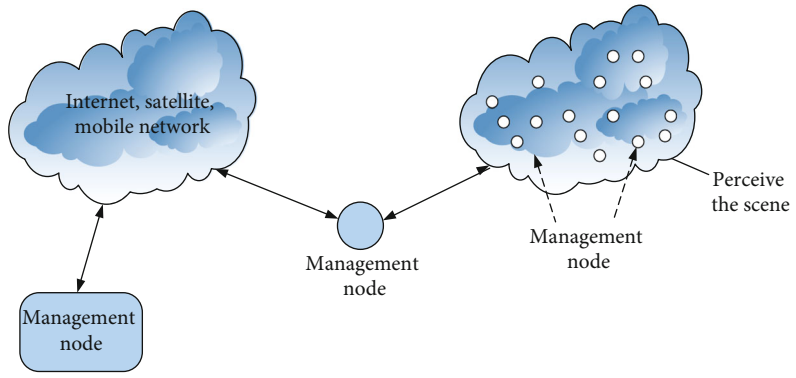

Figure 2: A sensor network system usually includes sensor nodes, sink nodes, and management nodes.

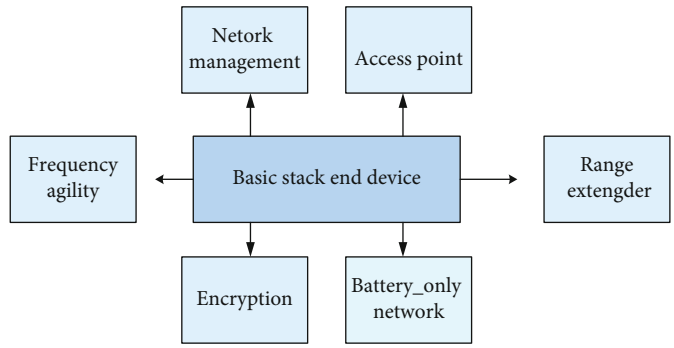

Figure 3: SimpliciTI network protocol includes six major functional modules.

Table 2: Detailed application and description of the interface.

Application layer	Interface	Instruction
Ping	0 × 01	Similar to the application in the TCP/IP network, return the received data
Link	0 × 02	Establish the first connection between two node devices
Join	0 × 03	Used to obtain node access information
Security	0 × 04	Used for information encryption and key exchange
Freq	0 × 05	Complete the frequency calibration and frequency offset management of the communication module
Mgmt	0 × 06	Used in the network application layer, such as antenna interruption

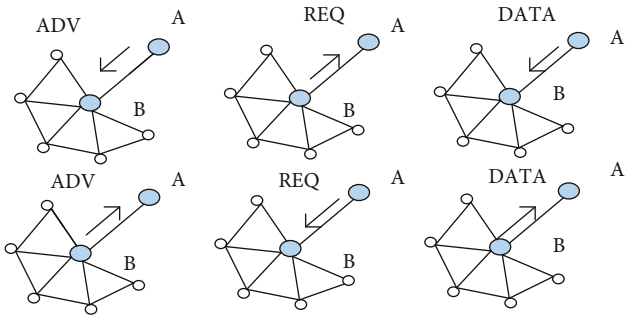

Figure 4: Data-centric adaptive communication routing protocol work.

each sensor node, to achieve the purpose of reducing network energy consumption and improving the overall survival time of the network. Simulation shows that LEACH clustering protocol can extend the network life cycle by 15% compared with general planar multihop routing protocols and static hierarchical algorithms. To balance the energy consumption in the network nodes, the family head glands are randomly selected in a circular pattern. Collecting data from the cluster nodes in the middle of the combination and pass them through the channel. The network operation needs a "cycle" like a unit, and each circuit is composed of a startup phase and a stable phase. In the initial stage of each cycle, a node is randomly selected as the cluster head node, and the surrounding nodes are announced as the surrounding cluster head nodes. The measurement determines which group to join and informs the cluster head node. In the stable phase, the nerve ending collects data and sends the data to the cluster head unit. After running for a period of time in the stable phase, the network will resume the next phase of the working cycle [15]. The election method of the family

head node is each node generates a random number between 0 and 1. If the number is less than $F(n)$, the node is the cluster head. The calculation formula of $F(n)$ is as follows:

$$F(n) = \begin{cases} \dfrac{b}{1 - b[c \bmod (1/b)]}, n \in t, \\ 0, \qquad\qquad \text{otherwise.} \end{cases} \tag{1}$$

Among them, b is the percentage of the number of cluster heads to the total number of nodes in the network, c is the current number of election rounds, and t is the set of nodes that are not cluster heads in the latest 1/b round [16].

