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ABSTRACTS OF THE PROCEEDINGS OF UK-CHINA SPORTS ENGINEERING WORKSHOP

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Recognition of Biological Signal Mixed Based on Wavelet Analysis

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Abstract. In order to extract the feature of signal and eliminate the noise in central wave, based on wavelet analysis, we apply global statistics method to the wavelet series of biological signal. The method to filter the signal was presented after the wave decomposition to biological signal. Thus the recognition and extraction of human EMG-signal mixed with random noise and ECG-signal was achieved. Finally, relevance analysis was made to the results, which test the feasibility of this method of recognition and extraction.

Applying Engineering Principles to Improve the Performance of Sports Equipment: Recent Developments at the University of Sheffield

Bob Kirk and Matt Carré

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Abstract. Scientific understanding and engineering knowledge can contribute to the improved performance of sports equipment and increased athlete safety. Research projects carried out at the Sports Engineering Research Group within the Department of Mechanical Engineering at the University of Sheffield are presented to highlight the application of various engineering disciplines to solve sports related problems and increase physical understanding. Techniques include the application of aerodynamic simulations to explain peculiar football free kicks and the use of artificial neural networks to improve shoe design.

Overview of Sports Engineering, Sport Science, Coach Development and Sports Development & Recreation at the University of Bath

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Abstract. The University of Bath has made a unique and very significant commitment to sports-related education, sports development and sports recreation in the South West of England. Undergraduate degree programmes in Sports Engineering, Sport and Exercise Science and Coach Education and Sports Development together with the extensive facilities of the Sports Training Village are described. Each aspect of sports related education, sports research or practice derives benefit from its respective location within the Department of Mechanical Engineering, the School for Health, the Department of Education and the Department of Sports Development and Recreation. Additional benefits are derived from the considerable collaborative interaction between these departments.

Mathematical Model for Variation in Human Body Weight

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Abstract. On the basis of theory of physiology and measured data, a System of ordinary differential equation of first order is derived as the mathematical model for variation in human body weight, and calculated values are found to be in good agreement with the measured ones.

Mathematical Model of Variations Speed on Sprint

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Abstract. In this paper, sports problem is deeded with in light of Knowledge about physiology and a mathematical model of variations of speed on sprint, which highly tallies with actual conditions, is set up.

A Study of Regulating Specialized SportQuality Index of Athletes by Utilizing Grey Systematic Analysis

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Abstract. The application of grey systematic analysis to describe the quality index of special sports may demonstrate the vague relationship between different internal links more precisely. On the basis of the uncertain variation of coefficient vectors and by analyzing the changing status of system in the course of training, the grey systematic analysis is able to predict the potential developing trend and regulate the athlete's quality index of

specialized sports. It can be used not only as a testing method to reasonably diagnose the athlete, but also provide reference for the coach to control and conduct the training.

Development of a Supervision System for Diving Coach

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Abstract: The current feedback cycle in diving training is slow and not intuitional. To solve these problems, as well as to study players' performance more thoroughly, we developed VSSCoach, a supervision system. VSS (Video and sensor synchronization fusion) technology is applied in this system. The validity of this system is proved through practice in national diving team.

The Performance and Application of PR-Ⅱ Model of Multi-center Psychology Feedback Training Instrument

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Abstract. We need the professional instruments to carry the psychology feedback training on athletes, the PR-Ⅱ model of multi-center psychology feedback training instrument is developed by Automatization Institute of Chinese Academy of Science and Capital Institute of Physical Education. The study introduces the basic performance and practical application, and brings forward some suggestions for further design and research .

Development of LJ-I Typed Photoelectric Tread-jump Timer & Experimental Study on Time of Tread-jump in Long Jump

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Abstract. In the first place, LJ-I Typed Photoelectric Timer was developed to measure time of tread-jump in long jump especially which is of convenience, credibility and real-time. Secondly, by using it the time of tread-jump in long jump was measured, and the result was proved that there be a minus relationship of middle correlation between the achievement of long jump and time of tread-jump, i.e. the shorter the time of tread-jump is, the longer the achievement of long jump.

