Research on the Mass Sports Fitness based on Internet of Things and Intelligent System

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Abstract
Nowadays, the Internet of things will become another change in the face of the world after the Internet, a new form of technology; it will break the traditional way of fitness, becoming a new fitness logo. In this paper, the authors research on the mass sports fitness based on internet of things and intelligent system. The digital terminal can monitor the health status at any time through the intelligent information acquisition equipment. At the same time, based on the collection and analysis of health data, we can provide personalized counseling programs for residents to participate in healthy diet and exercise, so as to achieve the purpose of health. The intelligent systems can provide a full range of community health guidance services.

Keywords: Intelligent System, Internet of things, Community sports

1. INTRODUCTION

Entered in twenty-first Century, with the advent of the information age, science and technology as the first productive function will be more prominent, people have realized the impact of the Internet on the work, life and learning (Dai, 2012; Crespo, 2015). Today, the Internet of things will become another change in the face of the world after the Internet, a new form of technology; it will break the traditional way of fitness, becoming a new “fitness” logo. Combined with the development model of the new type of community sports, Internet of things fitness system is analysis of the basis of the development of the Internet of things and the necessity of fitness system (Hu, 2012; Huang, 2013). The system of fitness and networking organization, analyze the relationship between cohesion and coordination between the various sectors including and mutual, summarizes the existing issues in this process, puts forward some opinions and suggestions (Jian, 2012; Kim, 2014). This will enable the public to understand the Internet of things fitness system, this new model, to experience the benefits of this model, to promote the quality of life of the people, and therefore has an important practical value.

Physical education is an important part of the construction of spiritual civilization in the city. It is very important to strengthen the construction of community sports to promote the construction of spiritual civilization in the urban community. Community sports as an important part of mass sports (Sigala, 2012). It is comprehensively implement the “Outline” the important content of the national fitness program, it is the effective way to realize the sports and the national economy and the coordinated development of social undertakings, is an important method to improve the overall quality (Krstev, 2014). Social development will promote the development of community sports, pay attention to and actively guide the development of community sports will also contribute to social harmony. With the rapid economic development, people's life pressure is increasing, urban community sports has become an important way of public leisure and decompression. However, according to the national sports site survey results show that: in our country's existing sports venues, the number of community sports facilities. Based on the reality, appeared in the development of city community sports in our country mainly focus on the following aspects: first, the community sports facilities serious lack, shortage of funds. Although the country attaches great importance to the construction of community sports and investment, especially in every corner of the national fitness path throughout the city and the countryside, but the base of our sports population and complex structure cannot meet the needs of the public. Second, the community sports organization and management system is not perfect (Zhang, 2012). City Community Sports Management in our country is mainly undertaken by the Neighborhood Community Association official sports organization of the community, and a large number of regular community sports activities are mainly composed of morning and evening exercises such as spontaneous community sports organizations to complete. However, due to lack of manpower and other neighborhood community association by the subjective and objective factors, yet with numerous small spontaneous community sports organizations to establish normal relations. Third, community sports management, sports instructor team is weak. At present, the number of social sports instructors in our country is only about 700 thousand. Fourth, the participation rate of residents in community sports activities is low. Affected by the natural environment and social environment, in general, China's urban community sports residents only a few. Carrying out community sports activities is an important way to promote the sports life, and it is an important way to realize the national fitness.
2. BASIC THEORY OF INTERNET OF THINGS

2.1. Internet of things

General networking refers to the use of bar code and radio frequency identification (RFID), sensors, GPS, laser scanners and other information sensing equipment, according to the agreed protocol, realize people and people and things at any time and place the connection, to exchange information and communication, in order to achieve the huge network system intelligent identification, positioning, tracking, monitoring and management. In 2005, the International Telecommunication Union (ITU) officially called the "Internet of things", now the common understanding is that the Internet is the various information sensing devices such as radio frequency identification (RFID), a huge network device, infrared sensors, GPS, laser scanning device and the Internet all together formed. The types of objects on the device in the electronic tag (RFID), sensor, two-dimensional code after connected with the wireless network interface, thus giving intelligence to the object, can realize people and objects or objects of communication and dialogue between them. The Internet information network technology and RFID technology combination, namely the use of items encoding global (EPC Electronic, Product Code) as the goods identification, connection automation using RFID "items" and "Internet", without the help of a specific system, can at any time and place, to achieve any recognition and management.

