Technology
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Sports Technology

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Executive summary

Sport is epitomized by competition, athletic achievement and global spectacle. Yet modern sport is equally shaped by technology. Behind every performance improvement, officiating decision, training method and fan experience lies a dense and increasingly sophisticated innovation ecosystem. Equipment, materials, data analytics, wearables, digital platforms and assistive technologies now play a central role in how sport is played, governed and experienced. These innovations are underpinned by intellectual property (IP), which both incentivizes technological development and provides a rich empirical record of how sports technologies evolve over time.

This WIPO Technology SPARK (Short Pieces of Analysis, Research and Knowledge) report examines sports innovation through the lens of IP analytics. By analyzing patents, trademarks and designs, the report reveals patterns of inventive activity, commercialization and design-led differentiation that are often hidden behind on-field results and brand visibility. Prepared in the context of World Intellectual Property Day 2026, themed “IP and Sports: Ready, Set, Innovate!", the report seeks to make the scale, diversity and strategic importance of sports-related innovation more visible to policymakers, businesses, researchers and the wider public.

Innovation in sports technology is growing

Innovation in sport is substantial in scale and continues to grow. Even within a focused definition of human-centered sports technology, tens of thousands of inventions (patent families), registered trademarks and designs relate directly to sport. Across these registered IP rights, sports-related innovation is growing significantly faster than global innovation overall, indicating that sport is an increasingly innovation-intensive domain rather than a mature or static one.

Between 2016 and 2025, sports-related patent filings grew at a compound annual growth rate of 7.6%, compared with 4.4% across all patents, reflecting sustained investment in technologies such as intelligent equipment, advanced materials and data-driven performance systems. Commercial activity shows a similar dynamic, with sports-related trademark registrations growing at a rate of 6.1%, nearly double the 3.4% growth rate for trademarks overall. The strongest relative growth is observed in designs, with sports-related design filings increasing at an annual growth rate of 8.3%, compared with 4.0% for designs across all sectors. Taken together, these trends demonstrate that sport is not merely keeping pace with global innovation, but outstripping it across invention, commercialization and design.

	Patents	Trademarks	Designs
Number of IP rights in the past 10 years in sports innovation, 2016–2025	>65,700	>1,250,000	>70,300
Compound annual growth rate in sports innovation (compared to total global innovation), 2016–2025	7.6% (4.4%)	6.1% (3.4%)	8.3% (4.0%)
Top sports in the past 10 years, 2016–2025	Golf Swimming Racket sports	Golf Swimming American football / Rugby	Gym / Fitness Golf Swimming
Top regions in the past 10 years, 2016–2025	1 Asia 63% 2 North America 22% 3 Europe 13%	1 Europe 42% 2 Asia 31% 3 North America 21%	1 Asia 76% 2 Europe 13% 3 North America 8%

Note: Patent counts represent the number of published patent families (as a proxy for the number of inventions).

Source: WIPO, based on patent and design data from Patsnap and trademark data from the Global Brand Database, January 2026.

The rhythm of sports technology innovation

IP activity varies significantly between sports. Despite having lower media profiles than some team sports, golf and swimming emerge as the most IP-intensive sports across patents, trademarks and designs, showing sustained innovation in equipment, materials and performance technologies. An additional notable finding is the prominence of gym and fitness technologies in design filings, highlighting the importance of product form, ergonomics and consumer-facing differentiation in this rapidly expanding segment.

Innovation in sports is globally distributed. Geographically, Asia dominates sports-related IP activity, which is consistent with broader global IP filing trends seen in recent years. Europe stands out in trademark activity, reflecting the region's dense landscape of sports brands, clubs and commercial actors, and supported by Europe's many smaller but highly active jurisdictions.

Technology stories, from officiating to everyday health

To complement the aggregate analysis of global IP data, this report examines a set of data-driven stories focused on specific technologies that illustrate how innovation unfolds in practice. Ball-tracking technology demonstrates how a single technology can transform officiating, fairness and trust across multiple sports. Wearable technologies show how innovations developed for elite sport can diffuse into mass markets, reshaping not only training and performance but also everyday health and well-being. Sports footwear illustrates intense competition at the intersection of biomechanics, materials science and manufacturing, with recent innovation increasingly focused on personalization and sustainability.

Parasports innovation highlights a distinct development pathway. With 26% of parasport patents originating from academic institutions, compared with 17% across sports technologies overall, the data point toward a more research-intensive and collaborative innovation model. This reflects both the technical complexity of assistive technologies and their more limited commercialization opportunities, underscoring the critical role of public research and inclusive innovation systems in expanding participation in sport.

Signals of future innovation

Looking ahead, IP analytics provides early signals of emerging technologies that are likely to shape the future of sport. Intelligent equipment, smart materials and data-driven systems increasingly blur the boundaries between physical performance, digital analytics and user experience. These technologies often diffuse rapidly across sports, driven by shared technological building blocks rather than being limited by sport-specific constraints.

At the same time, new forms of competition – particularly esports and hybrid physical–digital experiences – are expanding the ways players compete and fans participate. While different from traditional sports, these domains share similar innovation drivers: performance optimization, fairness, engagement and scalability.

IP analytics as a strategic tool

By applying IP analytics to sport, this report demonstrates how structured IP data can reveal patterns that are not visible through performance metrics or commercial success alone. Innovation in sport – like innovation more broadly – is not accidental. It is the result of sustained investment, strategic choices and institutional frameworks that support creativity and technological progress. IP plays a critical role in that process, helping turn ideas into impact in both elite performance and grassroots participation.

Introduction

Innovation in sport through the IP lens

Not so long ago, decisions in professional sport were driven largely by intuition, reputation and tradition. Scouts trusted their instincts, coaches relied on experience and star players were valued as much for their perceived potential as for their measurable contribution on the field. Then came a quiet revolution. Popularly captured in the 2011 film *Moneyball*, starring Brad Pitt, data analytics in sport began to challenge conventional wisdom, revealing that performance, value and competitive advantage could be measured more rigorously, and often more accurately, through data.

Today, sports data analytics is no longer a novelty – it is embedded across the entire sports ecosystem. Teams optimize tactics using real-time performance data; athletes track training load, recovery and injury risk through wearable technologies; and fans engage with sport in entirely new ways – through advanced statistics, fantasy football and other fantasy leagues, predictive gaming and data-rich broadcasts that transform spectators into active participants. At every level, data have become a strategic asset – shaping decisions, improving outcomes and redefining what success looks like.

Innovation works in much the same way. Behind every breakthrough technology – from smart wearables and performance-enhancing equipment to technology-assisted officiating systems and health-monitoring platforms – lies a vast and growing body of IP. Patents, trademarks and designs are not just legal instruments; they are rich data sources that document how technology evolves, where investment is directed, and who is shaping the future.

From data analytics to IP analytics

Just as sports data analytics transforms raw performance metrics into actionable insights, IP analytics turns complex IP information into a powerful lens, focused on innovation. By systematically analyzing patent and IP data, it becomes possible to identify emerging technologies, understand innovation trajectories and anticipate where future breakthroughs are likely to occur.

In sport, data analytics helps answer questions such as: *Which training methods deliver the greatest performance gains? Which players are undervalued?* and *Where should resources be invested to maximize results?* In technology and innovation, IP analytics addresses parallel questions: *Which technologies are gaining momentum? Who are the leading innovators? How fast is a field evolving, and in which directions?* and *Where are opportunities and risks emerging?*

Making sense of innovation data is central to WIPO's mission. IP analytics helps policymakers design better innovation strategies, enables businesses to make more informed investment decisions and supports researchers and entrepreneurs in navigating increasingly complex

technological landscapes. Importantly, it also helps demystify innovation for the wider general public, showing that progress is not accidental but shaped by patterns, choices and strategy.

Sports technologies provide a particularly compelling illustration of this dynamic. From biometric sensors and smart fabrics to data-driven training platforms, the sports sector sits at the intersection of health, technology and performance. IP analytics allows us to see how these technologies emerge, converge and scale – offering insights that go far beyond headline results.

Just as data analytics changed how sport is played, managed and experienced, IP analytics is changing how we understand innovation itself. This WIPO Technology SPARK (Short Pieces of Analysis, Research and Knowledge) report explores that connection, illuminating how data-driven insight is becoming as essential to technological progress as it is to modern sport.

IP and Sports: Ready, Set, Innovate!

World Intellectual Property Day,[1] commemorated annually on April 26 to mark the entry into force of the WIPO Convention[2] in 1970, in 2026 adopts the theme "IP and Sports: Ready, Set, Innovate." This theme underscores a fundamental truth: sports go beyond athletic competition, encompassing a dynamic ecosystem that intersects with fashion, entertainment, media, health technology, gaming and consumer goods. Within this multifaceted landscape, IP rights – including patents, trademarks, designs and copyright – serve as crucial catalysts for innovation, facilitating cross-sectoral collaboration and driving technological advancement. The convergence of IP and sports exemplifies how robust IP frameworks foster creativity, accelerate technological progress and generate substantial economic value across industries. IP protection incentivizes the continuous innovation that keeps sport dynamic, competitive and globally accessible.

This WIPO Technology SPARK report examines the cutting-edge innovations reshaping the sports industry, highlighting how inventors, creators and entrepreneurs leverage IP rights to push the boundaries of athletic performance, transform spectator experiences and expand the reach of sporting events worldwide. Through this analysis, we celebrate the frequently unseen technological innovations that are revolutionizing how society plays, watches and engages with sport in the 21st century.

Scope and methodology

This report draws on original analysis of patent data from Patsnap[3] and PATENTSCOPE,[4] and wider IP analysis using WIPO's Global Brand Database[5] and Global Design Database.[6] The study encompasses published patent applications, trademark registrations and design registrations between 2016 and 2025, providing a comprehensive 10-year perspective on sports technology innovation trends.[7] While patents and designs reflect technical and aesthetic

1 https://www.wipo.int/en/web/ipday
2 https://www.wipo.int/treaties/en/convention/
3 https://www.patsnap.com/
4 https://www.wipo.int/en/web/patentscope
5 https://www.wipo.int/en/web/global-brand-database
6 https://www.wipo.int/en/web/global-design-database
7 Except where indicated otherwise – for example, some of the trademark analysis is undertaken on all registered trademarks – with no date limitations – for reasons outlined in the next chapter.

innovation, trademark data provide complementary insight into branding, commercialization dynamics and the structure of sports-related markets, which are integral to the broader sports technology ecosystem.

Copyright also plays a critical role in sport, particularly in broadcasting, media content, software and digital fan engagement. However, unlike patents, trademarks and designs, copyright is generally not subject to registration and does not generate standardized, publicly available global datasets that support large-scale, comparative analytics. For this reason, this report focuses on registered IP rights, while copyright in sport is addressed through other dedicated WIPO activities and initiatives.[8]

Patent technology classification is here conducted using the International Patent Classification (IPC)[9] system and Cooperative Patent Classification (CPC),[10] with trademark analysis carried out with the Nice classification scheme[11] and design analysis using the Locarno classification scheme.[12] A patent family is a collection of patent applications covering the same or similar technical content (i.e., the same invention). Patent analysis is here carried out using simple patent families to count inventions. Patents are not counted where several patents correspond to the same subject matter and are filed in different jurisdictions ("jurisdiction" refers to a country or regional office where a patent is filed).

To identify the sporting disciplines to which individual patent families relate, the analysis applies AI-based tagging to classify patents according to sport-specific relevance. This approach allows for a one-to-many mapping between patent families and sports. A single invention (patent family) may therefore be associated with multiple sports where the underlying technology is applicable across different sporting contexts. For example, an invention relating to ball construction, stitching or materials may be relevant to football, rugby, volleyball and other ball sports, and is therefore counted across all applicable sport categories. This reflects the inherently cross-disciplinary nature of many sports technologies.

Defining the scope: human-centered sports technology

To enable a clear and consistent analysis of sports-related IP, the report applies a clear and intentional scope. While sport draws on technologies from many adjacent domains, the analysis – in particular that of patents, which form the main empirical foundation of this report – focuses primarily on sports technology directly related to playing, training for and participating in sport.

8 https://www.wipo.int/en/web/sports/broadcasting
9 https://ipcpub.wipo.int/
10 https://www.epo.org/en/searching-for-patents/helpful-resources/first-time-here/classification/cpc
11 https://www.wipo.int/en/web/classification-nice
12 https://www.wipo.int/en/web/classification-locarno

By design, the analysis does not extend to all technologies that may be used in sporting contexts. Areas such as broadcasting and audiovisual systems, stadium and venue design or sports nutrition fall outside the scope. The report also excludes motorsports and sports involving animals such as horse racing, where innovation is closely intertwined with automotive, mechanical or veterinary technologies. The focus is therefore on human-centered sports, where athletic performance rather than vehicle or animal technology is central.

Even with this relatively narrow definition, identifying all relevant sports-related IP remains challenging. Patents, trademarks and designs do not always explicitly reference sport as a use case and, for example, relevant inventions may be described using general technical language or classified outside obvious sports-related categories. Conversely, some technologies ultimately applied in sport may not be captured if their sporting relevance only emerges at later stages of commercialization.