Development of Research on Chinese Aquatic Sports Engineering

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Abstract. Sports Engineering is the applied subject which combines Mechanics, Physic with sports subject, the new subject which some subjects are combined in. Its research deals with the intersectant field composed of Hydrodynamics, Mechanics Engineer, the Robot Technique and so on. Since the decade years, Sports Engineering has developed rapidly; the Association of Sports Engineering has been set up and accelerated the academy. Presently, although the Association of the Chinese Sports Engineering doesn't be set up, a lot of work about Sports Engineering has been done. This article summarized of the research actuality, content and aspect of the Chinese Sports Engineering, viewed of the tendency of this field and provided the reference of the development of the Chinese Sports Engineering.

Development of the Computation of the Sails Aerodynamics

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Abstract. The aerodynamic performance of the sails is important to the sailing. For China to gaining the first Olympic gold of the sail in 2008, the aerodynamics of the sail should be strengthened to guide the sailors to make more use of the dynamics of the sails. With the rapid development of the computer, numerical simulation is the important tool of the research on the aerodynamic performance of the sails. By numerical simulation, many design projects can be done in the short time; it can be gained of the quantities of the sail shape to the aerodynamic characteristics, for example, the lift and drag coefficient of the sails; The aerodynamics of the only sail, the mutual influence of the double sails and the relation of the mutual aerodynamics of the different sailboats can be simulated in the game.

A Study of Test Methods for External Performance of Table Tennis Rackets

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Abstract: A new method of testing the external performance of different types of table tennis rackets is presented, such as driving speed, spin and control, involving measurement of the capability of the rackets producing speed and spin by analyzing the high-speed video images showing the way they produce loop; calculation of the actuation time and depth of the rackets against the ball by also analyzing the high-speed video images taken by the same high-speed video camera, which was used to record the process of the ball striking the rackets at 90 and 45

degrees, respectively, thus giving an evaluation of estimate of the rackets control capability. Taking Focus package-rubber series, a famous brand of Tianjin 729 Sports Products Co. Ltd., as a test piece, this test has obtained some concrete results, which, compared with that obtained by players who made trial of the rackets, demonstrate the consistency with the evaluation results.

Orienteering Based on System Simulation Technology

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Abstract. System simulation technology is a multidisciplinary integrated technology. This paper has discussed the conception of the system simulation technology, and analysis using system simulation technology，3D character models to establish system simulation training orienteering. Orienteering based on system simulation technology, provides students with a sense of the reality of experience personally, improves students learning, to enable students more in-depth understanding of orienteering.

The Participial Virtual Reality Game and the Development of Chinese Family Sports

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Abstract. Virtual reality is an important technology for human interaction, and participial interaction is the main features of children innovative learning. From the trend of world participial game, the violence computer games will be replaced by the Virtual participial games for children. In China, accounted for a large proportion of families with only one child, parent-child relationship has drawn wide attention. Parents and children can be evoked more communications by participial sports activities. For Chinese, living conditions and community conditions are not very big, so the participial virtual reality games are very suitable for the leisure of only-child family model.

On the Fusion of Traditional Chinese Culture and Modern Sports Architecture

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Abstract. Nowadays architecture has become a hotspot in people's research and development when human civilization has developed to such a degree. Sports architecture has become a very important part of architecture. This paper seeks to explore the concepts of sports architecture catering to the contemporary era through an analysis of China's traditional culture and architecture. By comparing China's traditional culture and the characteristics of modern architecture, this paper seeks to identify the new potentials for China's sports architecture to inherit and fuse with China's traditional architectural culture and the development of China's sports so that China's sports architecture possesses more contemporary, ethnic, and cultural features and a unique road of sports architectural culture is taken.

Development and Application of Equipment for Specialized Strength Training and Testing

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Abstract. This research finds out the relationship between the training weight and the strength peak, impulse, power, etc. By utilizing biomechanics, machinery engineering, computer science, human- machine engineering, etc, we establish a training and evaluation system of specialized strength training, developed a set of specialized strength training equipment with the variational resistance cam structure and the Adjustable decelerating System, which can be used in the training of games such as rowing, sailing, wrestling, etc. When installing a testing equipment on the training instrument, people are able to supervise the process of athletes' strength training, and the property of strength and fatigue status, so that to evaluate the athletes' competence of strength. Consequently, the training becomes more scientific.

