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Innovative evolution of technology used among racket sports: An overview

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Abstract
Technology plays a significant role in making modern life simple and effective. Technology has had a significant impact on sport science and many other facets of daily life. The market for the sports business has grown along with popularity, and so has the necessity for technological research. This chapter's major goal was to examine the impact of new technology advancements on athletic performance, particularly in racket sports. It also emphasised various technological gadgets and focused on the function of certain racket sports. The authors of this chapter discovered several technological innovations that are being used in the world of games and sports. The authors all agreed that these technology advancements raise performance scores and simplify games. It should be necessary to make the right selection in order to develop performance.

Keywords: Sports technology, sports performance, racket sports

Introduction

In order to generate the best sporting results, the modern sport industry combines natural athletic skill with cutting-edge analytics and artificial intelligence. Modern technology makes life easier in so many ways, and everyone has their own definition of technology. In today's world, almost everything is more comfortable and accessible due to technological improvements in almost every aspect of lifestyle. Now a days there are great changes in the playing pattern and speed observed in racket sports. Technological innovations have a great influence in today's game irrespective of any racket sport.

This chapter discusses the impact of technology and how it has altered the standards of racket sports through the use of new materials and technology in the production of equipment including courts, rackets, shoes, and clothes. Badminton, tennis, table tennis, and squash are sports that place a greater emphasis on technical talent. Lightweight and extremely powerful rackets are now used, and much better carbon and titanium-based plies are used in a wide variety of rubbers in table tennis, whether pimple inwards or pimple outwards were used according to the conditions. Better quality courts are now used for better grip of shoes, and power cushion is used in shoes according to presser points.

These days, video technology is crucial for a thorough study of the skill used by the player. Video analysis and recording are also very helpful for improving the method of skill accusation. Thus, all racket sports have benefited greatly from technological advancement.

Technology plays a significant role in making modern life simple and effective. Technology has had a significant impact on sport science and many other facets of daily life. The market for the sports industry has grown along with popularity, and so has the demand for technological research.

The primary goal of this chapter was to examine the impact of new technology on athletic performance. Discussion of various technical tools and an emphasis on specific racket sports were also included. The authors of this chapter discovered several technological innovations that are being used in the world of games and sports.

The authors all agreed that these technology advancements raise performance scores and simplify games. Making the right option when selecting the technology is essential for performance development since in the modern environment, dealing and managing players is a challenging process.

Everything in the world has an effect on people and society, both positively and negatively. More people than ever before play sports in the twenty-first century.

Sport has effectively evolved into a universal language that unites people from all walks of life, regardless of their ancestry, past, religious beliefs, or socioeconomic standing. In actuality, sports foster interpersonal relationships and global unity on a global as well as national level. The use of technological devices has increased due to spectator demands for sports performance. In many sports and games, as well as in step-by-step team moves, there is a difference between winning and losing games.

Demand for research has expanded as the sports business has become more popular and has a larger audience. New technology makes life simpler in numerous ways, and each person defines technology differently. Due to technology advancements in practically every sphere of lifestyle, almost everything in today's society is more comfortable and accessible. The most recent technological advancements have improved and streamlined the lives of the majority of people. Although the true essence of sport lies in the talent of gifted athletes, their performance can be significantly enhanced by the incorporation of cutting-edge technologies, ensuring competitive play and positive results.

As a result, technology has a huge potential to increase performance and decrease sports injuries. Furthermore, the impact of technology on athletics is astounding. The way sports are played, analysed, and improved in today's connected world has been changed by the use of wearable technology, big data analytics, social media, and sensor technologies. Through numerous technological advancements and apps, professional athletes can better their training strategies, acquire greater insight into their performance, and develop their skills. Last but not least, the authors also thought that a variety of systematic reviews could more precisely highlight the impact of technology on sport performance evaluation.

Badminton

The fastest racket sport is badminton, and playing styles and speeds have changed drastically in recent years. The current game of badminton is affected by mechanical innovations. This essay explains the effects of innovation and how they have altered game norms through the use of new technologies and materials in the creation of hardware such as courts, rackets, vehicles, footwear, and clothing. Today, badminton is a more skill- and innovation-based sport. Lightweight and titanium-made ultra-advanced rackets are used currently, and much better-streamlined transportation are used in a wide variety according on the conditions. Improved quality courts are also used now for better shoe hold and force pads are used in shoes as recommended by presser focuses. Video innovation is the most significant these days for a total investigation of the aptitude performed by the player, video recording, and examination are exceptionally valuable for the improvement of the procedure of ability allegation. So, innovation has built up a ton in the sport of badminton.