A similar scoping principle is applied to sports-related footwear and apparel. While these categories account for substantial patenting activity, only inventions that are explicitly linked to sporting use or performance are included in the analysis. Generic footwear and clothing technologies – such as those relating to casual, everyday or athleisure products – are excluded where they are not clearly tied to sport-specific functions, performance enhancement or use in sporting contexts. As a result, patents filed by major sportswear companies such as Nike and Adidas are only captured where they are classified in, or demonstrably relevant to, sports technology, ensuring that the analysis reflects innovation in sport itself rather than broader fashion or lifestyle markets.

Balancing coverage and precision

Our chosen search methodology for patents, trademarks and designs seeks to balance coverage and precision, prioritizing a high-quality, low-noise dataset suitable for robust analysis. Data validation and sampling exercises indicate that the dataset provides a reliable and robust basis for the trends and insights presented in this report. In the case of patents in particular, additional structural constraints arise. Unlike many WIPO IP analytics reports which focus on clearly delineated technical domains, this sports technology analysis addresses a field that is not neatly defined within the international patent classification framework. The IPC and CPC systems are organized by technical function rather than by sporting discipline, and they do not distinguish systematically between individual sports. Many enabling technologies – such as ball-tracking systems, advanced footwear materials or wearable sensor platforms – are inherently cross-disciplinary and applicable across multiple sports. As a result, classification codes alone cannot fully isolate sport-specific innovation.

To address this, the search strategy relies more extensively than usual on carefully constructed keyword queries in combination with classification filters. While this approach improves coverage, it introduces inherent limitations. Patent documents may reference multiple sports even where the primary commercial focus is on one discipline, and terminology can vary across jurisdictions (for example, “football” and “American football” denoting different sports). Accordingly, the figures presented in this report should be interpreted as robust directional indicators rather than exact counts. Absolute totals may carry wider margins of uncertainty than in more narrowly defined technology fields. However, overall trends, growth patterns and relative distributions are considered reliable.

More than a game: the hidden scale of innovation in sport

Sport is often viewed as entertainment, as competition and as physical excellence. Yet behind every match, race and performance lies a vast and largely invisible innovation ecosystem. From equipment and apparel to data systems, broadcasting tools and medical technologies, sport is underpinned by thousands of technological solutions, and many of them are protected by IP. This chapter reveals the sheer scale of innovation embedded in modern sport, showing that sport is not just played on the field, but built through sustained technological development.

Sports-related patents

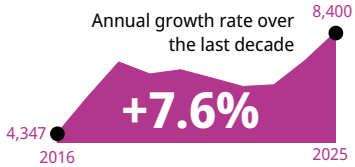
Patent data offer a structured way to observe how modern sport is shaped by technology. Over the last decade, sports-related patent filings reveal both the breadth of innovation – spanning equipment, training systems, wearable technologies and performance aids – and the dynamic shifts in where and how innovation takes place. Even within a relatively narrow scope limited to human-centered sport, the volume of protected inventions is considerable and highly diversified across sports disciplines and geographies.

Over the last decade, this overview captured over 65,700 inventions, reflecting an annual growth rate of 7.6%. By technological volume, golf constitutes the largest field with almost 19,000 inventions, followed by swimming, racket sports (which include tennis, badminton, table tennis, padel, pickleball, squash, etc.), basketball and football (soccer). These sports combine sizeable participation bases with mature equipment and training markets, creating consistent demand for incremental and performance-enhancing innovations. Meanwhile, sports such as cricket and volleyball are smaller in absolute numbers but have posted notable growth rates, suggesting expanding technological engagement and emerging commercial opportunities.

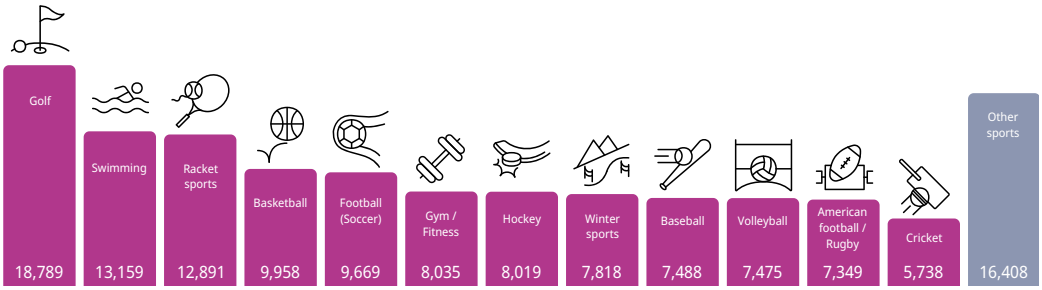
Growth patterns add further nuance. From 2016 to 2020, racket sports, basketball and swimming recorded the fastest expansion, reflecting increased investment in equipment materials, sensor integration and training technologies. Between 2021 and 2025, the leading growth areas shifted toward golf, cricket and hockey, indicating a reallocation of innovation attention and capital within the sports ecosystem. Over the past decade, cricket has outpaced all other sports: it had double-digit growth, despite currently holding the smallest overall share. These transitions suggest that innovation in sport is not static, but adjusts as technologies mature and new drivers of demand emerge.

Sports technology: Patents

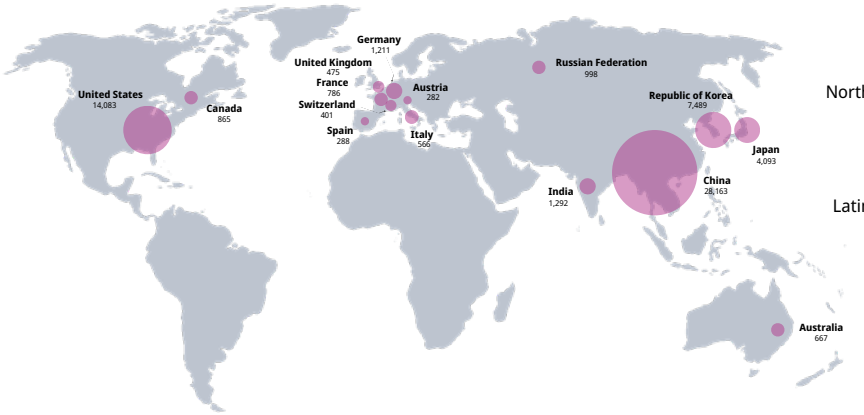
>65,700 patents have been published over the last decade



Patenting activity by type of sport (2016–2025)

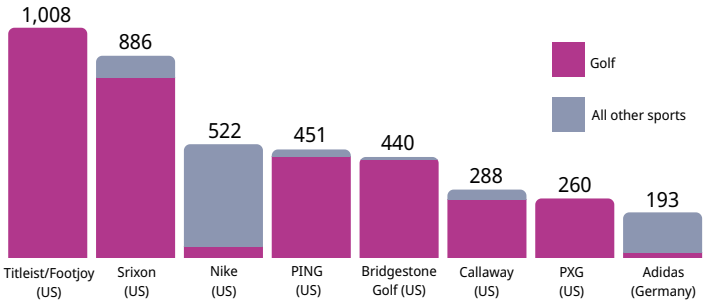


Top inventive locations by volume (2016–2025)



Region	Share
Asia	63%
North America	22%
Europe	13%
Oceania	1%
Africa	<1%
Latin America	<1%

Top patent owners (2016–2025)



Golf brands dominate sports patenting, with many outpacing multi-sport giants such as Nike and Adidas

Note: All counts represent the number of inventions, measured in terms of the number of published patent families. One-to-many AI-based tagging was used to classify patents within specific sports. “Inventive location” is based on original patent applicant address. “Patent owners” is based on the current patent assignee’s ultimate owner but simplified to show the related, and more well-known, sports brand instead of, for example, the holding company.

Source: WIPO, based on patent data from Patsnap, January 2026.

Did you know?

The global sports technology market is expected to more than quadruple in just a few years – growing from around USD 30 billion today to nearly USD 140 billion by the early 2030s.[1]

Geographically, patenting activity is highly concentrated. Asia accounts for the largest patenting share, followed by North America and Europe, signaling both strong domestic technology ecosystems and active multinational participation in Asian sports markets. Over the past decade, China and India have emerged as the fastest-growing regions. At the same time, rapid growth in markets such as India and China from 2016 to 2020, and in South Africa and India from 2021 to 2025, demonstrates that innovation hubs in sport are becoming more distributed, diversifying beyond traditional centers.

A similar dual structure is visible at the patent owner level. The landscape includes established global brands and specialized sporting goods manufacturers. It is particularly notable that sports innovation is significantly driven by specialized golf brands, standing out alongside multi-sport giants such as Nike and Adidas. For the past decade, leaders like Misto Holdings (whose key brands include Titleist and FootJoy), Sumitomo Rubber (Srixon), Nike and Karsten Manufacturing (PING) have established large patent portfolios. In terms of recent growth, TaylorMade Golf and Adidas lead the pack with portfolio growth of 38% and 26% respectively, signaling a powerful surge in innovation from 2016 to 2025.

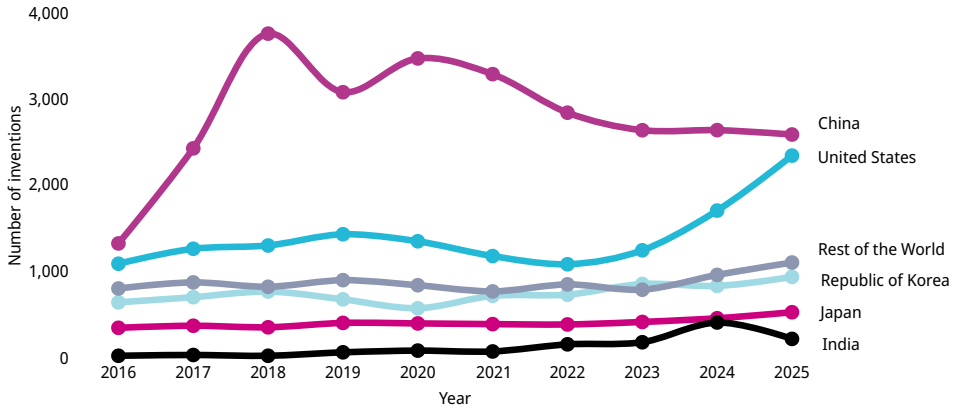
From 2016 to 2025, patenting trends in sports technology show that China maintained the highest volume of patents despite a decline from its 2018 peak, while the United States experienced significant growth toward the end of the period. Analysis of the top sports by inventive location reveals that golf is the leading category for patents in Japan (42%), the Republic of Korea (35%) and the United States (18%), whereas swimming ranks as the top category in France (19%) and India (11%) and also appears in the top three for the majority of other listed regions. Other specialized regional leaders include racket sports in China (14%), football in Germany (9%), gym and fitness in the Russian Federation (13%), and hockey in Canada (18%).

Taken together, sports-related patenting activity illustrates that innovation is fundamental to the evolution of sport. The scale, complexity and changing geography of the patent landscape shows that new performance margins increasingly depend on sustained research and development (R&D), specialized materials, data-rich training systems and increasingly global participation in the sports technology economy.

1 Fortune Business Insights (2026). *Sports technology market size, share & industry analysis, by technology (wearable technology, AI and ML, GPS & motion tracking, VR/AR, cloud & big data IOT, and others), by application (performance enhancement, injury prevention & recovery, talent scouting & recruitment, fan experience & engagement, broadcast & media analytics, fitness & health monitoring, and game strategy & tactical analysis), by end-user (sports organizations & leagues, broadcasters and media companies, sports clubs, and others), and regional forecast, 2026–2034*. Available at: https://www.fortunebusinessinsights.com/sports-technology-market-112896

Sports technology: Patents

Patenting trend by location (2016–2025)



Top sports by inventive location (2016–2025)

China

1 - Racket sports	**14%**
2 - Swimming	**12%**
3 - Basketball	**9%**

United States

1 - Golf	**18%**
2 - Swimming	**8%**
3 - Football (Soccer)	**8%**

Republic of Korea

1 - Golf	**35%**
2 - Swimming	**7%**
3 - Racket sports	**7%**

Japan

1 - Golf	**42%**
2 - Racket sports	**8%**
3 - Baseball	**7%**

India

1 - Swimming	**11%**
2 - Cricket	**10%**
3 - Racket sports	**8%**

Germany

1 - Football (Soccer)	**9%**
2 - Swimming	**8%**
3 - Winter sports	**7%**

Russian Federation

1 - Gym / Fitness	**13%**
2 - Swimming	**11%**
3 - Winter sports	**10%**

Canada

1 - Hockey	**18%**
2 - Golf	**11%**
3 - Winter sports	**8%**

France

1 - Swimming	**19%**
2 - Racket sports	**10%**
3 - Winter sports	**9%**

Note: All counts represent the number of inventions, measured in terms of the number of published patent families. One-to-many AI-based tagging was used to classify patents within specific sports. “Inventive location” is based on original patent applicant address.

Source: WIPO, based on patent data from Patsnap, January 2026.

Sports-related trademarks

Trademarks play a central role in sport. They protect the names, logos, symbols and identities that fans recognize instantly – from clubs and competitions to apparel, equipment and entertainment. However, interpreting trademark data in the sports context requires care. Unlike patents, where innovation activity can often be compared quantitatively, trademark systems operate differently, and those differences shape how the data should be understood.

How trademarks operate

First, size does not equal importance in trademarks. Some of the most valuable sports brands in the world – such as major football clubs, international sporting federations or global sporting events – may rely on a relatively small number of trademark registrations. A single trademark can carry enormous commercial and cultural value. Conversely, holding a large portfolio of trademarks does not necessarily indicate greater influence or success in sport. Trademark counts therefore should not be read as rankings, but rather as indicators of branding and market protection strategies.