![Radio frequency identification application in running](image)

**Figure 1.** Radio frequency identification application in running

Compared with the traditional Internet, Internet of things does have its distinct characteristics, can be summarized as three points:

1) Overall perception: the use of RFID, sensors, two-dimensional code, such as the dynamic information can be collected at any time and place. Internet of things deployed a large variety of types of sensors, each sensor is an information source, the information captured by the different categories of sensors to take 5 information format is different. The data obtained by the sensor is real-time, according to a certain frequency of periodic acquisition of environmental information, and constantly update the data.

2) Reliable transmission: the important foundation and core of the Internet of things technology is still the Internet, through a variety of wired and wireless networks and the integration of the Internet, the object of the information in real time to accurately transfer out

3) Intelligent processing: the Internet of things will be a combination of sensors and intelligent processing, the use of cloud computing, pattern recognition and other intelligent technologies to expand its application. To analyze process and deal with the data obtained from the sensor, to meet the different needs of different users, to discover new application fields and application modes. Internet of things using computer technology in a timely manner is to the vast amount of data for information control, to achieve the real people and objects, objects and things.
2.2. The typical architecture of Internet of things

The Internet of things architecture can be divided into three layers: perception layer, network layer and application layer, and the perception layer includes two parts: coding layer and information collection layer.

- **Perception layer**: by a variety of sensors, including temperature and humidity sensors, two-dimensional code labels, RFID tags and reader, camera, infrared, GPS and other sensing terminals. The perceptual layer is a source of information collection, object recognition networking, and networking is the core ability to achieve comprehensive perception, is the Internet of things including key technology, standardization, and industrialization breakthrough part. The coding layer is the cornerstone of the Internet of things, and it is the core and key of the transformation of the Internet of things information. The information collection layer refers to the process of obtaining the coding information of the article by means of automatic identification and near field communication technology including bar code, RFID, wireless sensor, Bluetooth, etc..

- **The network layer**: communication network is the exchange of information, including Internet, cable TV network and network management system and cloud computing platform, is the center of the whole network, responsible for the transmission and processing of information perception layer. Mobile communication network coverage is the infrastructure, networking and network layer networking standard three layers the highest level of industrialization, the strongest and most mature, the key is for Internet application features and improve the formation of cooperative awareness network.

- **Application layer**: the Internet of things and the user interface, it is combined with industry needs, to achieve intelligent applications of things, including commercial trade, logistics, agriculture, military and other different application systems. The networking application layer can provide rich applications based on the Internet of things, is the fundamental goal of the development of things, it will demand for networking and information technology and industry combined solution widely used intelligent set, the key lies in industry integration, the development and utilization of information resources, solutions, low cost and high quality information security and effective business model review.
3. APPLICATION OF INTERNET OF THINGS IN COMMUNITY SPORTS

Networking fitness system aims to provide services for the new fitness model of fitness, is installed in the indoor gymnasium in the intelligent network information acquisition terminal, fitness equipment and outdoor sports wear portable energy consumption monitor and data acquisition function of intelligent mobile phone of Internet of things sensing network terminal, the public health status, health data, venues and equipment information through the digital information processing technology and the Internet, mobile communication network, upload to the fitness information management network platform, the use of networking technology to implement the digital management of health services, build a network information platform of Sports Bureau management, enterprise implementation, public participation. The community is indispensable in our life contains a variety of comprehensive services based on the masses, it is to serve as the core, to meet the needs of many convenient life of the surrounding residents shopping, leisure, entertainment, catering, life etc.. People in the city live most of the time in the community, so that the application of Internet of things technology health management services came into being. This technical support, people exercise in the sports service center home, indoor gymnasium, or community outdoor fitness path, the daily running fitness activities, and walking exercise, residents' physique data, motion indicator data, food consumption, sports consumption and other information can be collected and transmitted in real time to the health service team, management of related information through the online health management network at the same time, individual residents and Community Sports Bureau, other services can also be carried out through the website information query and management. Through professional personalized diet and sports guidance services, residents can always understand their own physical condition and guidance.

Community sports service center to improve the physical quality and get rid of sub-health, chronic disease prevention and rehabilitation services for the purpose of providing personalized health guidance services in two aspects of diet and exercise, professional and thoughtful for community residents, and health status of their own real-time feedback query and motion data, in the fitness goal the daily consumption. Secondly, the residents in the home, by sensing household fitness equipment, intelligent mobile phone, digital set-top boxes, instrument, energy consumption intensity table and other types, the daily movement data feedback technique to the background of professional sports health service team through networking, residents according to the personalized guidance plan service team to develop, to intervene healthy diet and exercise, so as to achieve the purpose of health. Finally, the information gathering sensor community outdoor fitness path installation, portable energy consumption monitor and information acquisition function of intelligent mobile phone information sensor, can also exercise and daily activities of residents data provided by the network to the health service team, at the same time, other public service institutions in the community within the auxiliary equipment the sensor node, can also be the daily life of the residents for the collection of information, provide data support for the development of personalized health guidance services, so that the diet and exercise guidance service coverage to the residents in all aspects of daily life, to provide a full range of health guidance services for community residents.