The Establishment & Development Trend of Sports Engineering in China

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Abstract. It is in the past ten years that sports engineering has developed in the world. Now the International Sports Engineering Association (ISEA) has been established. And the international authoritative journal on sports engineering-- *Sports Engineering* was published. Although China has not set up a official organization or society of sports engineering, a lot of researches and studies relating to the sports engineering have been carried out in the nation since the Dalian conference in 2002. This Article addresses such issues as the theories and methods for the establishment of the sports engineering in China, related personnel nurturing, as well as the role and trend of sports engineering in the evolution of sports sciences in the future.

Outlook on Development Prospects for Modern Domestic Sports Entertainment Facility Industry

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Abstract. Along with the speedy economic development of our country, the increase of people's leisure time, the growth of the per capita income level and the increasing frequency of foreign exchange, more and more people have gained new understanding of sports entertainment and fitness. However, at the present moment, there still exist many problems which limit its development. Thus it has become the focus of many scholars on how to solve these problems and how to develop the profession of sports entertainment and fitness in our country. After much research this article concludes that it should be developed in the aspects of economy, concept, facility and time. With the appearance of the life style of sports entertainment, the modern sports entertainment facility industry will become a new profession at 21st century.

Reconstruct 3D Human Motion Using Motion Library

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Abstract. In this paper, we present a new approach to reconstruct 3D human motion from video clips with the assistance of a precaptured motion library. Given a monocular video clip recording of one person performing some kind of locomotion and a motion library consisting of similar motions, we can infer the 3D motion from the video clip. The approach segment the video clip into segments with fixed length, and by using a shape matching method we can find out from the motion library several candidate motion sequences for each video segment, then from these sequences a coarse motion clip is generated by performing a continuity test on the boundaries of these candidate sequences. We propose a pose deformation algorithm to refine the coarse motion. To guarantee the nature of the recovered motion, we apply a motion splicing algorithm to the motion clip. The experimental results show the effectiveness of this approach.

Numerical Simulation on the Hydrodynamic Performance of the Flippers for the Fin Swimming

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Abstract. The performance of the flippers for the fin swimming was simulated by the numerical method. By using the potential method and instable theory, the hydrodynamic performance of man and woman of new style in Russian and China was researched. For different items of the fin swimming, different technical requires were put forward, the results can direct coaches and athletes or athletic teams scientifically.

Current Situation and Developmental Countermeasures for Sports Engineering Education in China

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Abstract. To speed up the building of sports engineering education specialty in Chinese sports institutes and universities, this paper, based on documentation and survey, makes an analysis of the current situation of sports engineering education specialty in China. The results show: (1) China lags behind the developed countries in sports engineering education; and the setting of sports engineering specialty in China is still a blank. (2) It is of much consequence to speed up the establishment of sports engineering discipline in China. Therefore, the structure

of sports scientific research teams should be improved greatly and the level of physical education of institutions of higher learning in China be raised as well. (3) Developmental countermeasures should be put forward to optimize the setting of physical education curriculum, expand the cultivation of sports personnel, and reform physical education patterns in colleges and universities in China.

Applied Mechanism of the Virtual Reality Technique in Optimizing Training Effect

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Abstract. Virtual Training is a powerful assistant tool and research window and starts a fire-new phase in sports training field. The article discusses the applied characters of virtual reality technique in the sports training, functionary mechanism of Virtual Training, information value and significance of Virtual Training and significance of Virtual Training on sports experience. It analyzes how to actualize Virtual Training and also points out the real training is one and only approach to verify athletes' sports ability.

Conceivable Design of the Electronic Football Referee System

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Abstract. As the football is becoming more prosperous, the controversial referee results more negative influence on the football sports development. To develop the electronic football referee system is a fore-problem in football referee field. The article brings forward a conceivable design of the electronic football referee system and discusses the football refereeing reform way as an interrelated reference.

Research on Current Situation of E-sports in Urumqi, Xinjiang

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Abstract. This paper makes analysis of development of Urumqi E-sports, perception of the E-sports, and time and expenses in the E-sports, etc through questionnaire， and holds that development of E-sports in Urumqi, Xinjiang is at initial state at present. During the development some problems exist. Finally the paper puts forward countermeasures for development of the sports in the following days.