These days, video technology is crucial for a thorough evaluation of the player's aptitude. Video recording and analysis are also extremely helpful for improving the process of ability allegation. Therefore, badminton has seen a lot of innovation.

The Hawk Eye is a computer-based technology that aids in providing a virtual understanding of the motion of an item, such as the ball used in cricket, tennis, and other sports. Dr. Paul Hawkins in the United Kingdom came up with the idea in 2001 for cricket. Falcon Eye gained popularity in a very small window of time and is now present in a wide range of games. It is accepted as the mechanical method of mediation by the tennis and cricket organising committees, as well as by the connections between various games.

Highlights

- The technology also allows viewers to see other outcomes of a negative event being replayed continuously on the screen.
- Bird of Prey Eye technology aids in anticipating the edge and separation of the ball once it has been thrown.
- The innovation is a fantastic tool for dissecting previous games and creating new game mechanics.
- Falcon Eye Technology helps maintain the play reasonable by reducing human error and allowing officials, umpires, and juries to make the best decision on the field. It also aids the umpires in making accurate decisions on ambiguous choices.
- The system has six to ten cameras placed in various parts of the ground to observe the ball's movement from different angles.

Table Tennis

The impact of technology, which in recent decades has enabled table tennis to realise its full potential, must be considered in order to fully comprehend how much table tennis has evolved over the years.

Electronic Scoreboard

I.T Technology in Table Tennis

- Electronic Scoreboards
- Keeps images in the centre of the screen at all times
- Automated Scoring System
- Interactive Ping Pong Table
- As a point is won or lost the umpire selects the appropriate key then the score is displayed High Speed Cameras
- Omron's TT Robot
- Capable of filming 1000 frames per second

Objectives

- Created by Japanese company Omron
- Tracks where players hit the ball
- Gain a brief insight of Table Tennis

Automated Scoring System

- Founded in Berlin in 1926
- One of fastest ball game sport in the world
- Sensors detect vibration when ball strikes the table
- Incorporates high levels of modern technology

Interactive Table

- Invented in 2000
- Data is sent instantly to the scoring unit which translates it into real time display of the score
- A point is won when a player fails to return the ball on their opponent's side of the table
- High Speed Cameras

Table Tennis Robot

- Sensors designed to monitor ball (80 times per second)

- Played both individually and in teams

It applications in table tennis

- A system that is set up on visual display systems to show the points of each player
- Perfectly track fact moving objects e.g ball
- Not yet designed to handle spin
- The new technologies used in Table Tennis
- Automatically tallies points

2020 has seen the introduction of Table Tennis Review (TTR) technology at the sport's major competitions, including the Tokyo Olympics.

- At its first meeting of the year in Delhi, India, the International Table Tennis Federation (ITTF) Executive Committee made the choice.
- It comes after the TTR was first used during the 2019 ITTF World Tour Grand Finals in the Chinese city of Zhengzhou, where players are rumoured to have given the option to utilise technology to evaluate the initial judgments of umpire's positive comments.
- The ITTF Executive Committee has also committed to do all in its power to produce the best possible outcome, including cutting down on the amount of time between players' calls for review and final judgments.
- Given how pervasive the digital trend is in sports, we thought it was crucial to provide new technology that will guarantee a level playing field for all competitors and give them the ability to contest any judgement made by the umpire, according to ITTF CEO Steve Dainton.
- There are several advantages to employing the TTR method, and table tennis as a sport has advanced as a result.
- The players have provided favourable feedback, and going forward, we expect a significant increase in the viewing experience.

Tennis

According to studies from the Tennis Industry Association, technological advancements have significantly impacted tennis. First-time participants in the sport now have access to modern technology that was unimaginable to their forebears. This has elevated the encounter to a completely new level.

While "Hawk-Eye" is a well-known example of on-court technology (the electronic device that precisely records whether a ball is in or out), more recent technology has even made it possible for players to get feedback on their performance and fitness levels.