Second, trademarks can last indefinitely. Unlike patents and designs, which have a maximum term of protection and expire after a fixed period, trademarks can be renewed perpetually as long as they are in use. This has important implications for trademark analysis: a newly filed trademark does not necessarily reflect new innovation or market entry, while some of the oldest trademarks may also be the most valuable and strategically important. For this reason, the following trademark analysis applies no time-based limitations and, unlike the patent and design sections of this report, considers all registered trademarks regardless of filing date.

Third, sports trademarks are not only filed by sports companies. Many non-sports brands register trademarks for sports-related goods and services as part of broader brand protection strategies. Entertainment companies, media groups and consumer brands may all file sports-related trademarks even if sport is not their core business. This means trademark data capture the commercial reach of sport across multiple industries, not just within the sports sector itself.

Fourth, identifying sports trademarks is inherently imperfect. Trademark searches rely heavily on “goods and services” descriptions and classification systems such as the Nice Classification, which were not designed specifically for sports analytics. As a result, searches may include trademarks that only loosely relate to sport (false positives), while missing others that are clearly sports-related but are described using broader terminology (false negatives). For this reason, the sports trademark dataset should be understood as a best-effort approximation rather than an exhaustive list.

Finally, categorizing trademarks by individual sports is particularly challenging. Trademark “goods and services” descriptions often list a wide range of activities to maximize legal protection, even if the brand is not actively operating in all of them. As a result, sport-by-sport breakdowns provide directional insight rather than precise segmentation.

The role of trademark analysis

Despite these limitations, trademark analysis remains highly valuable. Trademarks reveal how sport is branded, commercialized and monetized, how fan engagement is built beyond the sports arena, and how sports identities extend into media, merchandise and global markets. When interpreted carefully, and alongside wider IP data from patents and designs, trademark information offers many interesting insights on how sport functions as both competition and commerce.

Growth patterns and market dynamics

Of the 1.7 million sports-related registered trademarks currently active worldwide, 1.25 million were registered in the past decade (2016 to 2025), thereby offering the most reliable picture of trademark activity. Trademarks are subject to 10-year renewal cycles, and many marks registered more than a decade ago were not renewed at the end of their first renewal period. As a result, counts for earlier years under-represent historical trademarking activity and should not be interpreted as a decline in brand creation at the time.

From 2016 onwards, the number of active sports-related trademarks increased sharply, highlighting a sustained intensification of branding activity across the sports ecosystem. This growth aligns with the expansion of digital sports platforms, direct-to-consumer business models, fitness technologies and data-driven fan engagement services, all of which depend heavily on brand recognition and differentiation rather than purely technical protection. This trend underscores the role of trademarks as a leading indicator of commercialization and market formation in sports technologies. While patents capture upstream technical invention, trademarks reveal how innovations are packaged, positioned and scaled in the marketplace, making them particularly well suited to analyzing the evolving business and consumer dimensions of sport.

Trademark registrations peaked around 2021, potentially reflecting accelerated digital adoption and brand expansion during the COVID-19 period, when sports organizations, technology providers and new market entrants sought to secure brand assets amid rapidly changing consumption patterns. Although inconclusive, the slight decline and stabilization observed after 2021 could suggest a normalization following this exceptional surge, rather than a contraction in sports innovation.

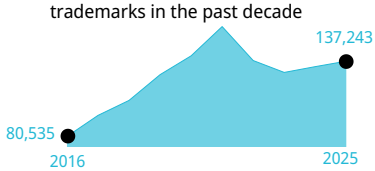
Sport-by-sport trademark counts show some clear patterns. Golf and swimming-related trademarks stand out, reflecting the strong role of lifestyle branding, apparel, equipment and training services in sports with high participation rates and year-round consumer markets. American football and rugby, football (soccer) and racket sports also show substantial trademark activity, consistent with their global reach and deep commercial ecosystems which span products, events, media and digital services.

Importantly, while trademarks are less tightly coupled to a specific sport than are patents or designs, this perspective remains valuable in comparative analysis. Contrasting trademark distributions with patent and design data helps distinguish between where technological innovation is occurring and where brands are positioning themselves commercially, offering a more complete picture of how sports technologies move from invention to market and consumer engagement.

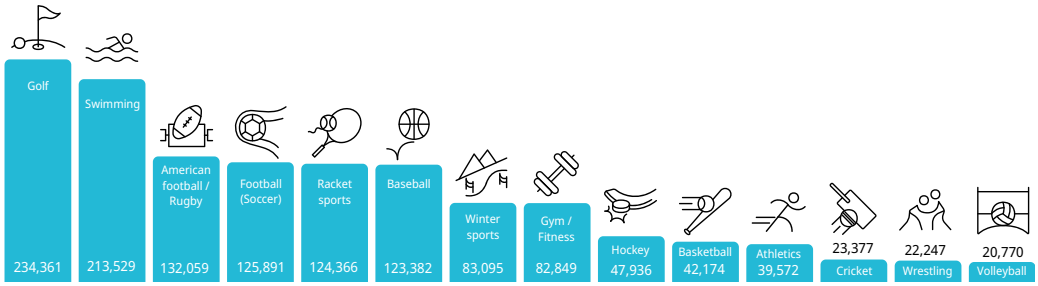
Sports trademarks

>1,725,000 registered trademarks for sports-related brands

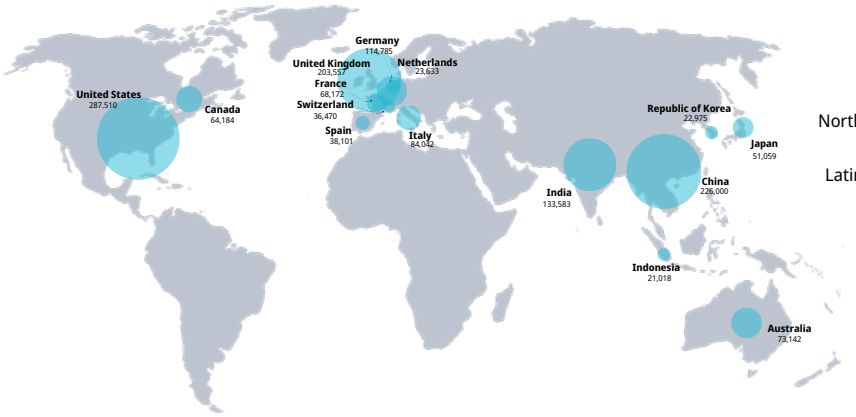
>1.25m newly registered sports trademarks in the past decade



Registered trademarks by type of sport

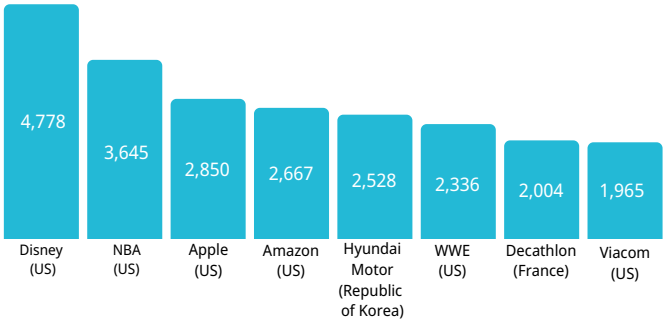


Top registered trademark owner locations



Region	Share
Europe	42%
Asia	31%
North America	21%
Oceania	5%
Latin America	1%
Africa	<1%

Top registered trademark owners



Top trademark classes

1	Clothing, Footwear and Headgear (Goods - Class 25)	38%
2	Education, Entertainment and Sporting Activities (Service - Class 41)	38%
3	Electrical and Scientific Apparatus (Goods - Class 9)	28%
	Advertising and Business (Service - Class 35)	27%
	Toys and Sporting Goods (Goods - Class 28)	26%

Source: WIPO, based on trademark data from the Global Brand Database, January 2026.

For example, among the sports analyzed, American football and rugby rank third in trademarks but eleventh in both patents and designs. Football (soccer) and baseball also exhibit higher rankings in trademarks compared to patents and designs. In contrast, gym and fitness has a lower ranking (eighth) in trademarks compared with its ranking in the data for patent (sixth) and design (first). This divergence correlates with structural differences in how value is generated across sports. League-centric sports such as American football, rugby, football (soccer) and baseball operate within highly brand-intensive ecosystems, where team, league and event identities drive extensive trademark activity. By contrast, gym and fitness is a more technology-driven domain characterized by sustained equipment, wearable and performance-related innovation, resulting in comparatively higher patent and design activity relative to trademarks.

Geographic distribution and market hubs

The geographic distribution of owners of sports-related trademarks highlights the global commercial footprint of sport, with trademark activity concentrated in large consumer markets and established branding hubs. As with other aspects of trademark analysis in this report, these patterns differ from those observed in patent data. Trademark ownership is typically less concentrated, with a wider range of actors holding medium-sized portfolios rather than a small number of highly specialized leaders. China and the United States emerge as the leading locations for trademark owners, reflecting the scale of their domestic markets, the commercial intensity of their sports industries and the strong role of trademarks in protecting brands across apparel, media, digital platforms and retail services. The United Kingdom also features prominently, which is consistent with its role as one of the leading centers globally for sports governance, media rights and brand-led sports businesses. Beyond the leading economies, a broad group of countries – including Australia, France, Germany, India and Italy – show substantial levels of trademark ownership, pointing to the importance of national and regional sports markets alongside global brands.

Leading trademark owners: a cross-industry view

The leading owners of sports-related trademarks illustrate the cross-industry commercial pull of sport, rather than a ranking of sports companies alone. Sports trademarks are not filed exclusively by sports organizations or equipment manufacturers. Many entertainment companies, media groups, automotive firms and consumer brands register trademarks covering sports-related goods and services as part of broader brand protection and licensing strategies, even where sport is not their core business. As a result, trademark data capture how sport functions as a commercial and cultural platform that extends well beyond the boundaries of the sports sector itself.

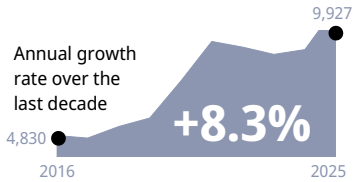
This helps explain the prominence of applicants such as entertainment and media groups (such as Disney or Viacom), professional sports leagues and event organizers (e.g., National Basketball Association (NBA) or World Wrestling Entertainment (WWE)), alongside global consumer brands (such as Apple or Amazon) and automotive companies (for example, Hyundai). These actors are active in areas such as broadcasting, merchandising, sponsorship, events, digital fan engagement and branded experiences, all of which rely heavily on trademark protection. In contrast to patent data, which often highlight a smaller number of highly specialized technology leaders with very large portfolios, trademark ownership is more broadly distributed, with a larger number of applicants holding medium-sized portfolios rather than a few dominant filers.

Viewed alongside patent and design data, this pattern reinforces the complementary role of trademarks in sports innovation analysis. While patents tend to reveal where technical development is concentrated, trademarks show where commercial positioning, brand extension and market-facing activity are taking place, offering insight into how sports-related technologies and experiences are scaled, marketed and monetized across industries.

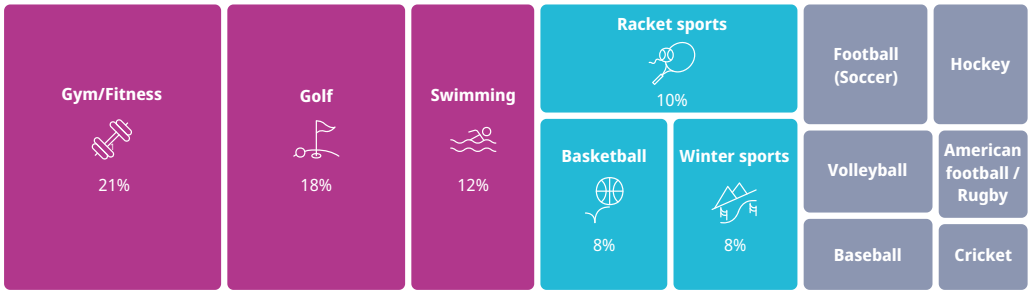
The distribution of sports-related trademarks across the Nice Classification for trademarks highlights the commercial and experiential core of the sports ecosystem. Registrations are dominated by Class 25 (clothing and apparel) and Class 41 (education and entertainment), each accounting for close to 40% of all registered sports trademarks, underscoring the central role of merchandise, lifestyle branding, training and organized sporting activities in sports markets. Strong representation in Class 9 (software and electronic technologies) and Class 35 (advertising and retail services) reflects the growing importance of digital platforms, data-driven services and direct-to-consumer business models, while Class 28 (games, toys and sporting goods) continues to ground the sector in its traditional product base. It is important to note that a single trademark may be registered across multiple Nice classes, which explains why the combined shares exceed 100%. This multi-class filing behavior reflects both the increasingly cross-sector nature of sports innovation and strategic brand management choices.