(2) The artificial neuron model has three basic elements

(a) One group connection

(b) Summation unit

(c) A nonlinear excitation function

Expressed by mathematical formula as

$$w_k = \sum_{i=1}^{b} u_{kj} y_i, v_k = net_k = w_k - \theta_k, x_k = \varphi(v_k). \tag{2}$$

Among them, u_{kb} is the weight of neuron k, w_k is the current combination result, θ_k is the threshold, $\varphi(\bullet)$ is the activation function, and x_k is the output of neuron k. If the input dimension is increased by one dimension, $y_0 = -1$ or (+1), and the weight is $w_{k0} = \theta_k$, the threshold θ_k can be included [17]. Different types of neural networks use different activation functions $\varphi(\bullet)$, among which the most common is the threshold function (hardlim), linear function, (pirelin), and (sigmoid) functions [18]. The difference in transfer function also leads to differences in the structure and function of various neural networks, as shown in Figure 5.

MLCM is a maximum lifetime model. Wireless sensor network is an energy-restricted network. The energy consumption of a node will not exceed the remaining energy of the node. When the data forwarding rate of the node is g and node f, the life cycle of node v_i is

$$T(f) = \frac{H_n}{b_r(m) + b_t(n,m) + e_{\text{other}}} = \frac{H_n}{e_{nm} \cdot \sum_{v_n, v_m \in v, v_m \subseteq X} f_{v_n v_m}^{v_n s_d} + \rho \sum_{v_m, v_n \in v, v_m \subseteq x} f_{v_m v_n}^{v_n s_d} + e_{\text{other}}}. \tag{3}$$

Due to the lack of control over the wireless network application environment, network system operation, and wireless communication, it is unreliable. When building the network test platform, we encountered the following problems, including how ida accurately detects the power grid and the quantitative data evaluation of the network in this case, that is, how to conduct network testing; how to establish network monitoring; real-time simulation reflects the characteristics of large-scale network real-time application environment, that is, how to build test sites [19].

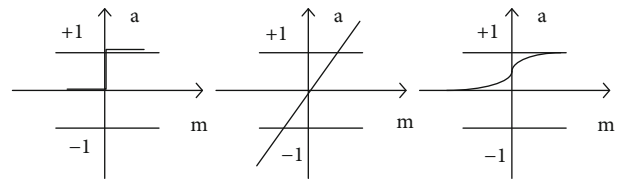

Figure 5: Differences in structure and function of neural networks.

In the working state of wireless sensor network nodes, according to the node's influence on the data flow, the nodes can be divided into source nodes and intermediate nodes. The source node senses and generates data and can also receive data and forward the data containing itself to the next neighbor node; the intermediate node does not generate data and only forwards the received data to the next neighbor node [20]. The data flow of the two nodes is

$$\sum_{v_m, v_n \in v, v_m \subseteq x} f_{v_m v_n}^{v_m s_d} + \lambda_n g_n = \sum_{v_n, v_m \in v, v_m \subseteq x} f_{v_n v_m}^{v_n s_d}. \tag{4}$$

Among them

$$\lambda_{\text{n}} = \begin{cases} 1, V_n \neq S_d, \\ -1, V_{\text{n}} = S_d. \end{cases} \tag{5}$$

The network node life cycle model is

$$T_n(f) = \frac{E_n}{e_{nm}\left(\sum_{V_n, V_m \in V_n, V_m \subseteq x} {}^{V_n S_d}_{V_m V_m} + \lambda_n g_n\right) + \rho \sum_{Vn, V_m \in V_n, V_m \subseteq x,} f_{V_n V_m}^{V_n S_d} + e_{\text{other}}}. \tag{6}$$

The life cycle 1 of the network at a certain data forwarding rate is the smallest life cycle of all nodes:

$$T_{\text{sys}}(f) = \min_{n \in S} T_n(f). \tag{7}$$

The structure of the fault injection node used in the FIPES fault injection node modular structure experiment includes a data communication module, a clock module, a storage module, a power supply module, a charging module, and an indication module [21]. The hardware modular structure of the fault injection node of the system is shown in Figure 6.

