Technology Devices in Sport Education, Technology Applications with Wearable Sensor and Accelerometer in Physical Exercises—And Ho Chi Minh and Lenin Ideologies on Physical Exercise for the Youth

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Abstract Together with technology applications in sports such as wearable sensors and accelerometer and digital technology applying in coaching athletes, the young generation will be future owners of the nation, therefore they need to practice and do physical exercises to have a strong body and good mind and spirit. The objective of this paper is to find out what kinds of technical applications (such as wearable sensors) and how they can be applied in sports games as well as in physical exercises. In reality, up to now there are many researches and interests in the field of robotics interaction (this is new trend) with the meanings to recognize athletes or human activity, i.e., identifying type of activity of human, from the received signal stream (image, accelerometer, etc.). In this field there are at least two various methods to classify problem of activity recognition. And this is depending on whether machine learning models with recognition or the type of sensor is used to collect signals of activity. Study showed that to observe human or athletes activities to increase recognition efficiency, people are simultaneously observed by environmental cameras while still wearing accelerometers. Digital technology can also be applied for coaching

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athletes. Moreover, the camera could be worn in several different locations on the body such as on the chest, wrists, and head. The combination of wearing multiple sensors has also been conducted for specific applications (care and monitoring of health progress and assessment of recovery) which can be used in sport games. Last but not least, regarding physical education for school youth, President Ho Chi Minh identified as an important part of the national education of an independent and democratic Vietnam: "An education will train children to become useful citizens for Vietnam, an education that fully develops their existing capacities."

Keywords Technology devices · Tech applications · Sport training · Wearable sensor · Accelerometer · Ho Chi Minh ideologies · Young generation · Vietnam

1 Overview

According to the sensor-based classification, there are two commonly used types of sensors: image sensors and accelerometers. Previous studies often used image sensors mounted in the environment to observe and acquire images of human activities. The use of sensors (cameras) mounted in the environment is often suitable for monitoring applications to monitor crowds in public places (building corridors, hospitals, airports, workplaces). This method does not require people to carry any equipment, but it is limited by the camera's field of view. The approach using accelerometer wear sensors is an option that allows to overcome this limitation. However, the signal received from the accelerometer is often quite ambiguous, making it difficult to identify and interpret the recognition results when necessary.

Under the socialist regime, science is the common property of the whole people. Therefore, the contingent of scientific and technical cadres must make every effort to spread their knowledge widely among the working people, so that the people can step up the emulation of producing more, quickly, well, and cheaply. Only then will the country be rich, the people will be strong, and the people's life will be improved in all aspects. That was President Ho Chi Minh's teaching to the national team of scientific and technical cadres exactly 57 years ago at the 1st National Congress of the Vietnam Association for the Dissemination of Science and Technology (Date May 18, 1963).

Uncle Ho's teachings emphasized the role and significance of science and technology in the cause of building socialism, so that the people could be rich, the country would be strong, and compete with the great powers of the five continents.

In summary, there is technology applications of wearable sensors for athlete coaches to record results of athletes in various sports: running, walking, jogging, mountain climbing, biking, etc.

On the other hand, digital technology also has applications in sports games as we presented in following section. And this sector received many financial support [1–9], and there are risks need to be managed [10, 11].

Research questions:

What are technology devices and applications in sports game and for athletes?

2 Research Approach and Methods

The article conducts an overview of the research works of domestic and foreign scholars, synthesize collected and searched documents to systematize theories related to technology applications, combined with survey, synthesis and inductive methods. Authors use observations and experiences, together with dialectical materialism, synthesis and inductive methods.

Santos et al. [12] mentioned effects of the skills4Genius sports-based training program in creative behavior. Then Stylianos et al. investigated activity recognition using wearable sensors for tracking the elderly. Beside, Tran et al. [13] stated a multimodal multi-view dataset for human fall analysis. Wearable Inertial sensors have revolutionized the way kinematics analysis is performed in sports. Therefore, this study differs from previous studies in a sense that it will identify supporting roles of digital tech for sports coaching and athletes. Also, athletes activities are recorded to increase recognition efficiency, they are simultaneously observed by environmental cameras while still wearing accelerometers. So there will come the novel of this paper.