It is not surprising that 2.07 million new athletes join the sport each year, with this number increasing by 3.8% annually. Additionally, 14.75 million non-players have expressed an interest in picking up the sport, and 2.2 million people are returning to tennis after a break.

The growing interest in tennis is attributed directly to the acceptance of the new technology. Players and coaches have never-before-seen opportunities to improve their talents thanks to wearable technology and smart court technology, which opens up fascinating new prospects for them.

Cyclops and Hawk-Eye

The "Cyclops" machine, introduced in 1980, was the first significant advancement in electronics. The presence or absence of servings could be determined using an infrared beam technology. In 2006, "Hawk-Eye," which tracks the movement of the ball and displays a digital image of its landing, defeated it.

Every shot's spin, speed, and movement during a rally are also determined by it, giving players more opportunity to contest a call if the ball is called out. A precise digital representation that clearly illustrates the conclusion is created in a matter of seconds.

The serve speed can be determined using the radar gun, which was introduced in 1994 to track the ball. The Australian player Samuel Groth set a record for the fastest serve ever.

IBM tech

The American computing juggernaut IBM, which has driven Wimbledon for about 20 years, is in charge of technological developments that are well beyond our wildest dreams. Sport has changed as a result of its Point Stream technology, such as the 2008-released Slam Tracker. The real-time, point-by-point web dashboard provides data and statistics for each match that is currently being played.

In order to provide an analytical evaluation of players and what they need to do to enhance their game, IBM analysed 41 million data points from Grand Slams over the course of eight years in 2012. The same year, IBM's Momentum was introduced, bringing match results and statistics to life.

A momentum metre created from the data shows which players now possess a statistical advantage. The statistics are useful to both players and commentators, who may use them to analyse games with greater understanding because they have the data right at their fingertips. Having more inside information than ever before can be advantageous for spectators.

Wimbledon's "tech bunker"

A "tech bunker" at Wimbledon allows the data giant to broadcast live tennis across a variety of media around the globe. The bunker is located next to court number, Wimbledon's second-largest court, and is subterranean. Numerous screens are mounted on the walls, and rows of desks are covered in IBM technology, which is used by tennis experts to deliver the most up-to-date information to fans around the world.

All the information, sent in real-time from each of the 18 courts, is shown on a massive screen within the bunker. The information isn't aired live; rather, it is sent to broadcasters during the competition, who interpret it and communicate it to viewers in an engaging manner.

Players who want to review their performance via a video clip after the game can also use the summarised data to get that information. The participants can obtain and retrieve the data sets that are contained in the video files as soon as 20 minutes following play. This enables them to assess their performance in relation to earlier games.

Amazingly, information about elite athletes has been gathered going all the way back to 1877! The system now includes their statistics, allowing players to compare their performance to some of the best players in history who competed on the same courts in the nineteenth century.

Today's athletes can request to have the data forwarded to their mobile device so they can watch it on the way home and evaluate their performance. The programme was tested

at Wimbledon in 2018 and was well-liked.

Enhanced AI

In 2018, IBM injected a slew of fresh concepts into the Wimbledon bunker. Senior data operators have increased the quality of data acquisition by keeping an eye on every match throughout Wimbledon in addition to the show court events. IBM may access the day's footage via the new IPTV system, instantly updating and examining statistics for any court.

On the six main Wimbledon show courts, the improved AI could even identify players' moods! This improved the automated video highlights for viewers that were powered by AI. The most thrilling moments from Wimbledon were brought to life by other innovative audio technology, which allowed fans to see highlights in just 15 minutes.

3D technology

In the twenty-first century, 3D technology is making a difference. New software and hardware for 3D motion tracking are capable of astonishing feats, such analysing a player's spine's motion to predict whether they are going to have a back injury even before they experience any pain!

Future technology was on show at the recent Tennis Tech Fair in Miami, where a dizzying assortment of improvements that are now being created. The QLIPP racquet sensor, which attaches to any racquet and measures shot type, spin, speed, and precision of ball contact, was also included. It may gauge how frequently a player strikes the "sweet spot" of the racquet.

Wearable Smart tech

The PIVOT, created by Turing Sense, is one example of new wearable Smart technology. It consists of many sensors attached to the player's shoulders, wrists, elbows, hips, and knees to deliver immediate real-time feedback. A specialist can examine this to aid in enhancing the player's swing and preventing injuries.