When the node data is sent to the main control chip for communication and interaction through the serial communication module, the main control chip receives the time at this time. The read time is added in front of the data from the communication interface, and then the integrated data is written into the storage device. When it needs to receive the fault command sent by the host computer, the host computer sends a fault command to the main control chip. After the main control chip receives the command, it will call back the command and then send it to the node [22].

The research data of all above wireless sensors take the quality monitoring of the student's physical fitness

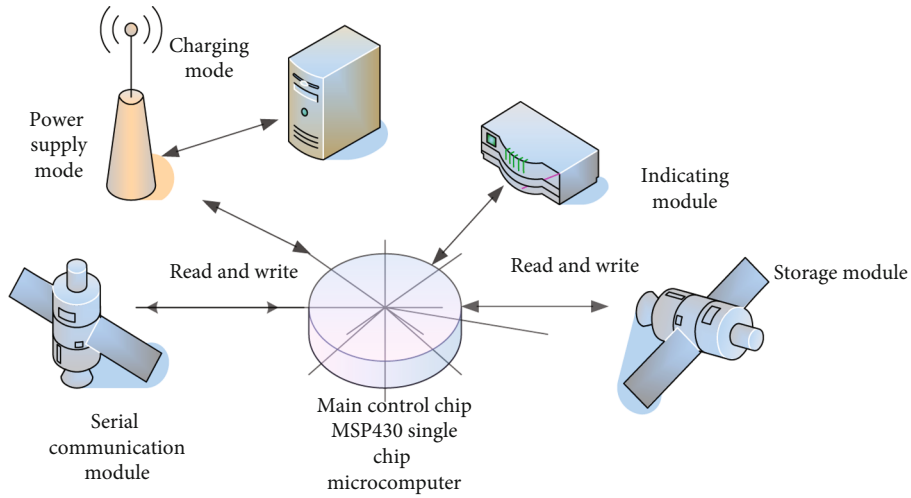

Figure 6: FIPES fault injection node modular structure work.

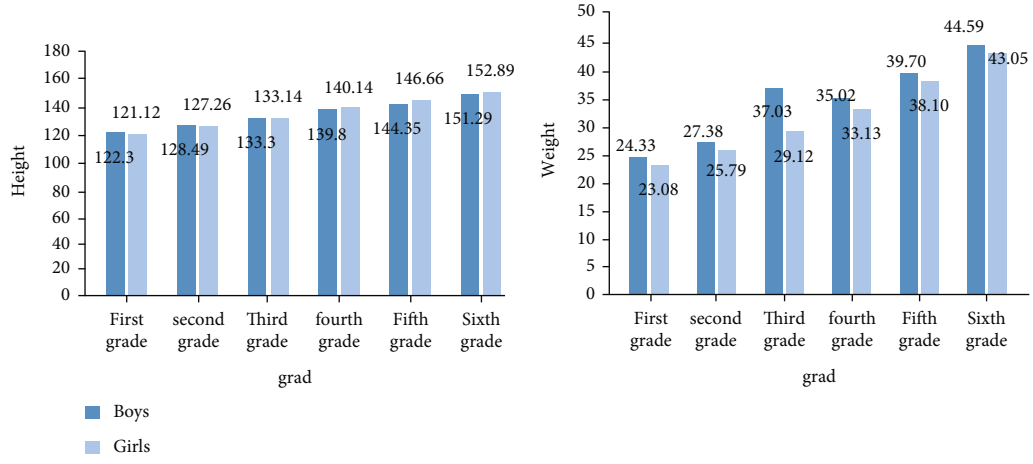

Figure 7: Comparison of height and weight of men and women in grades one to six.

test as the starting point to build a scientific and efficient physical fitness monitoring for the students, which requires the use of wireless sensor technology. It will not only promote the further development of my country's physical education but also provide some new research ideas and methods for school sports science research. Applying all research methods to specific physical fitness tests of students, the quality monitoring of wireless sensors newly implemented by major universities also has good feedback. In the physical examination of students, the use of wireless sensor technology makes the monitored data more accurate, while reducing a lot of time and labor costs.