Sports technology: Designs

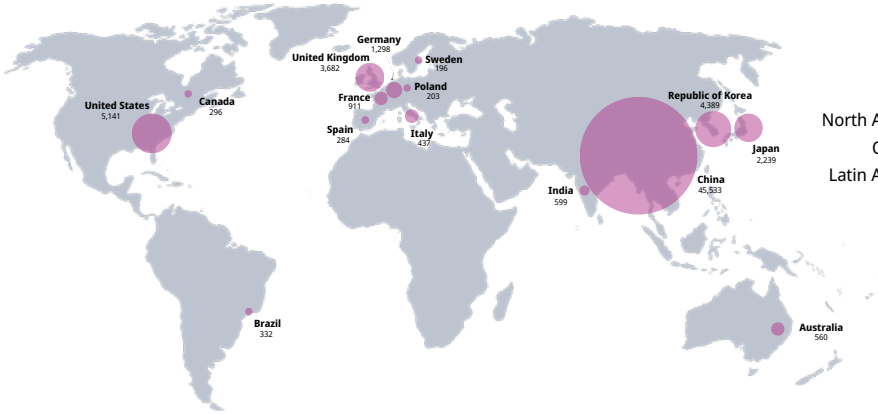
>70,300 designs have been published over the last decade



Designs by type of sport (2016–2025)

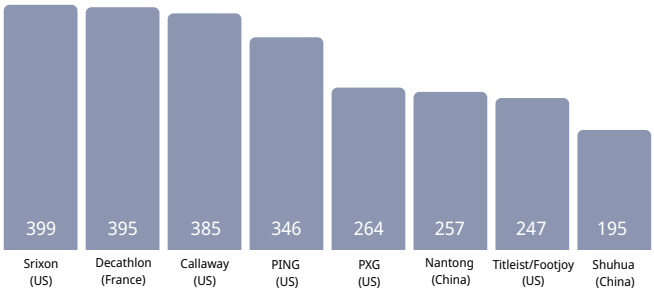


Top design locations by volume (2016–2025)



Region	Share
Asia	76%
Europe	13%
North America	8%
Oceania	1%
Latin America	1%
Africa	<1%

Top design owners (2016–2025)



The leading owners of sports design are globally distributed among manufacturers of golf and fitness/gym equipment, as well as the sporting retail giant Decathlon

Source: WIPO, based on design data from Patsnap, January 2026.

Sports-related designs

Over 70,300 sports-related designs have been filed between 2016 and 2025, reflecting an annual growth rate of 8.3%. Asia is the dominant region for design innovation, holding a 76% share of global volume, followed by Europe at 13% and North America at 8%. Within this design landscape, gym and fitness equipment represents the largest category at 21%, while golf (18%) and swimming (12%) also maintain significant shares. Top design owners are distributed globally, led by companies such as Sumitomo Rubber (whose key golf brand is Srixon), the French sporting retail giant Decathlon, and several US-based golf manufacturers including Topgolf Callaway Brands Corporation (Callaway) and Karsten Manufacturing (PING). This distribution highlights a diverse competitive field where both specialized equipment makers and mass-market retailers drive technical and aesthetic progress.

Building on this competitive design landscape, Adidas provides a clear example of strategic design protection through the Trionda football, filed in October 2024 under the Hague System as international design DM/241148. The Adidas Trionda is the official match ball of the 2026 FIFA World Cup, hosted by Canada, Mexico and the United States, that was introduced in October 2025. The ball is constructed from just four thermally bonded polyurethane panels, the lowest number used in a World Cup ball. It features textured macro- and micro-patterns intended to improve flight stability, swerve and grip in wet conditions. It also integrates "connected ball technology," incorporating an inertial measurement unit that provides highly accurate movement data for video-assisted refereeing. The visual identity of this ball draws on the iconography of the three host nations, using red, green and blue elements alongside symbols such as a maple leaf, eagle and star, while the name combines "tri" (three) and "onda" (wave in Spanish). From a design analytics perspective, this case illustrates how leading sports manufacturers increasingly embed performance technology and symbolic event branding into protected product aesthetics, aligning design filings with major global tournaments to strengthen both market visibility and IP positioning.

Adidas' design DM/241148 for the official match ball of the 2026 FIFA World Cup (left) alongside the consumer-grade replica ball for sale on the high street (right).

Source: (left) Design DM/241148 registered on October 10, 2024, Global Design Database[2] ; (right) Wikimedia Commons (By User34790 - Own work, CC BY-SA 4.0[3])

2 https://designdb.wipo.int/designdb/en/showData.jsp?SOURCE=HAGUE&KEY=D241148)
3 https://commons.wikimedia.org/w/index.php?curid=176409947).

Different games, different innovations

Not all sports innovate in the same way. The technologies that shape football differ from those driving athletics, cycling, tennis or swimming. Each sport presents its own challenges – speed, endurance, precision, safety, fairness or fan engagement – and innovation responds accordingly. This chapter explores how different sports generate distinct innovation patterns, illustrating how technology adapts to the unique demands of each game.

Football (soccer): the global game

Golf: precision engineered performance

Racket sports: split second precision

Cricket: beyond the boundary

Swimming: chasing milliseconds

The global game: football (soccer)

Every time you watch a Football World Cup match or a spectacular goal, you are seeing far more than athletic brilliance. You are watching thousands of patented ideas working together in real time. That free kick bending into the top corner carries aerodynamic surface textures on the ball that are designed to tame air turbulence. The goalkeeper's fingertip save depends on grip-enhancing polymers first tested in high-performance motorsport. Even the goalposts quietly assist with determining whether a goal is given, equipped with sensors capable of detecting a ball crossing the line with millimeter precision.

Did you know?

The FIFA Football World Cup is the most-watched sporting event ever, with global audiences reaching into the billions across television and digital platforms.[1]

But the biggest transformation in football is the one fans cannot see. The sport has become a data engine. Professional players now train and compete wearing GPS and biometric trackers that record distance covered, sprint patterns and heart rate fluctuations. Performance tracking and monitoring now accounts for a third of all football-related patents, revealing how deeply data analytics shapes modern coaching, recovery and tactical decisions.

> "VAR [technology] is here to stay. It helps the referee, it helps the game, it helps football."

- Gianni Infantino (FIFA President), FIFA press conference, 2018

The patent publication trend adds another layer, with activity rising into 2018, staying high through 2019 to 2023, and then jumping sharply in 2024 and 2025. That rhythm mirrors tournament cycles, but it also reflects a global race to build better sensing, broadcasting and decision support tools. Football has become a technology-intensive sport, and the rapid spread of systems like the video assistant referee (VAR), goal-line detection and advanced tracking shows how quickly the game is evolving. Football's worldwide governing body, the Fédération Internationale de Football Association (FIFA), now treats innovation as a strategic pillar, linking these tools to fairness, accuracy and the overall experience for referees, players and fans.

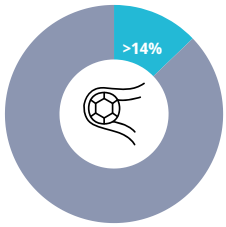
For supporters, the message is simple. Every clever detail on the pitch, from the ball's behavior to the precision of officiating and the comfort of modern boots, leaves a patent trail behind it. Football's innovation engine is bigger, more global and more diverse than ever.

1 Richter, F. (2022). FIFA World Cup: the biggest stage of all? *Statista*, November 17, 2022. Available at: https://www.statista.com/chart/28766/global-reach-and-tv-viewership-of-the-fifa-world-cup/?srsltid=AfmBOoqBQHc6oOm-ASMkuOqSYWkdRMKtizaKujiX4J113NOgmb4Xb_Ou

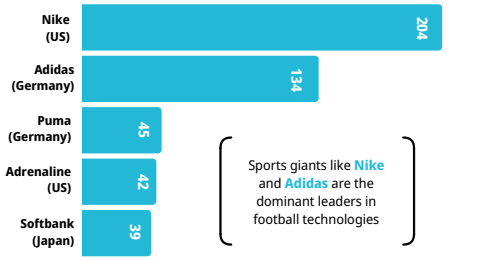
9,669 Football (Soccer) patents

were published from 2016 to 2025, >14% of all sports technology patents.
1 in every 6 sport patents relate to football.

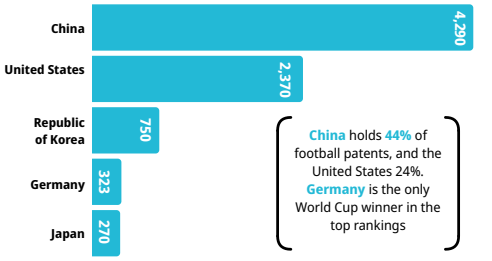
- **Football is the world's most popular sport, engaging nearly half the globe**
- **>450 football patents used WIPO PCT system (~5% of all football patents)**



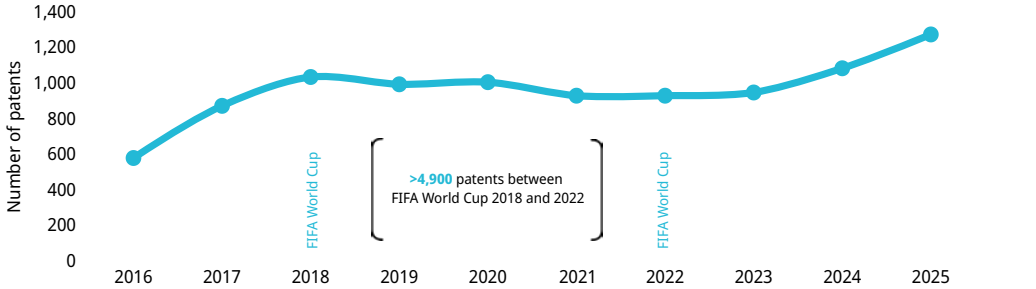
Top patent owners



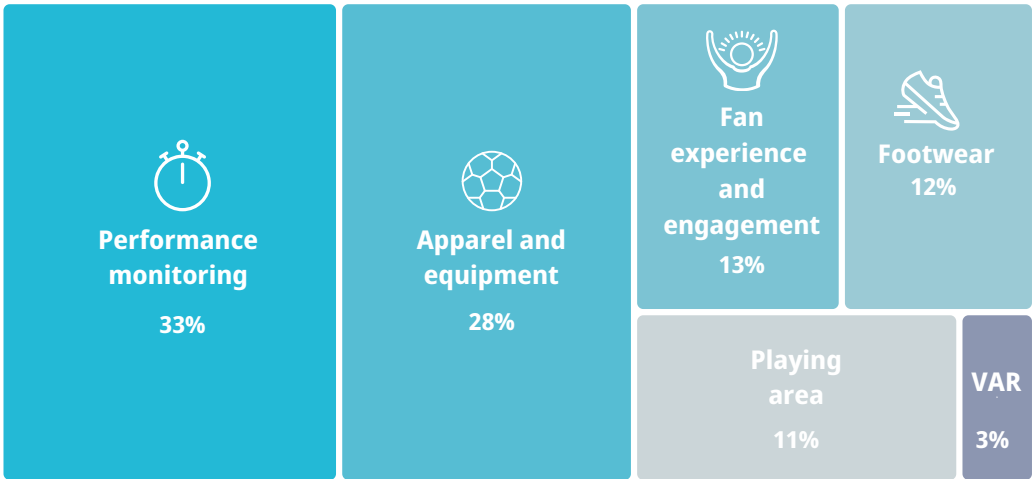
Top inventive locations



Football patenting trend by time



Football patents by technology focus



Note: All counts represent the number of inventions, measured in terms of the number of published patent families. One-to-many AI-based tagging was used to classify patents within specific sports and categories. "Inventive location" is based on original patent applicant address. "Patent owners" is based on the current patent assignee's ultimate owner but simplified to show the related, and more well-known, sports brand instead of, for example, the holding company.

Source: WIPO, based on patent data from Patsnap, January 2026.

Precision-engineered performance: golf

A perfect golf swing looks effortless from a distance, but slow it down and the illusion disappears. The club head is moving faster than a car on the highway. The ball compresses like a stressed engine component. The sound at impact is the unique product of materials, geometry and timing. Golf may appear traditional, but every shot is a collision between human rhythm and decades of engineering, with a relentless quest for marginal gains that creates an innovation intensity unmatched in sport.

Did you know?

Athletes in high-impact contact sports tend to have shorter professional careers, while in sports like golf, top-level competition can continue well into an athlete's 40s, and beyond.[2]

Golf's biggest transformation is happening in the invisible world of measurement. Swing radars, launch monitors and high-speed cameras now capture every nuance of motion, and with more than 4,000 inventions in analytics and simulation – including data and image-processing technologies – over the past decade, the sport has become a proving ground for motion capture, radar sensing and machine learning. The patent publication trend reflects this shift: steady growth, a brief slowdown, then a sharp surge as participation expanded, and simulators and connected driving ranges became popular. What is often overlooked is how far golf's innovations travel, from synthetic turf and battery systems to aerospace modeling and medical-grade manufacturing. In the pursuit of a perfect shot, technologies emerge that reach far beyond the 108 million golfers worldwide.[3]

> "Do I believe that AI can change how golf is fundamentally coached? 100%. I think it's the future."

- Bryson DeChambeau (Professional Golfer), Google Cloud Transform, 2025

For players, the experience still feels simple: a ball, a club, a target. But behind that simplicity sits a dense web of invention. From the tension-wound rubber of the 1898 Haskell ball that first unchained the drive, to the rugged Surlyn shells of the 1980s that turned distance into a luxury available to all, golf has traded hand-stitched leather for high-stakes chemistry. Each patent in this lineage marks a moment where a simple white sphere stopped being just a ball and evolved into a precision-engineered projectile piece of aerospace flight.