In summary, Digital technology can be applied for coaching athletes.

3 Main Findings

3.1 Technology Devices and Applications in Sports

Haake [14] stated that with the help of simple equipment such as the pole vault or javelin considered as technological developments, which influence the index by around 30%, whereas one-hour record index with aerodynamic improvements is about 100%. Then, they come to conclusion that if distance or time is used as a performance measure, there is index of performance improvement extended to amateur and elite sport.

Next, Giblin et al. [15] mentioned there is a wide spread of applications of technology in many kinds of major sports and this will help to gain what they called competitive advantage in elite sports and this is important feature. There is innovation on information between athletes and their coaches, or method in which they collect and process data, so this has influenced greatly on how athletes are trained and monitored in training per day as well as competition environments.

Then, Kenttunen et al. [16] specified that there is increasing in demand of wellness technology for athletes for both the purpose of improving life and improving

Fig. 1 Volley ball as favorite sport. (*Source* authors collection from Vietnamese universities)

training quality, for instance, reducing injury risk. Besides, it is recognized that there is growing demand of information personalized going with the increasing sports interests (and wellness tech mentioned). There is also increase in digital coaching (with valuable training and guides) as it showed helpful for athletes' knowledge related to their techniques, for example in skiing technique perceived.

Figure 1 shows that volley ball as favorite sport which is collected from Vietnamese universities.

3.2 Technology Applications in Sports and Physical Exercises

3.2.1 Wearable Sensor and Accelerometer

With progress in technology, compared to whiteboards and reviews of post-practices, advanced technology has helped to increase potential of athletics as these tech became more resilient and smaller, more resilient, as well as less burdensome in recent years, For instance, wearable sensors can help to transfer to coach's tablet and GPS accurately pinpoints motion (with real time information conveyed), with support of smart phones and wearable tech help to prevent injuries. Compared to whiteboards and post-practice reviews, technology has substantially increased athletic potential.

Hence, training of sports are revolutionized with advanced technology through live-tracking performances, perfecting movements of athletic, as well as eliminating

injuries virtually. (source: https://onlinemasters.ohio.edu/blog/how-technology-is-revolutionizing-sports-training/, access date 9/21/2021).

In a few recent studies, to observe human activities to increase recognition efficiency, people are simultaneously observed by environmental cameras while still wearing accelerometers as studied by Tran et al. [13]. Even so, such a multimodal information acquisition system still faces difficulties such as installation cost, field of view and the difference between viewing angles. Recently, image sensors have been widely used to track the journey/daily activities of people in a number of sports and health monitoring applications. In these studies, the camera could be worn in several different locations on the body such as on the chest, wrists, and head. The combination of wearing multiple sensors has also been conducted by a number of research groups, but currently the methods are not geared toward user convenience (each sensor is worn in one position) so it is only suitable for specific applications (care and monitoring of health progress and assessment of recovery) that are not yet aimed at general users.

Wearable image sensor: In the past few years, there have been many studies using wearable image sensors to identify people's activities. Bearing image sensors generate large volumes of first-person image data, opening up new possibilities in gesture-based human–machine interaction (HCI) applications, activity logging, and gestures/sign language recognition. Usually, the camera is worn on the head or in front of the chest and neck to create a field of view similar to the human eye as shown in Fig. 2.