The Babolat POP is worn on the racquet hand and is compatible with Android or Apple phones. It has a sensor that measures rally length, power, and spin.

Wearable technology and smartphone apps are among the top tennis fitness trends, according to the American College of Sports Medicine, and they are not just for professionals but for players of all skill levels. We can only speculate as to how far tennis will be advanced in the future as technology advances at such a rapid rate.

Squash

Stiffness and lightweight are the two aspects of a racquet that matter the most. The most popular material for making powerful racquets is now graphite, although technology for increasing stiffness without increasing weight is still in its infancy. Many claim that the Dunlop Max 200G racquet is the most well-known of the new graphite racquets. John McEnroe and Steffi Graf both used this racquet. This racquet weighed roughly 12.5 ounces in 1980. 20 years after that, the average weight of a racquet has significantly decreased to about 10.5 ounces; even now, some racquets weigh an exceptional 7 ounces. To significantly reduce weight, new materials have been introduced, such as fibreglass, titanium, Twaron, ceramics, boron, and even Kevlar. To get the desired results, these elements are still combined with graphite.

Without seeking for new materials, Wilson found a solution to the stiffness issue in 1987. Instead, he developed a concept and offered a thicker frame known as the "widebody." It is still a wonder why more people didn't realise that increasing the racket frame's width would be sufficient to counteract the ball's impact and address the stiffness issue. Wilson created racquets using this concept, but these were large racquets since the frame was 39 mm wide, more than double the width of the original hardwood racquet.

Although "widebody" racquets had a sharp decline in popularity by the end of the 1990s, the concept persisted in following models and eventually became the norm in racquet manufacturing. Modern racquets are wider than the racquets with the original hardwood frames, though not as wide as Wilson envisioned.

Graphite Racquets

However, as a result of the advancements they made, the squash racquet manufacturing firms didn't make as much money anymore. Graphite rackets are highly strong and can be used for many years before needing to be replaced. As opposed to the wooden predecessor, which after time cracked and lost its function. This means that the owner of a graphite racket does not need to purchase a new one as it is durable and can last for several years. The manufacturers of racquets must constantly introduce new technologies, like as lighter weights, larger frames, and even heavier weights. In order to provide additional effects, such as more control over the spin and direction of the ball, new materials in combination with graphite were introduced.

The squash racquet has come a long way since it was first introduced thanks to these technological advances. The squash racket would undoubtedly become far from its original purpose with ongoing research to increase its quality and endurance.

We may anticipate new innovations being developed and added to the racquets of today in the upcoming years. Only time will tell how far the racquet will advance and what innovations will be used in squash racquets of the future. It's impossible not to be astounded by how much equipment has improved over time.

Conclusion

As a unique social phenomenon, sports have evolved into modern technology accessories. Technology is transforming sports because it has a big impact on how people live their daily lives and how their bodies look. Consequently, technology continues to alter how sports are played. Sports are played, how injuries are handled, what sports are played, and how it improves performance outcomes. Sporting technologies are tools created by humans to further interests or objectives in or pertaining to a certain sport. Athletes use this technical method to try and make their training and competition environments better in order to increase their overall athletic performance. It is the understanding and use of specialised tools and the newest technologies to complete jobs effectively. Sports technology must therefore be understood by coaches and athletes in order for them to make informed decisions regarding how it influences their performances.