![Figure 4. Running data real-time feedback](image)

Physical fitness instructors is through the members of real-time training data analysis, comparison, evaluation to give one to one guide, to achieve a scientific exercise and adhere to exercise. Analysis of website front view their test report, physical trend can clearly understand their own physical condition, combined with the training goal to actively cooperate with the instructor to complete their physical fitness promotion exercise program, experts can choose their trust through expert customer service online guide service. The expression form of the network supporting layer of the Internet of things is: the Internet, mobile communication, remote control wireless transmission, the mutual communication between people and objects or objects and objects. Through the integration of information technology for several kinds of communication methods, to achieve two-way communication of long distance, fitness equipment is more than VR digital technology to achieve the
transmission of fitness guidance based on prescription, it can automatically identify the individual fitness
guidance scheme issued by the tutor, download the fitness guidance prescription, then members of each exercise
results upload, ultimately the two-way communication of intelligent. The networking system has the perception
layer fitness outdoor path acquisition sensing function information and have the information collection function
of intelligent network fitness, service to the community sports, is committed to achieving personalized diet and
exercise service, provide the basic data support for the government sports management departments and the
whole people's health, scientific and accurate for community residents to provide health services. The
networking application is the fitness systems first installed in the indoor gymnasium in have the information
collection function of intelligent network fitness equipment for the first performance, it supports members of
individual exercise guide download; upload the daily exercise information storage.

![Figure 5. Health management system](image)

4. COMMUNITY HEALTH SERVICES

From the development of community sports, community sports refers to a certain region in people living
together, to the area of the natural environment and sports facilities as the material basis, to all members of the
community as the main body, in order to meet members of the community sports needs, enhance physical and
mental health of community members, consolidate and develop the community emotion as the main purpose,
area mass sports expediently. Community elderly sports fitness service system, is refers to the special
management departments unified guidance, soft conditions are composed of a variety of sports fitness services
by community organizations and individuals in the community elderly special sports fitness service demand and
development and the hard conditions of the collection system. But under the current situation, the community
elderly physical exercise is organized free exercise, participate in organized exercise in the elderly accounted for
37.1% of the total, mainly refers to a variety of counseling sites, elderly activity center, unified organization and
guidance of the elderly sports fitness activities; family activities accounted for 17.1% of the total number of
couples, mainly refers to the number of free exercise activities; activities accounted for 45.8% of the total,
mainly refers to the individual or others and exercise together. Thus, there are 62.9% old people's physical
exercise is the free exercise of the organization, it is the main form of community elderly physical exercise. The
most common aged people in community sports activities is walking running, 63.3% community elderly people
choose to run this with similar results; 57% elderly people choose aerobics, dance class projects; 36.2% of the
elderly to choose Wushu, Taiji, qigong project; there are also 18.1% old people choose mountaineering the
project, can be seen walking and running is the preferred project in Xiamen, the elderly, and this may be
walking, running and low field requirement, second more than the number of items is engaged in aerobics,
dance classes, which may be associated in the elderly women. In addition to the two project exercise crowd
concentrated thought, other projects scattered temper population, relatively low proportion.

<table>
<thead>
<tr>
<th>Project</th>
<th>Select number</th>
<th>Percentage</th>
<th>Sort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take a walk, run</td>
<td>175</td>
<td>63.3%</td>
<td>1</td>
</tr>
<tr>
<td>Body building exercise</td>
<td>139</td>
<td>57%</td>
<td>2</td>
</tr>
<tr>
<td>Taiji boxing</td>
<td>98</td>
<td>36.2%</td>
<td>3</td>
</tr>
<tr>
<td>Fitness equipment</td>
<td>34</td>
<td>11.3%</td>
<td>4</td>
</tr>
<tr>
<td>Table tennis</td>
<td>25</td>
<td>8.1%</td>
<td>5</td>
</tr>
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Community physical fitness activities of the elderly residents to form is still showing spontaneous, loose fitness activities, supplemented by community management in the form of specific community elderly sports fitness organization are as follows: complete folk organization form, which is spontaneous, informal organizations of the masses, no close ties with the government sports department. The talented person as the organizer, and they are the general in the park, the community open space on the morning or evening exercises. Street community and civil official civilian organization form, which is a common phenomenon in our country at present the organization, its activities in addition to the morning and evening exercise, but also to carry out community sports and community sports competition. Change of community sports by the affiliated to the entity type of organization form, which fully rely on and use of relevant policies, laws and regulations, establish the concept of development of the market economy system, the transformation to the management model, the development of sports market, multi-channel fund-raising, and the gradual implementation of independent management organization. Community organization form, which is composed of sports associations and sports clubs, is a relatively mature form of community sports organizations, more common in economically developed areas.