2 RBC Wealth Management (n.d.). *Professional athletes need a retirement game plan*. Available at: https://www.rbcwealthmanagement.com/en-us/insights/professional-athletes-need-a-retirement-game-plan

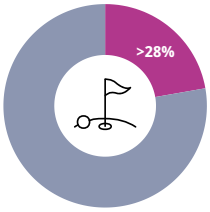
3 R&A (2025). *Global Golf Participation 2024*. Available at: https://assets.randa.org/c42c7bf4-dca7-00ea-4f2e-373223f80f76/53c40191-17dc-4a7b-8767-b9f582d6607c/The%20R%26A%20Global%20Golf%20Participation%202024.pdf

18,789 Golf patents

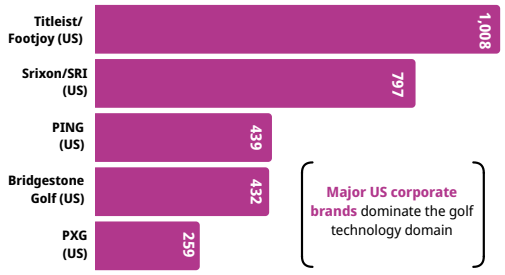
were published from 2016 to 2025, >28% of all sports technology patents.
1 in every 4 sport patents relate to golf.

Golf is one of only two sports played on the Moon!

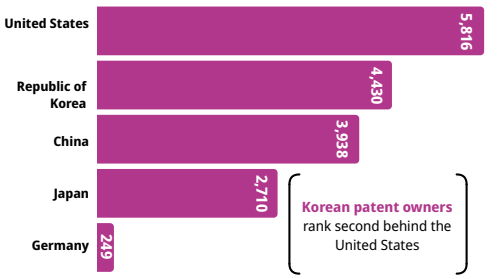
>930 golf patents used WIPO PCT system (~5% of all golf patents)



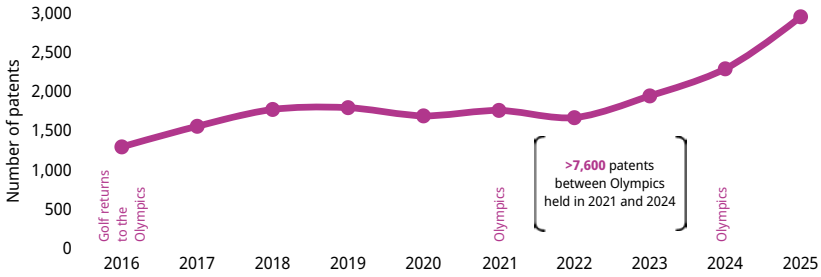
Top patent owners



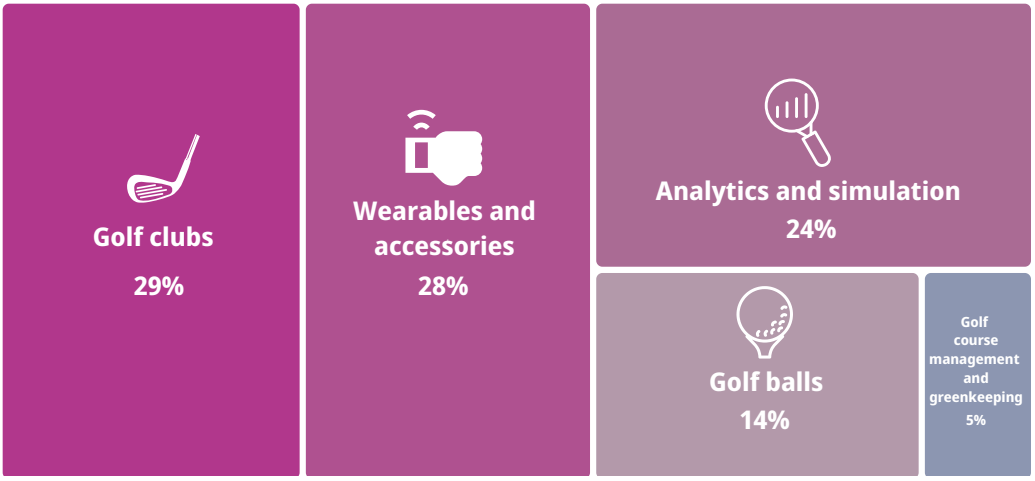
Top inventive locations



Golf patenting trend by time



Golf patents by technology focus



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Source: WIPO, based on patent data from Patsnap, January 2026.

Split-second precision: racket sports

Racket sports – which include tennis, badminton, table tennis, padel, pickleball and squash, among others – create a unique innovation ecosystem where breakthroughs in one discipline rapidly spread to others, creating cross-pollination effects found in few other sports. A carbon fiber advancement developed for tennis rackets appears in badminton equipment within months, while string technology innovations flow seamlessly between sports that share similar impact dynamics.

> "With racket technology and string technology, you can iron those [technical] problems out..."
>
> **- Roger Federer (20-time Grand Slam tennis champion), Sky Sports News (September 19, 2024)**

The evolution of racket strings illustrates this interconnected innovation pattern. Natural gut strings, used for centuries, gave way to synthetic materials in the 1950s, but the real revolution began with the molecular engineering of the 1990s. Modern strings incorporate polyester polymers, co-polymer blends and even nano-materials that respond differently to ball contact. This technological momentum extended beyond equipment. Court-side analytics systems evolved to track ball trajectories, footwork patterns and shot selection tendencies, turning matches into rich datasets. Coaches began using predictive models to anticipate opponent behavior, while broadcasters transformed these metrics into immersive visual storytelling. Racket sports' strategic depth became more visible – and more compelling – than ever before.

Did you know?

Padel and pickleball are two of the fastest-growing sports globally, with easy-to-learn rules and strong social appeal.[4]

What makes innovation in racket sports unique is its balance: technology enhances the game without overwhelming it. The essence remains the same – timing, rhythm and precision – but the tools now reveal layers of performance that were previously invisible. This evolution becomes even clearer when tracing the sport's innovation timeline, from early composite breakthroughs to today's sensor-driven, data-rich ecosystem.

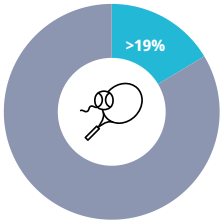
4 Farrant, T. (2026). Padel: why you should try one of the world's fastest-growing sports in 2026. *Euronews*, January 3, 2026. Available at: https://www.euronews.com/culture/2026/01/03/padel-why-you-should-try-one-of-the-worlds-fastest-growing-sports-in-2026

12,891 Racket sports patents

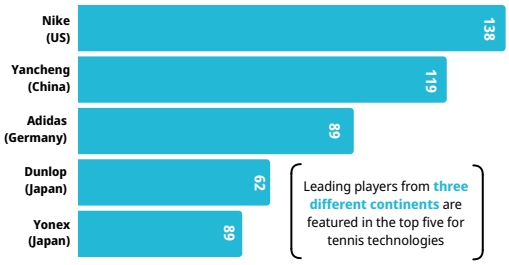
were published from 2016 to 2025, >19% of all sports technology patents.
1 in 5 sport patents related to racket sports.

Squash is ranked the healthiest sport, burning 1,000+ calories hourly

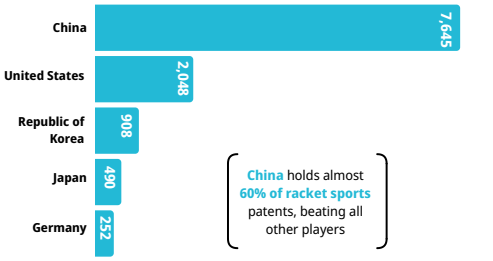
>520 racket sports patents used WIPO PCT system (4% of total)



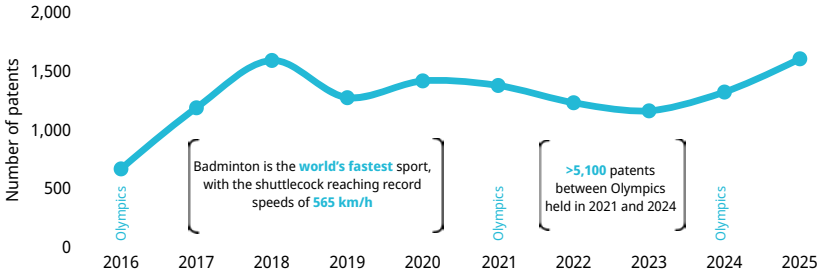
Top patent owners



Top inventive locations



Racket sports patenting trend by time



Racket sports patents by technology focus

Note: All counts represent the number of inventions, measured in terms of the number of published patent families. One-to-many AI-based tagging was used to classify patents within specific sports and categories. "Inventive location" is based on original patent applicant address. "Patent owners" is based on the current patent assignee's ultimate owner but simplified to show the related, and more well-known, sports brand instead of, for example, the holding company.

Source: WIPO, based on patent data from Patsnap, January 2026.

Beyond the boundary: cricket

Cricket's technological evolution is often described as gradual, but historical patent records tell a far more dynamic story. Over the past decade, annual filings have climbed from just over 300 in 2016 to more than 850 by 2025, reflecting a sport that has become a serious innovation arena, and that is quietly reshaping how cricketers train, how officials make decisions and how fans experience the game. What makes this shift remarkable is that it has unfolded without disturbing the sport's cultural foundations.

The turning point came after Phil Hughes' tragic death in 2014, which forced cricket to confront the limits of its protective gear. That moment accelerated years of delayed innovation, prompting rapid upgrades to helmets and early experiments with simple embedded sensors to better understand impact forces. Safety became the spark that pushed the sport into a new technological era, and as patent filings rose through the late 2010s and early 2020s, cricket began treating innovation not as disruption but as necessity – a shift embodied most clearly in the emergence of the Decision Review System (DRS) and its suite of high-speed imaging, acoustic detection and predictive modeling tools.

> "Digital transformation will play a crucial role... as we look to attract and engage more fans..."

- Geoff Allardice (CEO of the International Cricket Council (ICC)), ICC Strategy Launch (November 2021)

What surprises many outside the sport is how far cricket's innovations now reach. The mathematics behind ball-tracking informs defense systems; acoustic analysis developed for edge detection supports industrial diagnostics; and computer-vision techniques refined to distinguish bat from pad have influenced medical imaging. Cricket, once seen as a guardian of tradition, has become an unexpected contributor to technological progress well beyond the boundary rope.

This evolution is visible not only in the rising volume of patents but in the changing nature of the inventions themselves, a progression that becomes clear when tracing cricket's innovation timeline, from early protective breakthroughs to today's AI-driven performance systems.

Did you know?

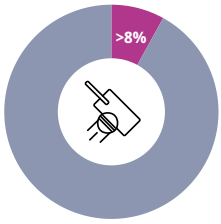
Cricket is the second most popular sport in the world, with particularly strong engagement in South Asia, Australia and the Caribbean.[5]

5 Worldatlas (2025). *The Most Popular Sports in the World*. Available at: https://www.worldatlas.com/articles/what-are-the-most-popular-sports-in-the-world.html

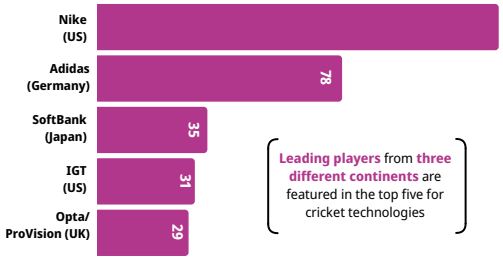
5,738 Cricket patents

were published from 2016 to 2025, >8% of all sports technology patents.
<1 in 10 sport patents relate to cricket.

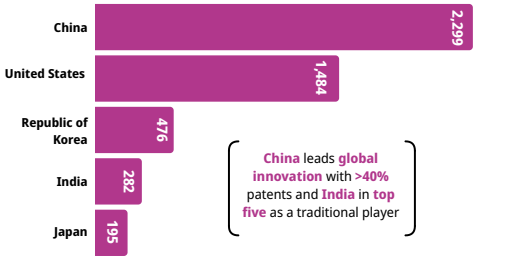
- **Cricket is the second most popular sport in the world after football**
- **280 cricket patents used WIPO PCT system (~5% of all cricket patents)**



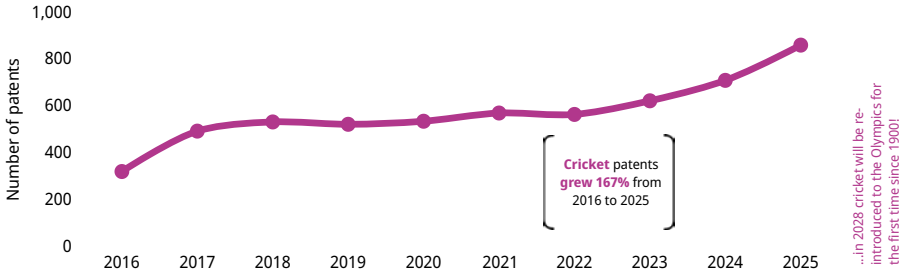
Top patent owners



Top inventive locations



Cricket patenting trend by time



Cricket patents by technology focus

Note: All counts represent the number of inventions, measured in terms of the number of published patent families. One-to-many AI-based tagging was used to classify patents within specific sports and categories. "Inventive location" is based on original patent applicant address. "Patent owners" is based on the current patent assignee's ultimate owner but simplified to show the related, and more well-known, sports brand instead of, for example, the holding company.

Source: WIPO, based on patent data from Patsnap, January 2026.