References

1. Omoregie P. The impact of technology on sport

performance, accra, Ghana; c2016. p. 896-905.
2. Roy T, Roy D, De A. Modern Technology and Health Risk Factors: A Pedagogical Emergent for Social Wellbeing. Int J Curr Trends Sci Technol. 2017;7:20192-20196.
3. Fuss FK, Subic A, Mehta R. The impact of technology on sport — new frontiers. Sports Technol. 2008;1:1-2. https://doi.org/10.1080/19346182.2008.9648443.
4. Murison M. What Happens When Drones Get Involved in Professional Sports? – DRONELIFE, 2017. https://dronelife.com/2017/02/08/drones-sports/ (accessed February 1, 2020).
5. Kingsley D. How Have New Technologies Improved Athletic Performances? | Articles | Analytics 2020. https://channels.theinnovationenterprise.com/articles/229 -how-have-new-technologies-improved-athletic performances.
6. ways in which technological innovation enhances athletic performance. Richard Van Hooijdonk Blog 2017. https://www.richardvanhooijdonk.com/blog/en/4-waysin-which-technological-innovation-enhances-athleticperformance/ (accessed June 14, 2020).
7. Joshi N. 4 sensors that are being used in drones |IOT| Drones Technology; c2016. https://www.allerin.com/blog/4-sensors-that-are-beingused-in-drones-technology (accessed February 1, 2020).
8. Corrigan F. How to aerial film people and best drone footage of people. Dronezon; c2018. https://www.dronezon.com/aerial-photo-and-video/aerialfilming/aerial-film-people-and-best-drone-footage-ofpeople/ (accessed February 1, 2020).
9. Jha AR. Theory, design and applications of unmanned aerial vehicles. Boca Raton: FL: CRC Press/Taylor & Francis Group; c2016.
10. Meszaros L. Drone technology: A new ally in the fight against COVID-19. MDLinx; c2020. https://www.mdlinx.com/article/drone-technology-anew-ally-in-the-fight-against-covid19/61gQW7xmBCg6LyGy43925Z.
11. Islam MS. Relationship of abdominal muscle endurance with selected anthropometric measurements in soccer players. Int J Physiol Nutr Phys Educ. 2018;3:1088-90.
12. Islam MS, Kundu B, Saha S. Relationship between repeated sprint ability and accuracy of soccer shooting performance in young players. Eur J Phys Educ Sport Sci 2019, 5. https://doi.org/10.5281/zenodo.3381127.
13. Roy T, De A, Nandi DSC. A study on mental toughness in relation to agility and reaction ability among female kho kho players. Int J Home Sci. 2016;2:406-9.
14. Arena Q. Are Drones the Future of Sport Training? Quadcopter Arena; c2018. https://quadcopterarena.com/are-drones-the-future-ofsport-training/ (accessed January 21, 2020).
15. Islam MS. Introducing drone technology to soccer coaching. Int J Sports Sci Phys Educ. 2020;5:1-4. https://doi.org/10.11648/j.ijsspe.20200501.11.
16. Advanced Technologies Used In Cricket Games. Cricket 365 Com; c2018. https://www.cricket365.com/latest-news/advancedtechnologies-used-in-cricket-games/ (accessed June 15, 2020).
17. Three advancements in technology that have changed the game of cricket. BatFast Cricket Simulators; c2018. https://batfast.com/news/technology-advancemet-cricketchange/ (accessed June 15, 2020).
18. 11592928. Hotspot | The X-Ray view of Cricket. Cricvision; c2014. http://www.cricvision.com/hotspotthex-ray-vision-cricket/ (accessed June 15, 2020).
19. Spidercam to be used during World T20, says ICC CEO. News18; c2016. https://www.news18.com/cricketnext/news/spidercam-tobe-used-during-world-t20-says-icc-ceo-1196071.html (accessed June 15, 2020).
20. Mjolsnes R, Arnason A, Osthagen T, Raastad T, Bahr R. A 10 week randomized trial comparing eccentric vs. concentric hamstring strength training in well-trained soccer players. Scand J Med Sci Sports. 2004;14:311-7.
21. Islam MS, De A. Functional Hamstring to Quadriceps Strength Ratio (H: Q) and Hamstrings Injury of Soccer Players: A Qualitative Analysis. Orthop Sports Med Open Access J. 2018;2:126-32. https://doi.org/10.32474/OSMOAJ.2018.02.000133.
22. GPS technology in professional sports. Sport Perform Anal; c2020. https://www.sportperformanceanalysis.com/article/gpsi n-professional-sports.
23. Singh G, Yogesh Technology and badminton British Journal of Sports Medicine. 2010;44:i51.
24. Retrieved from https://fairgaze.com/generalnews/technological-advancements-in-the-field-of-badminton.html
25. Retrieved from https://www.sporttechie.com/how-technology-has-transformed-table-tennis
26. Retrieved from https://prezi.com/n0ct4ogyxtq0/it-technology-in-table-tennis/
27. Retrieved from https://www.insidethegames.biz/articles/1089119/table-tennis-review-ittf-tokyo-2020
28. Retrieved from https://www.allabouttennis.co.uk/blog/how-advanced-technology-has-helped-tennis/
29. Retrieved from https://winningsquash.com/squash-racquet-an-evolution-in-technology/