4. Using Wireless Sensor Technology to Monitor Students' Physical Test

The wireless sensor system is used in conjunction with the student health monitoring standards issued by the Ministry of Education to test the height, weight, vital capacity, seat bending, 50 meters, and other items of students of different ages. Aiming at students of different ages is to ensure the authenticity of the test and try to avoid most accidents to prove the experimental research.

4.1. Height and Weight of Primary School Students. Parents should not neglect physical exercise, but only focus on cultivating children's knowledge. Parents only pay attention to their children's cultural achievements and neglect physical exercise. This is the norm for parents. However, we cannot just let it go. We should give parents a healthy awareness of physical exercise, establish the idea of "the body is the capital of the revolution," and the family and school work together to give children a strong physique. The new "National Standards for Physical Fitness and Health of Students" have made major changes to the standards of students' physical fitness, adding the BMI index (body length and square kilograms), and students must not only exercise regularly but also pay attention to diet [23]. Investigating and studying the average height and weight of men and women from grade one to grade six in a certain elementary school, as shown in Figure 7.

The research results show that the height gap between boys and girls is still a bit large, and boys are generally higher than girls. Moreover, the height growth trend of all students is flat, but the weight growth is indeed rapid. It can be seen that students are very lack of physical exercise.

The data signal monitored by the wireless sensor reconstructs the recently appeared subspace matching tracking algorithm and compressed sensing matching tracking algorithm. The reconstruction quality of these algorithms is comparable to straightforward procedures, and the reconstruction complexity is low. However, these algorithms are based on sparsity A [24]. However, in practical applications, the sparsity of A's symptoms is usually unknown, and the tracking algorithm is automatically matched. When A is unknown, a positive reconstruction effect can be obtained. The concept of sparsity A sets the following basic conditions for the reconstruction of symptoms: generally, the number of observations B of a system cannot be greater than the corresponding signal length M, so for signal $Y = D^{CS}X$, signal reconstruction is a difficult problem that requires solving the underdetermined equations $Y = D^{CS}X$. Generally speaking, it is very difficult to solve underdetermined equations, because the number of unknowns is more than the number of equations, and there are other constraints, it is difficult to solve. Through research in the compressed sensing theory, if the signal X can be guaranteed to be a sparse signal or can be compressed, starting from this hypothesis, we can draw a conclusion that the equation can be solved. In the compressed sensing theory, the observation matrix is required to have RIP properties, as long as this can accurately use the signal reconstruction algorithm to restore the signal in the B observation values, and ensure the effectiveness of the compressed sensing algorithm [25]. To study the signal reconstruction algorithm of compressed sensing theory, it is necessary to define the vector

$$X = \{X_1, X_2, \cdots, X_{\mathrm{m}}\}. \tag{8}$$

The P norm is

$$\|X\|_P = \left(\sum_{j=1}^{N} |x_j|^p\right)^{1/p}. \tag{9}$$

Among them, when $P = 0$, it is a norm, which is the number of nonzero items of X. If the signal X is sparse, or compression can be guaranteed, the underdetermined equations $Y = D^{CS}X$ can be calculated as a minimum 0-norm problem:

$$\begin{cases} \min \left\|\psi^T X\right\|_0, \\ \text{s.t.} A^{CS}X = \varphi\psi^t X = Y. \end{cases} \tag{10}$$

This calculation method requires all permutations and combinations of the positions c: a of each nonzero item in M to be traversed, and finally, the optimal solution is solved. Proposing a new solution optimization method,

$$\begin{cases} \min \left\|\psi^T X\right\|_1, \\ s.t. A^{CS}X = \Phi\psi^T X = Y. \end{cases} \tag{11}$$