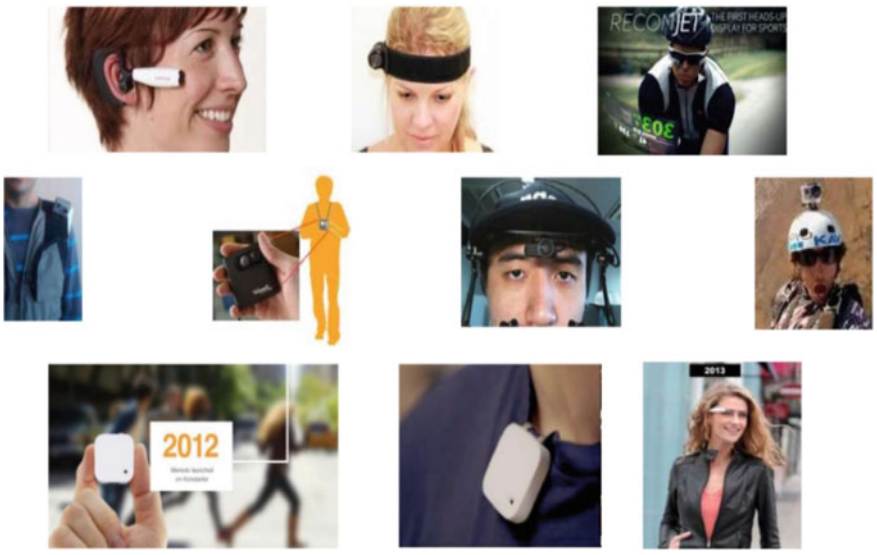

Fig. 2 Some common image sensor installation locations (*Source* Trung-Hieu Le thesis [17])

3.3 Ho Chi Minh and V. I Lenin Ideologies on Physical Exercises

"…Every weak citizen means the whole country is weak, every healthy citizen means the whole country is healthy.

… If the people are strong, the country is prosperous. I hope my compatriots all try to exercise. I practice every day by myself" are the sentences in Uncle Ho's "Call to exercise" posted on March 27, 1946. Talking about the goal, the people are strong and the country is prosperous are the two noble goals of the regime. This means that people's health is one of the great factors determining the development of the country toward "rich people and strong country". The people's health also contributes to the defense and construction of the country.

Therefore, other views of Ho Chi Minh are consistent with the orientation of strong development of sport for the health of the people. Through serving the people's health, serving the health of everyone, sport contributes to all activities of economic, cultural, social, and educational development… that is, to the cause of striving for "Rich people, strong country".

Ho Chi Minh's views on the development of mass sport President Ho Chi Minh pointed out that: "Under democracy, Sports and Physical Education must become common activities of the masses, aiming to enhance the people's health. If the people are healthy, everything can be done well." He encouraged: "So exercising, improving health is the duty of every patriotic citizen". Since then, Ho Chi Minh has advocated "We should develop the sports movement widely". Those are the general views of Ho Chi Minh about mass sport and sport for everyone. Regarding physical education for school youth, Ho Chi Minh identified this as an important part of the national education of an independent and democratic Vietnam: "An education will train children to be useful citizens for Vietnam, an education that fully develops their existing capacities". (*source: baoquangbinh.vn, access date 9/20/2021).*

V. I Lenin preferred to challenge himself (like many other sportsmen), which means physically, and he derived certain pleasure from being close touch with nature.

Elwood [18] stated during in Western Europe in his long years Lenin continued to pursue some sports, in that time he has become a mountain climber and a long distance cyclist.

In summary, the need of sports games and physical education are emphasized more by V. I Lenin and Ho Chi Minh and there are wide applications of devices including Wearable sensor and accelerometer in these sport activities.

4 Conclusions

In our modern society, science and technology can be applied in physical exercises and sport games as well as into other industries.

Technology applications and devices and wearable sensors have been applied into many sport games and has helped many athletes to reduce injuries (so, the camera could be worn in several different locations on the body such as on the chest, wrists, and head).

Beside, athletes activities are recorded to increase recognition efficiency, they are simultaneously observed by environmental cameras while still wearing accelerometers. Digital technology can also be applied for coaching athletes.

Diehl et al. [19] said physical activity among students is essential for complimenting sedentary behavior and for individuals' future health.

President Ho Chi Minh attaches great importance to physical education for the young generation, because the young generation will be future owner of the nation. On March 31, 1960, President Ho Chi Minh wrote "Letter to the Conference of Sports Officers in the North", the teacher: "If you want to have good productive labor, good work and study, you need strength strong. If you want to stay healthy, you should develop a widespread sport movement". The person advised: "Sports and physical training officials must study politics, conduct professional research and work enthusiastically to serve the people's health." (source: Ho Chi Minh: Complete Volume, Publishing House. National politics, Hanoi, vol. 12, p. 542).

Fig. 3 Ho Chi Minh paid attention to physical exercise. (*Source* authors collection from tuyengiao.vn)

Figure 3 shows that how Ho Chi Minh paid attention to physical exercise which is collected from tuyengiao.vn.

Research Limitation

We need to make detailed analysis for each sport games training.

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