Chasing milliseconds: swimming

Swimming has undergone one of the most dramatic technological revolutions in modern sport, a shift clearly reflected in its rising patent activity – from just over 700 published patents in 2016 to more than 1,700 by 2025. This steady climb mirrors a discipline that has embraced engineering as a core performance driver, transforming the pool into a space where biomechanics, hydrodynamics and data science converge.

The first wave of innovation focused on the fundamental challenge of moving through water with less resistance, prompting designers to experiment with compression patterns, micro-textured fabrics, and pool features that dissipate turbulence more efficiently. As these hydrodynamic improvements took hold, the sport entered a phase where engineering and technique advanced together. At the same time, measurement technology matured: underwater cameras, pressure-sensing platforms and wearable trackers began capturing stroke timing, kick efficiency and body-roll symmetry with far greater precision than coaches could ever infer by eye. Training shifted from repetition to targeted refinement, and the steady rise in patent activity, including hundreds of globally oriented Patent Cooperation Treaty (PCT) filings, reflects how swimming innovation has expanded from isolated experiments into a fully integrated performance ecosystem.

> "Innovation is at the heart of our strategy... from wearable technology to enhanced broadcast data, we are committed to showing the world how fast these athletes truly are."

- Brent Nowicki (Executive Director of World Aquatics), World Aquatics State of the Sport, 2025

What distinguishes swimming's technological journey is its constant negotiation between enhancement and integrity. The sport has repeatedly confronted the boundaries of what equipment should and should not do, ensuring that innovation elevates human performance without overshadowing it. This balance has shaped the trajectory of patents across the last decade, from early hydrodynamic breakthroughs to today's sensor-driven performance systems.

Did you know?

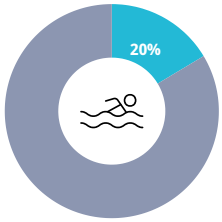
The Olympic Games, featuring sports such as swimming, athletics and gymnastics, attract a global television audience of more than two billion people – making them one of the most widely watched sporting events in the world.[6]

6 International Olympic Committee (2022). Olympic Games confirmed as the world's most appealing sports and entertainment event. Available at: https://www.olympics.com/ioc/news/olympic-games-confirmed-as-the-world-s-most-appealing-sports-and-entertainment-event

13,159 Swimming patents

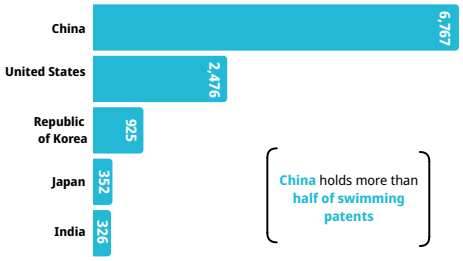
were published from 2016 to 2025, 20% of all sports technology patents.
1 in 5 sport patents related to swimming.

- **Swimming engages every major muscle group simultaneously**
- **>600 swimming patents used WIPO PCT system (4.5% of total)**

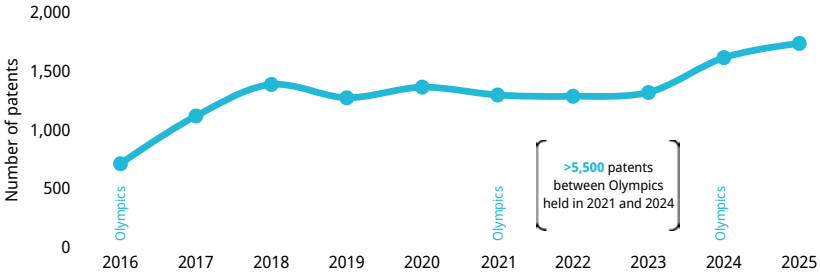


Top patent owners

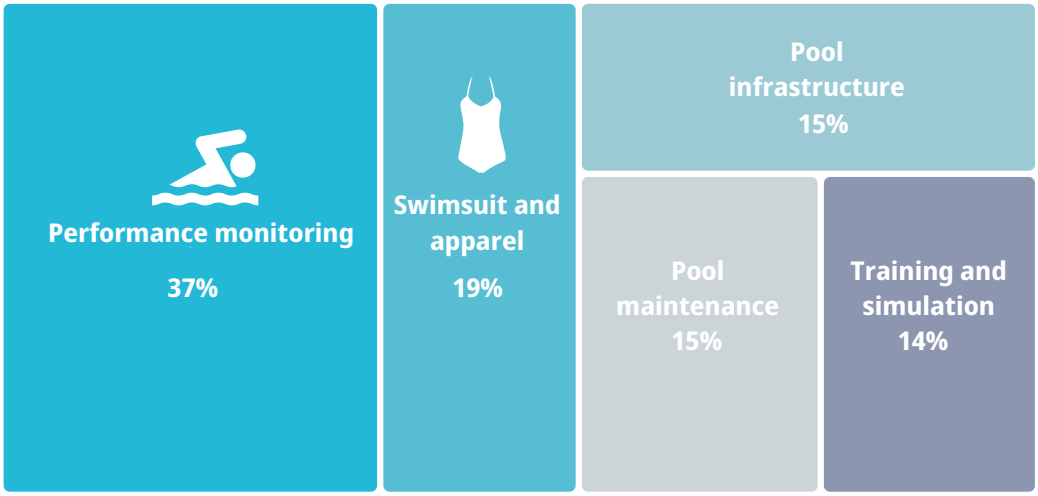
Top inventive locations



Swimming patenting trend by time



Swimming patents by technology focus



Note: All counts represent the number of inventions, measured in terms of the number of published patent families. One-to-many AI-based tagging was used to classify patents within specific sports and categories. "Top countries" is based on the original patent applicant address. "Patent owners" is based on the current patent assignee's ultimate owner but simplified to show the related, and more well-known, sports brand instead of, for example, the holding company.

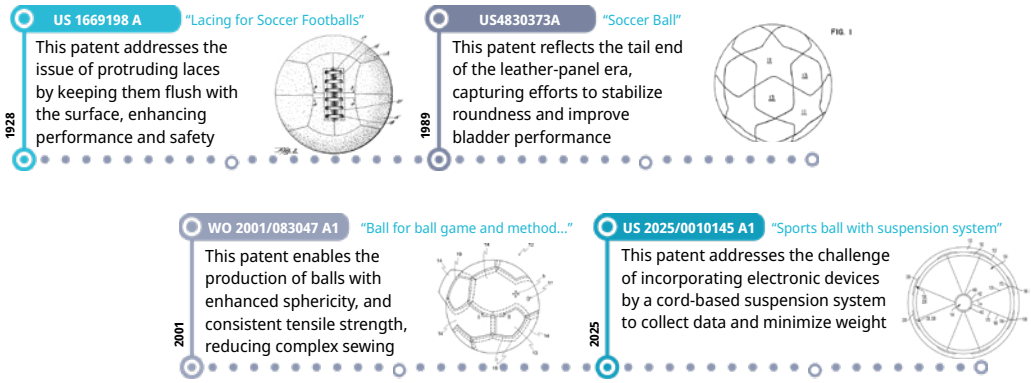
Source: WIPO, based on patent data from Patsnap, January 2026.

Timelines

The following timelines illustrate how innovation within the five sports studied in this chapter has evolved over time through selected patent examples. By placing individual inventions in chronological sequence, these timelines provide a tangible view of technological progression – showing how incremental improvements, new materials and emerging digital capabilities gradually reshape how sport is played, measured and experienced.

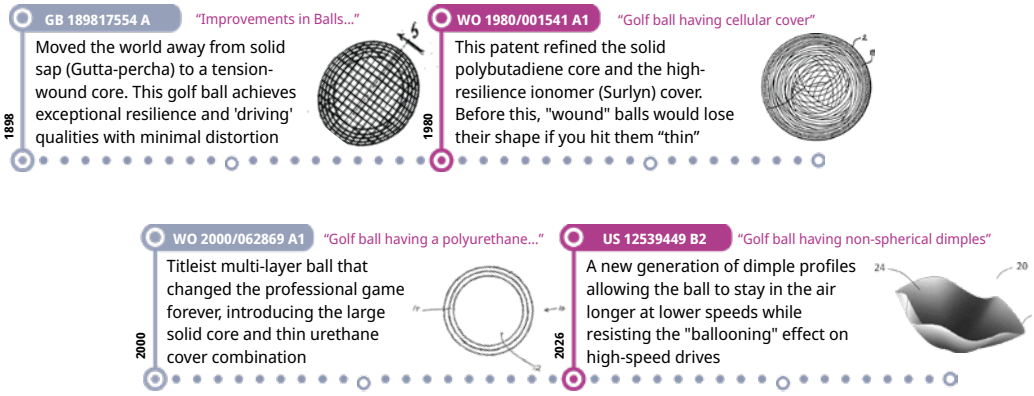
The examples were identified using the WIPO PATENTSCOPE database and selected to highlight representative developments within each sport rather than to provide an exhaustive history. Viewed together, they demonstrate how innovation in sport often unfolds cumulatively: early mechanical or materials-based inventions are progressively complemented by electronics, sensors, data analytics and connectivity. In this way, patent documents offer a unique historical record of technological change, revealing the pathways through which sports technologies evolve from simple equipment improvements to sophisticated, data-driven systems.

The global game: football (soccer)



Source: WIPO, based on patent data from PATENTSCOPE, January 2026.

Precision-engineered performance: golf

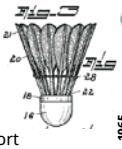


Source: WIPO, based on patent data from PATENTSCOPE, January 2026.

Split-second precision: racket sports

1935 — US 2025325 A "Shuttle cock"

This invention solved the issue of unpredictable flight by using shot-pellets to balance the cork head, turning badminton from a backyard pastime into a precision Olympic sport



1965 — US 3206203 A "Racquet for tennis, badminton, squash, and like games..."

Improved string retention and ease of manufacturing allows for symmetrical and efficient stringing, reducing the likelihood of string breakage

1994 — US 5342042 A "Ball location system"

The system minimizes false triggers, reduces electromagnetic interference, and accurately determines the ball's position by processing signal ratios and comparisons

2021 — US 10918913 B2 "Tennis ball"

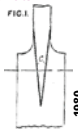
Novel idea to reduce waste, by replacing air pressure with a high-tech polymer that provides bounce through material memory, eliminating the need for air pressure being packaged in cardboard

Source: WIPO, based on patent data from PATENTSCOPE, January 2026.

Beyond the boundary: cricket

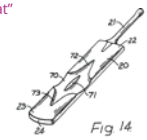
1911 — GB 191012294 A "Improvement in Cricket Bats"

This invention provides insulation, reduces shock transmission, enhances player comfort, and minimizes the need for specific willow blade selection by acting as a cushioning mechanism



1980 — US 4186923 A "Cricket bat"

The first patent to remove wood from the back of the bat to create a lighter tool with a larger "sweet spot" in the center

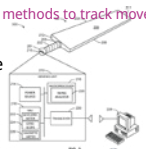


2009 — WO 2009/144491 A1 "A cricket sports bat"

A patent for an ultra-long handle and ultra-short blade designed specifically for the power-hitting requirements of T20 cricket

2020 — US 10695632 B2 "Apparatus and methods to track move..."

New-era patents focus on embedding inertial sensors in the handle to track real-time swing speed and impact vibrations for digital coaching



Source: WIPO, based on patent data from PATENTSCOPE, January 2026.

Chasing milliseconds: swimming

1914 — FR 474965 A "Procédé pour le nettoyage..."

Before the suit, the first major "propulsion" patent was for rubber swim fins (flippers), which revolutionized underwater velocity. This used ethylene trichloride and ethylene bichloride as solvents to remove the fat layer

2002 — US 6446264 B2 "Articles of clothing"

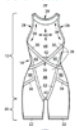
Inspired by sharkskin, this patent used V-shaped ridges to reduce drag. It marked the start of the "Tech Suit" era

2008 — EP 1935265 B1 "Swimsuit"

The most controversial patent in sports history. Using NASA-tested polyurethane panels to compress the body into a "tube," it led to 43 world records in one year

2022 — US 11246357 B2 "Swimsuit with tension bands and..."

Full-polyurethane suits were then banned in 2010, and modern patents focus on "carbon cages", woven carbon fibers that prevent muscle fatigue without adding buoyancy



Source: WIPO, based on patent data from PATENTSCOPE, January 2026.

Game-changing technologies

Some technologies do more than improve performance – they fundamentally change how sport is played, adjudicated and experienced. From officiating systems and performance tracking to data-driven decision support, certain innovations reshape entire sporting ecosystems and often spread from one sport to another. This chapter tells the stories of such game-changing technologies, showing how a single breakthrough can ripple across disciplines and redefine the rules of the game.

Hawk-Eye: from broadcast tool to global officiating standard

Cricket has a long history of early and influential adoption of technologies, in particular broadcasting technologies, and has often served as a testbed for innovations that later became standard across global sports coverage. Technologies often enter sport as broadcast enhancements before becoming trusted tools for fairness and rule enforcement.

In the 1960s and 1970s, cricket was among the first sports to embrace televised coverage with multiple camera angles, reflecting the game's pace and spatial complexity, since long match durations and clearly defined phases of play made cricket particularly suitable for experimentation with camera placement and shot sequencing. In the 1970s and 1980s, cricket broadcasters were also early adopters of slow-motion replays, using these in particular to analyze batting strokes, bowling actions and close fielding decisions. In the 1990s, stump cameras were one of the earliest uses of equipment-integrated cameras in professional sport, before fan engagement was deepened with player and umpire microphones in the early 2000s. At a similar time, cricket was one of the first to adopt a cable-suspended aerial camera system, commonly known as "Spidercam," which is something that is now ubiquitous at sports stadiums around the world, used for sports such as football (soccer), American football and rugby.