This kind of method has certain stability when used in sparse signal reconstruction [26]. Finally, it is concluded that the height of boys is in a period of rapid growth between the ages of 7-15, which is 2 years longer than that of girls. It may be that girls are quieter. Boys like to exercise, the amount of exercise is much greater than that of girls, bone stimulation is greater than that of girls, and bone growth will accelerate. Comprehensive analysis shows that the height change law of boys and girls basically meets the national testing standards, and there is no significant difference. In terms of weight, half of our classmates weighed slightly higher than the national standard compared with the average level of primary school students in China. The personal differences between classmates are very obvious. One reason may be genetic factors, and the other may be overeating or too little exercise.

Therefore, the following points need to be done: (1) strengthen nutrition, have a balanced diet, and ensure adequate intake of essential nutrients every day. (2) Persist in exercise and promote good physical development, persist in time for half an hour. (3) Pay close attention to own physical condition and understand relevant physical health knowledge. Young people are the future and hope of the motherland. Their physical fitness not only affects their current growth and education but also affects the future and destiny of the country. Therefore, the principals of primary and secondary schools should pay close attention to the health of students and take the necessary measures.

4.2. Comparison of Male and Female Vital Capacity of College Students. Cardiopulmonary function refers to the ability of the human heart to pump blood and the lungs to inhale oxygen, and the abilities of both directly affect the activities of the body's organs and muscles, which are essential. The whole process involves the function of the heart to make blood and pump blood, the lungs' ability to take oxygen and exchange gas, the efficiency of the blood circulation system to carry oxygen to all parts of the body, and the function of the muscles to use this oxygen. Therefore, cardiopulmonary function is the most important indicator of students' health. Basic strength usually reflects the strength and size of the respiratory muscles and is related to factors such as the amount of thoracic exercise, gender, age, height, weight, chest circumference, and physical activity. Normally, males are 3500 ml-4000 ml, and females are 2500 ml-3500 ml. The vital capacities before and after the first, second, third, and fourth year of the freshman year, sophomore year, junior year, and senior year are now researched and analyzed, as shown in Figure 8.

Studies have found that boys' lung capacity is generally much higher than that of girls, because boys often exercise their diaphragms, and their breathing is usually the abdomen; on the other hand, girls' breathing usually involves

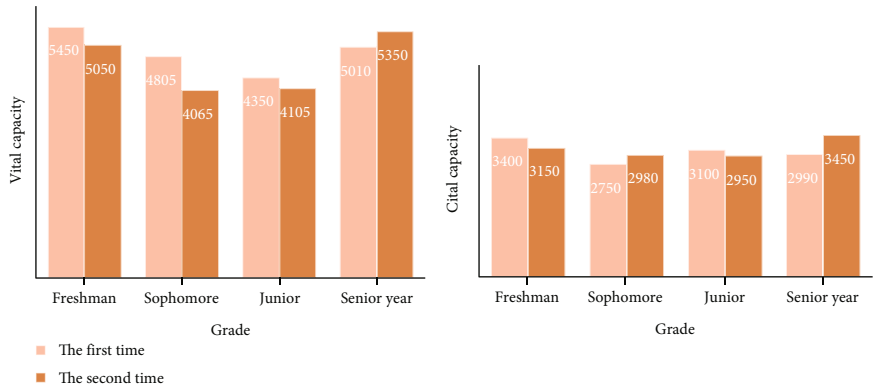

Figure 8: Comparison of vital capacity between men and women from freshman to sophomore year before and after half a year.

the joint muscles of the chest. In addition, the vital capacity of freshmen to junior college students generally showed a downward trend, and there was no sign of enhancement until the senior year. Schools must first establish the concept of health, take school physical exercise as an important work of school education, and organize fitness exercise programs scientifically.

4.3. Junior High School Students 50 Meters. Speed quality refers to the body's ability to perform fast movements or the ability to complete a certain movement in the shortest time. Speed quality is an important index to evaluate the human body's athletic ability, which is mainly related to the human body's muscle fiber type, muscle strength, and other factors. As a quality indicator of the student's physical fitness test, the 50 m run has an important reference value for evaluating students' speed ability.