![Community sports fitness](image)

At present, most of the community residents' committees in our country have no full-time community sports administrators, but also have no professional community senior sports administrators. At the same time in the community sports administrators, experts rarely, lack of theoretical knowledge to carry out sports activities! Experience and scientific and effective exercise methods, strategic research and lack of community sports activities of the overall planning and community sports activities, something that is basically not, even if the random state. The current situation of sports China elderly nationwide elderly sports organizations, including the official sports organization and folk sports organization survey, main difficulties of sports development for the aged in China showed as follows: the government does not pay enough attention to the elderly sports work. This is mainly reflected in two aspects; first, government financial investment is less, resulting in the elderly sports organizations lack of funds, resulting in elderly venues, and the lack of funds. Second, the government of the elderly sports organizations in the preparation of less, the elderly sports organizations and management institutions are lagging behind.

1) **Community sports organizations**: the traditional community sports activities carried out under the personal, family, neighborhood, street combination in the form of organization, for collective activities especially sports events organizers need according to certain rules, to participate in sports activities in the crowd are orderly organized, ensure the community sports activities can be carried out smoothly. Community events of large scale, wide coverage, will inevitably require the activities of the organization to develop reasonable rules of the game, the players, referees and other organically integrated into a whole. Internet of things fitness is a powerful way to avoid this condition; it does not require the existence of a real organization. The use of networking fitness system simply login to the online game network management task can be completed at a specific time in accordance with the contestants selected game mode, the game after the completion, the system will automatically display candidates.

2) **Community sports activities in time and space**: the traditional community sports activities in time to make full use of the morning and evening, holidays and other leisure time activities in space, based on the principle of the nearest situ. However, the fierce competition in the current social environment makes people face the dual pressures of life and work, because of the limit of time and space, although aware of the benefits of
physical fitness activities, but less participation in sports activities. In contrast, the Internet of things to increase the proportion of groups involved in sports activities have more advantages. Fitness for community residents to participate in sports activities in time and space is not restricted, community residents can exercise at any time, any place. Can choose indoor fitness club, also can choose outdoor open space.

3) To participate in sports activities groups: community sports is more professional, systematization, standardization and scale, to some extent limit the extensive participation of community residents, and the sports and fitness show high content, difficult and close to the people to meet the public demand for sports competition, only a small number of a certain level the people in. Networking fitness participation groups covering almost every resident of the community, it is not restricted by the nature of the community sports activities, not affected by individual factors, as long as the fitness needs, you can participate in community sports activities in the past.

4) Evaluation of community sports activities: the traditional mode of community residents to participate in community sports activities evaluation results generally take the way of self evaluation, namely according to their degree of fatigue, sweating, heart rate speed feel exercise load, and the contents and methods of their participation in sports activities is not feasible make scientific judgment. The networking system can be collected by the residents of fitness system data, motion indicator data, food consumption, sports consumption and other information, send the information to the background of health service team collected, providing professional and thoughtful health guidance for community residents.

5. CONCLUSION

The networking system is installed in the interior to fitness sites in the intelligent network information acquisition terminal, fitness equipment and outdoor sports wear portable energy consumption monitor and data acquisition function of intelligent mobile phone of Internet of things sensing network terminal, the residents physical conditions, fitness venues and equipment data, information through the digital information processing technology and the Internet and mobile communication network, upload to the management information network platform, the use of networking technology to implement the digital management of the public health service, to build a network information platform of Sports Bureau management, enterprise implementation, public participation. The elderly in the community in the course of physical fitness to participate in sports enthusiasm is high, but the elderly sports fitness scientific knowledge not much; the concept of sports consumption needs to be improved; they hope to get high quality and rich and colorful sports fitness service in community elderly sports fitness activities; management mainly institutions are inadequate services the problem, lack of management professionals; appears in the service content of the main problem of inadequate funding, lack of guidance, problems of physical fitness activities of the elderly community less etc.

REFERENCES