However, the most famous form of sports technology where cricket led the way is the mass adoption of camera-based ball-tracking technology used to support officiating decisions. While first applied to cricket, the technology has since spread to tennis, badminton, football (soccer), rugby, volleyball and more.

In cricket, most ways a batter can be "out" are objective, except one: leg before wicket (LBW). Here, the umpire must judge whether a ball that hit the batter's pads would have gone on to hit the stumps. This decision is inherently subjective and often controversial.

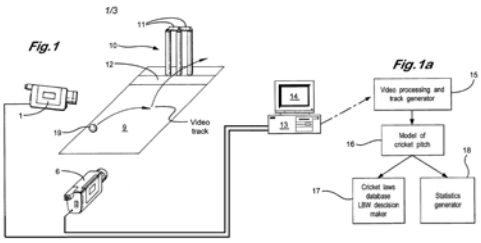
The Hawk-Eye system uses multiple high-speed cameras to track the ball in three dimensions. It reconstructs the ball's trajectory frame-by-frame, helping determine whether it would have hit the stumps. When there is doubt about whether the ball touched the bat, advanced sound-based edge-detection technology, UltraEdge, adds audio data to confirm contact. Together, these tools support the third umpire in making transparent, accurate decisions.

Patent spotlight

The original Hawk-Eye patent, filed in 1999, relates to a multi-camera video analytics system that tracks and predicts a cricket ball's 3D trajectory in real time, improving umpiring accuracy and enabling data-driven analysis of play.

- Patent number: **GB 2357207 A**
- Applicant: **Roke Manor Research Ltd.**
- Title: **Ball tracking and trajectory prediction**
- Publication date: **June 13, 2001**

Patent drawing



Source: Adapted from PATENTSCOPE.[1]

End-user application

Image courtesy of Hawk-Eye Innovations Ltd.

1 https://patentscope.wipo.int/search/en/detail.jsf?docId=GB134897436)

Problem: Existing video processing systems in cricket face challenges in accurately tracking a ball in 3D space throughout its flight path, due to variable camera distances, player obstruction, ball color variations and the need for real-time processing to assist umpiring decisions, particularly for LBW determinations.

Solution: A video processing system utilizing multiple cameras positioned around the cricket field, with a video processor and data stores for modeling the field and game rules, capable of identifying ball pixels, computing 3D positions, predicting flight paths and mapping interactions with field features to determine key events like LBW, while minimizing camera field of view and using statistical data for decision-making.

Benefit: The system provides accurate, real-time ball tracking and event detection, reducing human error in umpiring decisions and offering valuable statistical data for commentators and analysts, enhancing the accuracy of LBW determinations and providing insights for strategy and coaching.[2]

Named after one of its inventors and perhaps also for the sharp vision it gives umpires, Hawk-Eye was originally developed by two engineers, Paul Hawkins and David Sherry, at Roke Manor Research (a subsidiary of Siemens) in the United Kingdom. In 1999, a UK patent application was submitted,[3] followed by an international patent application through the PCT system at WIPO,[4] although both were withdrawn before grant. In 2002, all of the technology and IP concerned

2 Problem, solution and benefit summaries are AI-generated by Patsnap and do not represent WIPO interpretations.
3 https://patentscope.wipo.int/search/en/detail.jsf?docId=GB134897436&_fid=GB134897436
4 https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2001041884&_fid=GB134897436

with Hawk-Eye was spun off into a separate company, Hawk Innovations, subsequently Hawk-Eye Innovations. This was initially established as a joint venture between Roke Manor Research and Sunset + Vine, who produced the television cricket coverage where the Hawk-Eye system was first used to enhance the viewing experience.

Hawk-Eye moved from the television screen to the umpire's decision-making toolkit in 2009, when the International Cricket Council (ICC) officially adopted Hawk-Eye for Test matches and it became part of cricket's Decision Review System (DRS).[5]

Tennis was the sport that transformed Hawk-Eye from a promising technology into a trusted authority. Unlike cricket, where the system reconstructs a projected ball path, tennis demanded something simpler but far less forgiving: an immediate, binary decision – in or out – often separated by just a few millimeters.

Hawk-Eye first entered professional tennis as a review tool, not as a replacement for human officials. In 2006, the system was trialed at the US Open, allowing players to challenge line calls made by human judges. When challenged, Hawk-Eye reconstructed the ball's bounce using camera-based tracking and displayed the result to players, officials and spectators.

This innovation did not remove human judgment; it augmented it. Players were given a limited number of challenges, preserving the rhythm of the game while introducing transparency. On average, players used around 2.3 challenges per set, with roughly 30% of challenges upheld, demonstrating both the value of the system and the fallibility of human calls.

The success of the US Open trial led to rapid acceptance. In 2007, the Wimbledon Championships adopted Hawk-Eye for reviewed line decisions, lending the technology additional credibility. Over the following years, the challenge system became standard across elite-level tennis, and by 2020 all four Grand Slam tournaments were using Hawk-Eye in this decision-reviewing role.

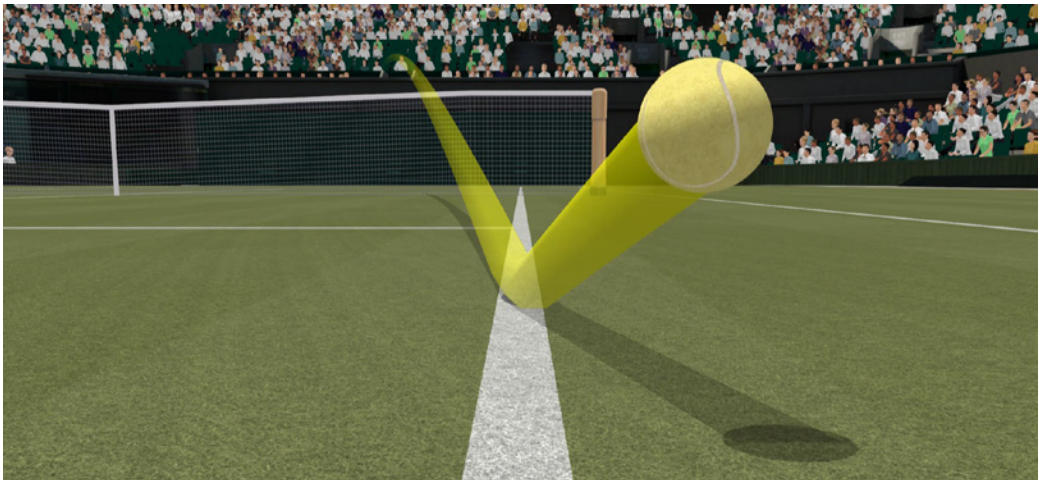


Image courtesy of Hawk-Eye Innovations Ltd.

5 Bal, B. and G. Dureja (2012). Hawk Eye: A logical innovative technology use in sports for effective decision making. *Sport Science Review*, XXI(1–2), 107–119. DOI: 10.2478/v10237-012-0006-6

The reason Hawk-Eye gained trust so quickly was accuracy. The system achieved around 99.9% accuracy, compared with an estimated 85–90% accuracy for human line judges. For players, this reduced frustration. For fans, it replaced argument with evidence. For officials, it offered reassurance rather than replacement.

Crucially, tennis demonstrated that acceptance matters as much as precision. By making the technology visible – showing the data, the margin of error and the decision – Hawk-Eye became part of the spectacle rather than an invisible authority.

Once Hawk-Eye had proven itself as a review mechanism, the next step was inevitable. Advances in processing speed, camera resolution and decision algorithms enabled the system to move beyond review and into automated line calling. In this model, Hawk-Eye no longer waits for a challenge. It replaces human line judges entirely, calling lines in real time. The first large-scale introduction of automated line calling began in 2019, initially at selected tournaments and exhibition events. Adoption accelerated rapidly in 2020, when operational constraints and health considerations caused by the COVID-19 pandemic led major tournaments – including the US Open – to run matches without human line judges, relying entirely on automated calls.

Hawk-Eye shows how technology can transform sport, making split-second decisions fairer and more transparent, and shaping the way games are played and watched worldwide.

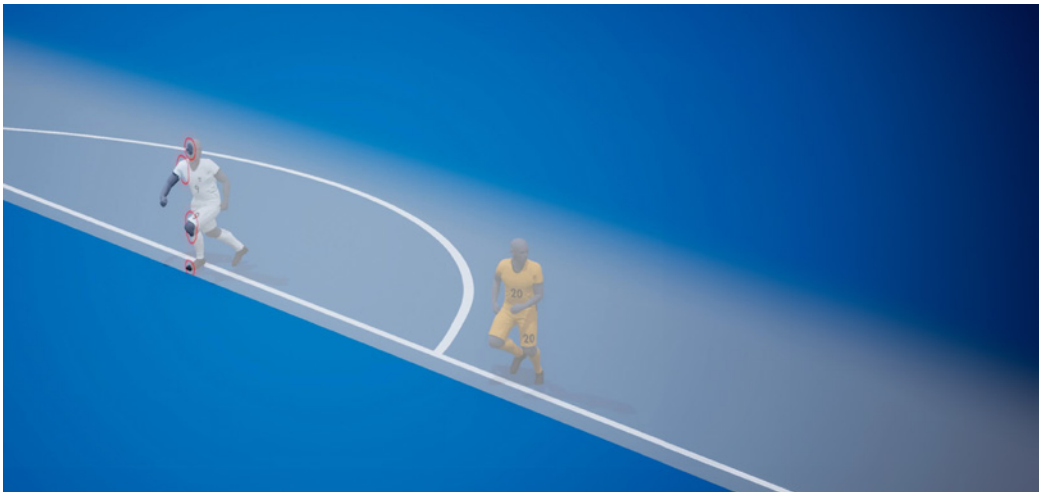


Image courtesy of Hawk-Eye Innovations Ltd.

Hawk-Eye Innovations – a Sony Group company since 2011 and part of Sony's sport businesses – still delivers pioneering computer vision-based solutions that have now been adopted across more than 20 major sports, enhancing fairness, consistency and fan engagement worldwide. In recent years, Hawk-Eye has expanded its reach into leagues and events across cricket, tennis, football, baseball, rugby and more. For example, Hawk-Eye's Semi-Automated Offside Technology (SOAT) – shown above – accelerates VAR (video assistant referee) reviews by automatically generating lines and identifying the "kick point," increasing accuracy and reducing interruptions in elite football. Hawk-Eye now serves hundreds of tournaments and competitions globally, generating substantial licensing and services revenue as it underpins officiating and analytics solutions for major federations, broadcasters and rights holders. Its continued growth reflects the strong commercial demand for precise, data-driven sports technology in elite competition.

The wearables revolution: from elite performance to everyday well-being

For much of sporting history, advanced performance data were the preserve of elite athletes and professional teams. Physiological monitoring, workload optimization and recovery analysis were tools used behind closed doors by coaches, sports scientists and medical staff. Today, similar data sit on millions of wrists, fingers and phones. The global wearables market – now a cornerstone of sports technology – did not emerge by accident. It was shaped deliberately through sustained investment in innovation, then protected and scaled through IP.

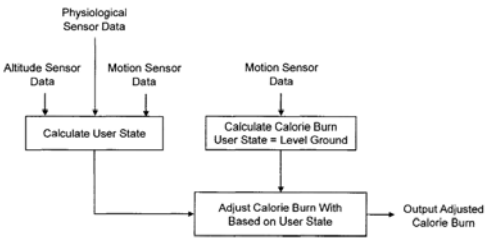
The early 2000s marked a turning point when advances in miniaturized sensors, battery efficiency and wireless connectivity created the technical foundations for consumer-facing fitness tracking. One of the first companies to translate this into mass-market impact was Fitbit. Initially focused on step counting and basic activity metrics, Fitbit's rapid rise was underpinned by a growing portfolio of patents covering motion sensing, data processing and user feedback systems.

Patent spotlight

One of the earliest Fitbit patents, filed a year before the launch of the Fitbit Ultra in 2011, relates to improved calorie burn calculations.

- Patent number: **US 8180591 B2**
- Applicant: **Fitbit Inc.**
- Title: **Portable monitoring devices and methods of operating same**
- First publication date: **April 5, 2012**
- Grant date: **May 15, 2012**

Patent drawing



Source: PATENTSCOPE.[6]

End-user application

Source: Photo by Ashstar01 via Wikimedia Commons, licensed under CC BY-SA 3.0.

6 https://patentscope.wipo.int/search/en/detail.jsf?docId=US73531279)

Problem: Existing portable monitoring devices lack accurate methods to calculate calorie burn and other activity-related metrics, particularly in varying environments and activities, as they rely on incomplete data analysis and do not effectively integrate altitude and motion sensor data.

Solution: A portable monitoring device equipped with both altitude and motion sensors, along with processing circuitry, calculates calorie burn by integrating data from these sensors to assess changes in elevation, motion and activity state, providing accurate metrics such as calorie expenditure, distance and pace across different activities.