Running projects can use network positioning algorithms, and the current positioning algorithms for wireless sensor networks mainly include DV. Hop positioning algorithm, Euclidean positioning algorithm, and Hop. Euclidean positioning algorithm.

V. The main working principle of the hop location algorithm is to first calculate the minimum number of hops from the node to the wireless sensor network beacon node for an unknown wireless sensor network node. At the same time, the average distance is calculated, and the average distance is multiplied by the minimum number of hops to obtain the distance from the wireless sensor network node to the beacon sensor node. When the unknown wireless sensor network node obtains the distance of more than three beacon nodes, the trilateral method is used to measure and locate, as shown in Figure 9.

The Euclidean location algorithm is an algorithm that calculates the location of an unknown sensor node that is two hops away from a wireless sensor network beacon node.

Supposing there is an unknown node in the wireless sensor network, E, F, and G, let L be a beacon node. The Euclidean positioning algorithm can directly measure the distance FL, FG, and GL between sensor nodes through RSSI technology. Sensor node E is adjacent to F and G. In this way, in the quadrilateral EFGL, by knowing the length of each side and the length of the diagonal FG of the quadrilateral, the length of the other diagonal EL of the quadrilateral can be calculated by the law of cosine of the trigonometric function. That is, the distance between the unknown sensor node E and the wireless sensor network beacon node L.

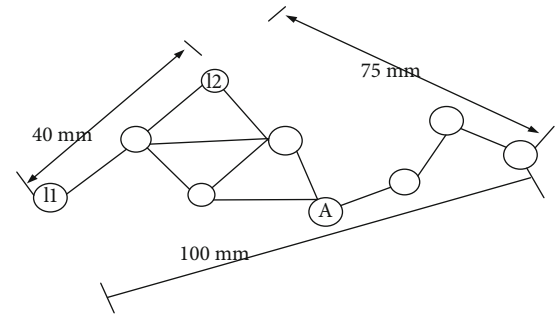

Figure 9: Wireless sensor network node.

$$\cos\alpha = \frac{EF^2\text{-}EG^2\text{-}FG^2}{2EG \times FG}, \tag{12}$$

$$\cos\beta = \frac{FL^2\text{-}EG^2\text{-}GL^2}{2GL \times FG}, \tag{13}$$

$$EL^2 = EG^2 + GL^2\text{-}2EG \times GL\cos(\alpha + \beta). \tag{14}$$

The Euclidean positioning algorithm is a theoretically better positioning algorithm for wireless sensor networks. All unknown sensor nodes that are two hops apart from the beacon node of the wireless sensor network can be located. The 50-meter data monitoring of the second and third grade students in the study is shown in Figure 10.

Data research has found that the average score of students in the 50 m running test is 807 + 124 s for boys and 914 ± 108 s for girls. The average scores for boys and girls are only maintained at the passing level of the National Physical Fitness and Health Standard and are at the lower limit of the passing range. All scores input through the wireless sensor will automatically form a student's 50-meter score evaluation according to the set program, as shown in Table 3.

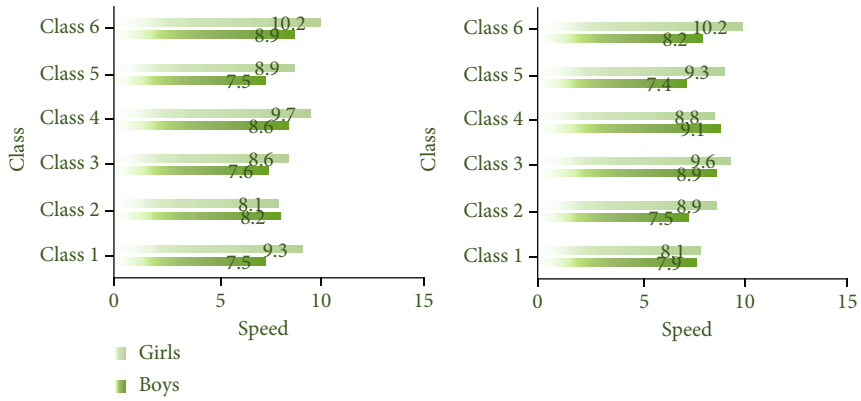

Figure 10: Men's and women's 50-meter scores in the second and third grades.

Table 3: Evaluation of the 50-meter test scores for all junior high school students.

Grade	First grade boys	First grade girl	Second grade boys	Second grade girl	Grade three boys	Grade three girls
Excellent	20.63%	25.31%	27.65%	29.36%	30.91%	32.19%
Good	36.25%	41.65%	45.99%	39.69%	45.98%	44.01%
Pass	43.12%	33.04%	26.36%	30.95%	23.11%	23.8%

The comprehensive evaluation from the two aspects of test scores and grade evaluation reflects the poor speed quality of students.

4.4. Junior High School Students Bend Forward while Sitting. Flexibility refers to the flexibility of different joints and muscles. Good flexibility can better reflect the beauty of the body. If the body lacks flexibility for a long time, it will cause mild heat around the joints, thereby limiting the range of joint motion.

How to calculate the forward bending distance of the sitting body? In the calculation distance section, calculate the average distance to each wireless sensor network reference node, and send the calculation result to each pending node of the wireless sensor network through broadcast. The node to be determined receives the information of the reference node and compares the received average hop distance with the minimum number of hops of each reference node previously obtained to calculate the distance of the node to be determined. The calculation method of the hop distance of the pending node is as follows:

$$L_n = \frac{\sum_{m \neq n} \sqrt{(x_n - x_m)^2 + (y_n - y_m)^2}}{\sum_{m \neq n} h_m}. \tag{15}$$

The reference node broadcasts the calculated average hop distance to the wireless sensor network where it is located, and the pending node retains the first average hop distance data received by the sensor node. At the same time, the hop count information is forwarded to the surrounding nodes to ensure that data can be received from the nearest reference node.

The coordinates of the undetermined node can be calculated by the above calculation to obtain the distance of more than 3 reference nodes, and the position of the undetermined node can be calculated by the trilateral method. The coordinates of N, M, and T are (x, y), (x_n, y_n), (x_m, y_m), and (x_t, y_t), respectively, and the distance from the node to be determined to the reference node is d_n, d_m, and d_t. From the geometric relationship, the following relationship can be obtained:

$$\sqrt{(x - x_{\mathrm{n}})^2 + (y - y_{\mathrm{n}})^2} = d_n, \tag{16}$$

$$\sqrt{(x - x_{\mathrm{m}})^2 + (y - y_{\mathrm{m}})^2} = d_{\mathrm{m}}, \tag{17}$$

$$\sqrt{(x - x_t)^2 + (y - y_t)^2} = d_{\mathrm{t}}. \tag{18}$$

Through the above steps, the coordinates of the undetermined nodes are obtained, and the average positioning error index is used to compare the positioning algorithms of the wireless sensor network. Supposing the coordinate of the undetermined section i is x_i, y_i, the actual coordinate value is (x_i', y_i'), and the following formula calculates the error of the positioning algorithm:

$$\Delta d_i = \sqrt{\left(x_i - x_i'\right)^2 + \left(y_i - y_i'\right)^2}. \tag{19}$$

In a wireless sensor network including N undetermined nodes, the average positioning error is calculated using the following formula:

$$\Delta = \frac{1}{NR} \sum_{i=1}^{N} \Delta d_i \times 100\%. \tag{20}$$

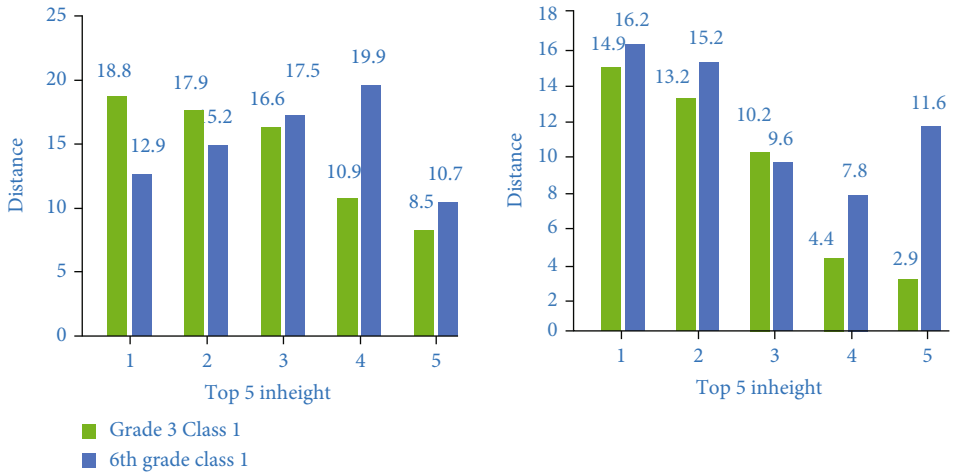

Figure 11: The five highest boys and girls in class 3 and class 6 are bent forward.

Table 4: Physical education curriculum intervention program.

Category	Intervention content		
Speed	30 meters	60 meters	100 meters
Strength	Raise your legs in place 10 seconds	15 m acceleration run	20 m forward run
Endurance	10 m lunge	Speed running	20 m trolley
Flexible	Kick	Yoga	Stretch

Inviting the highest five boys and girls in the first grade of third grade and the first grade of sixth grade to monitor the fixed-point distance statistics of sitting forward bending as shown in Figure 11.

The results of the seat bending test showed that the flexibility of girls is generally much better than that of boys, and the abovementioned students are within the scope of the national physical health standards. In addition to showing the flexibility of the human body, the results of the seat bending test also show the structural characteristics of the female body. Women's muscles, ligaments, and joints are more flexible. In general, women are more flexible, while boys also have a good foundation for flexibility.

4.5. Physical Fitness Intervention Program. With the help of wireless sensor technology, it is detected that the physical health of students is generally low, which has a large relationship with the lack of a lot of physical exercise by students. Therefore, according to the analysis of the physical fitness of the students, it is recommended to draw an intervention plan for the basic physical fitness, as shown in Table 4.

At the same time, to help students better improve and improve their physical fitness, we propose an open extracurricular preplan for the experimental group students. The program mainly provides suggestions for students' health awareness, extracurricular exercises, and lifestyle.

4.5.1. Health Awareness. Cultivating students' health awareness and developing good health habits.

4.5.2. Extracurricular Exercise. The main form of exercise is aerobic exercise; daily walking is mainly brisk walking or running at a constant speed; breaks between classes to do stretching exercises outdoors; interclass exercise time organizes extracurricular exercises in the unit of class.

The exercise intensity is mainly of medium intensity. It is recommended that 3-5 times a week, each time is about 05-1 hours. The frequency and time of exercise can be adjusted according to your own physical status, so as not to affect the next day of class.

4.5.3. Lifestyle. Diet-pay attention to the dietary rules, insist on eating breakfast, reasonably, match nutrition, pay attention to the intake of high-quality protein, diversify food as much as possible, and ensure a daily intake of 1500 m1 of drinking water. Sleep is in accordance with the school's schedule. Go to bed at 22 : 00 in the evening, wake up at 5 : 30 in the morning, and take a lunch break at noon to ensure enough sleep.

4.5.4. Matters Needing Attention. Ensuring the intensity and time of each exercise.

If there are no special circumstances, work and rest on time.

Parents' work cooperation is also essential, because children have no self-control, so parents need to help their children arrange reasonable time for physical exercise and develop good work and rest.

5. Conclusion

Physical fitness is an important foundation for students' education and life. Without a healthy body, everything is impossible to talk about. Young students need not only

culture but also health knowledge. The continuous decline of students' physical fitness has become an inevitable topic. However, many students in physical health quality monitoring are not aware of their physical health, and it is difficult for schools to fully understand. Therefore, the student physical fitness test is a way for students and schools to better understand the physical condition of students and then promote the development of a physical education curriculum. It is an inevitable technology to apply scientific and accurate wireless sensors to physical health detection. Students are the pillars of the country and the body of the country. Students' education and life must be put first in order to maintain the country's strength forever, and sunshine always blooms.

Data Availability

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

Conflicts of Interest

The author declares that she has no conflicts of interest.

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