Benefit: The device provides precise calculations of calorie burn and activity metrics, accounting for changes in elevation and motion, enhancing user data accuracy and reliability across diverse activities.[7]

As the market matured, competition intensified and links to elite sport became more explicit. Garmin brought its heritage in GPS navigation and endurance sports into wearables, building devices used not only by consumers but also by professional cyclists, runners and teams seeking precise performance data. Garmin's patents cover location tracking, heart-rate monitoring, training load metrics and sport-specific analytics – illustrating how technologies refined for high-performance environments could be adapted for mass adoption.

A further shift occurred when Apple entered the market with the Apple Watch. Rather than positioning wearables solely as fitness devices, Apple reframed them as holistic health platforms. Its extensive IP portfolio covers sensors, biometric analysis, user interfaces and secure health data integration. This marked a strategic transition from performance measurement to preventative health and well-being, expanding the audience for wearables far beyond sport-focused users.

More recently, companies such as Oura have pushed the frontier further, focusing on sleep quality, recovery and long-term well-being – areas long recognized as critical in elite sport but historically invisible to consumers. Oura's ring-based form factor and patent filings around temperature sensing, readiness scoring and longitudinal health analytics reflect a broader industry trend: sports technology is no longer just about how fast you train, but how well you recover, sleep and sustain performance over time.

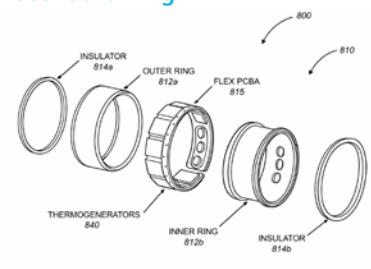
7 Problem, solution and benefit summaries are AI-generated by Patsnap and do not represent WIPO interpretations.

Patent spotlight

Oura's recently granted patent for a compact, ring-based wearable integrates advanced electronics to deliver continuous, accurate health and fitness monitoring without compromising comfort or usability.

- Patent number: **US 12013725 B2**
- Applicant: **Ouraring Inc.**
- Title: **Wearable computing device**
- First publication date: **May 2, 2024**
- Grant date: **June 18, 2024**

Patent drawing



Source: PATENTSCOPE.[8]

Illustrative end-user application

Source: Getty Images / PonyWang.

8 https://patentscope.wipo.int/search/en/detail.jsf?docId=US428307261 AI-assisted redrawing for improved clarity.

Problem: Conventional wearable electronics are often bulky and intrusive, making them uncomfortable for extended wear and ineffective in providing consistent and accurate monitoring of body activities.

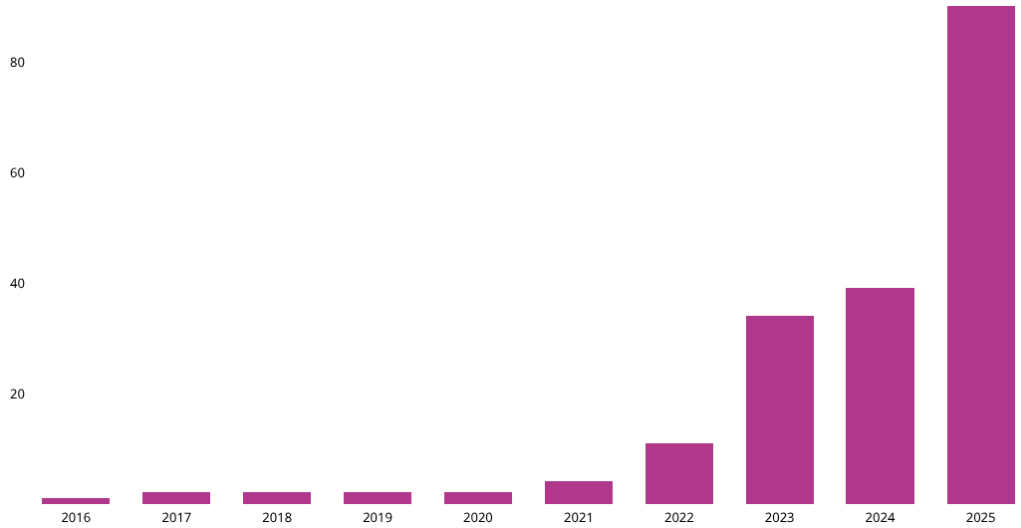
Solution: A wearable computing device in the form of a ring with a flexible printed circuit board, photovoltaic cells, LEDs and a charging mechanism that allows for prolonged use, enabling accurate fitness monitoring and gestural input through its compact and ergonomic design.

Benefit: The wearable computing device provides reliable and extended monitoring of fitness activities and biological data while being comfortable for prolonged wear, enhancing user experience with improved accuracy and convenience.[9]

9 Problem, solution and benefit summaries are AI-generated by Patsnap and do not represent WIPO interpretations.

Oura's patent portfolio shows strong growth in recent years

Oura Health Oy published patent families by earliest publication year, 2016–2025



Source: WIPO, based on patent data from Patsnap, January 2026.

This evolution is seen clearly by analyzing the IP data. Early patents clustered around step counting and basic accelerometry. Over time, filings expanded into heart-rate variability, blood oxygen estimation, sleep staging, stress detection and AI-driven health insights. Patent landscapes also show increasing cross-sector convergence, with technologies moving between sports, healthcare and consumer electronics – accelerating innovation while also raising some complex questions about data ownership and interoperability.

Today, wearables are widely used across elite sport and by hundreds of millions of consumers worldwide. This is evident in the fact that the global wearables market size was already approximately USD 220 billion in 2025, and is expected to more than double, to almost USD 500 billion, by 2030.[10]

The future of wearables most likely lies in deeper personalization, predictive health insights and integration with medical ecosystems. Once again, IP is likely to play a decisive role – shaping who leads, who collaborates, and how innovations reach society at scale.

Just as elite sport once led the way in understanding the value of performance data, wearables demonstrate how those insights – enabled and structured by IP – have escaped the stadium and become part of everyday well-being.

10 Mordor Intelligence (2026). *Wearable technology market size & share analysis – growth trends and forecast (2026–2031)*. Available at: https://www.mordorintelligence.com/industry-reports/wearable-technology-market

Modern sports footwear: engineered for speed and sustainability

Few sports technologies are as visible – or as contested – as those used in running shoes. Behind every high-profile model lie intense races in materials science, manufacturing and biomechanics, underpinned by dense patent activity. Over the past decade, these contests have reshaped not only elite competition, but also the expectations of everyday runners.

The first major wave of innovation focused on energy return and running efficiency. Advances in foam chemistry, plate integration and sole geometry enabled shoes that store and release energy more effectively with each stride. These technologies, widely adopted in elite distance running, were protected by patents covering both materials and their interaction with the body.

A second wave emerged with additive manufacturing: 3D printing opened new possibilities for footwear design, allowing midsoles to be built with complex lattice structures tuned for cushioning, stability and responsiveness. Beyond performance gains, additive manufacturing techniques enabled faster prototyping cycles and introduced the prospect of customization at scale. Patent filings in this space reflect growing interest in digitally driven design, manufacturing flexibility and data-informed performance optimization.

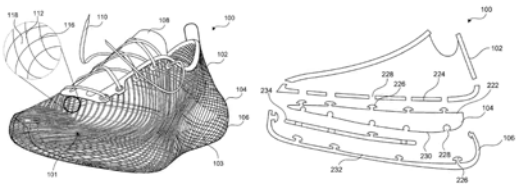
More recently, sustainability has become a defining driver of innovation. Footwear companies are now filing patents for recyclable materials, mono-material constructions and shoes engineered for easy disassembly at end of life. These designs challenge traditional manufacturing models and reflect growing pressure to address environmental impact without compromising athletic performance.

Patent spotlight

Adidas' recent patent for modular, 3D-printed footwear concept uses integrally connected components to enable economically viable, mass-customized shoes tailored to individual fit, comfort and design preferences.

- Patent number: **US 12550975 B2**
- Owner: **Adidas AG**
- Title: **Modular footwear and methods of making the same**
- First publication date: **December 4, 2025**
- Grant date: **February 17, 2026**

Patent drawing



Source: PATENTSCOPE.[11]

11 https://patentscope.wipo.int/search/en/detail.jsf?docId=US428307261

Problem: Traditional shoe manufacturing processes rely on standardized sizes and designs, failing to meet individual consumers' specific needs for fit, comfort and aesthetic preferences, leading to discomfort and inadequate support.

Solution: The development of footwear comprising modular parts with integrally formed connectors that can be assembled to form various portions of the shoe, allowing customization of shape, size and appearance through additive manufacturing techniques.

Benefit: Enables an economically feasible, personalized fit and appearance of footwear by allowing consumers to customize shoe components such as the upper, midsole and tongue portions, enhancing comfort and support according to individual preferences.[12]

One example of this shift is On Running, a Swiss sportswear company that has extended its performance-led innovation model into circular footwear design. Building on its patented CloudTec cushioning architecture, On Running has developed shoes engineered not only for running efficiency, but also for end-of-life recovery. Through its Cyclon circularity program, the company has introduced models designed around recyclable, bio-based and mono-material components that can be returned, disassembled and remade into new footwear, thereby embedding sustainability directly into the product's technical architecture.

On Running's rise from a Swiss-based startup to a globally recognized sportswear brand is rooted in a singular engineering insight and the strategic use of IP. In 2010, former professional triathlete and duathlete Olivier Bernhard – alongside Swiss engineers Caspar Coppetti and David Allemann – transformed a garden-hose cushioning prototype into the patented CloudTec performance platform, designed to provide an explosive take-off and soft landing in running shoes. This mechanical architecture, both distinctive and performance-effective, became the brand's core technological differentiator and was progressively protected through patents and design rights, enabling On Running to attract investment, establish manufacturing partnerships and scale internationally. From its first prototype and early industry awards to rapid global expansion – including a 2021 listing on the New York Stock Exchange and collaborations with elite athletes including Roger Federer – On Running's story illustrates how engineered performance, patent-driven innovation and strategic IP commercialization can convert a bold idea into a leading global player in sports footwear.

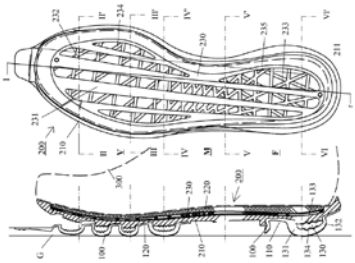
12 Problem, solution and benefit summaries are AI-generated by Patsnap and do not represent WIPO interpretations.

Patent spotlight

On Running's patent, and corresponding design, for a lattice structured midsole panel enhances flexibility and stability, optimizing natural foot motion while reducing weight and material usage.

- Patent number: **US 9320317 B2**
- Owner: **On Clouds GmbH**
- Title: **Sole construction**
- First publication date: **September 18, 2014**
- Grant date: **April 26, 2016**

Patent drawing



Source: PATENTSCOPE.[13]

13 https://patentscope.wipo.int/search/en/detail.jsf?docId=US107403732

Design

Source: Design DM/083010 registered on February 19, 2014, Global Design Database.[14]

14 https://designdb.wipo.int/designdb/en/showData.jsp?SOURCE=HAGUE&KEY=D083010

Problem: Existing sole constructions for running shoes lack integral flexibility, which can lead to inefficient movement sequences and potential damage during running, as they rely primarily on the deformability of individual hollow elements rather than providing overall elastic flexibility.

Solution: Incorporating a lattice-shaped panel in the intermediate sole that covers the heel, midfoot and forefoot regions, with longitudinal and transverse ribs, which allows for elastic bending and torsional flexibility, thereby enhancing the overall elastic flexibility and stability of the sole construction.

Benefit: The lattice-shaped panel improves the natural movement sequence of the foot during rolling off by providing adaptive flexibility and stability, reducing the risk of damaging movements and optimizing pressure distribution, while also reducing material usage and weight.[15]

Viewed more holistically, patenting trends in sports footwear reveal a clear evolution. Earlier filings prioritized speed, cushioning and efficiency gains. More recent patents increasingly combine performance claims with sustainability objectives, signaling a broader redefinition of what innovation in sport looks like, and what it is expected to deliver. Sports footwear offers a clear illustration of how IP shapes competition – not just between athletes, but between ideas. Patents reveal how performance technologies mature, and how elite sport continues to act as a proving ground for products that ultimately reach millions of consumers worldwide.

15 Problem, solution and benefit summaries are AI-generated by Patsnap and do not represent WIPO interpretations.

Parasports

Parasports are organized competitive or recreational sporting activities designed for individuals with physical, sensory or intellectual impairments. The term "para" derives from the Greek word meaning "beside" or "alongside," reflecting that these disciplines exist in parallel to non-disabled sports. Globally, the Paralympic movement – led by the International Paralympic Committee – has transformed parasports into a high-performance, internationally visible sector. Events such as the Paralympic Games demonstrate that elite athletic achievement in parasport is not defined by limitation, but by technical adaptation, training excellence and innovation.

Did you know?

Events at the Paris 2024 Paralympic Games drew huge global engagement – with TV viewers up 40% compared with the previous Paralympic Games in Tokyo – illustrating how inclusive sport innovation resonates with audiences worldwide.[16]

Within the context of this report, parasports represent a particularly powerful illustration of how innovation, inclusion and performance intersect. Unlike many mainstream sports technologies, where marginal gains drive competitive advantage, parasport technologies often serve a dual purpose – enhancing elite athletic performance while simultaneously advancing accessibility and mobility solutions with broader societal impact. In this respect, parasport innovation sits at the convergence of sports engineering, rehabilitation science and assistive technology.

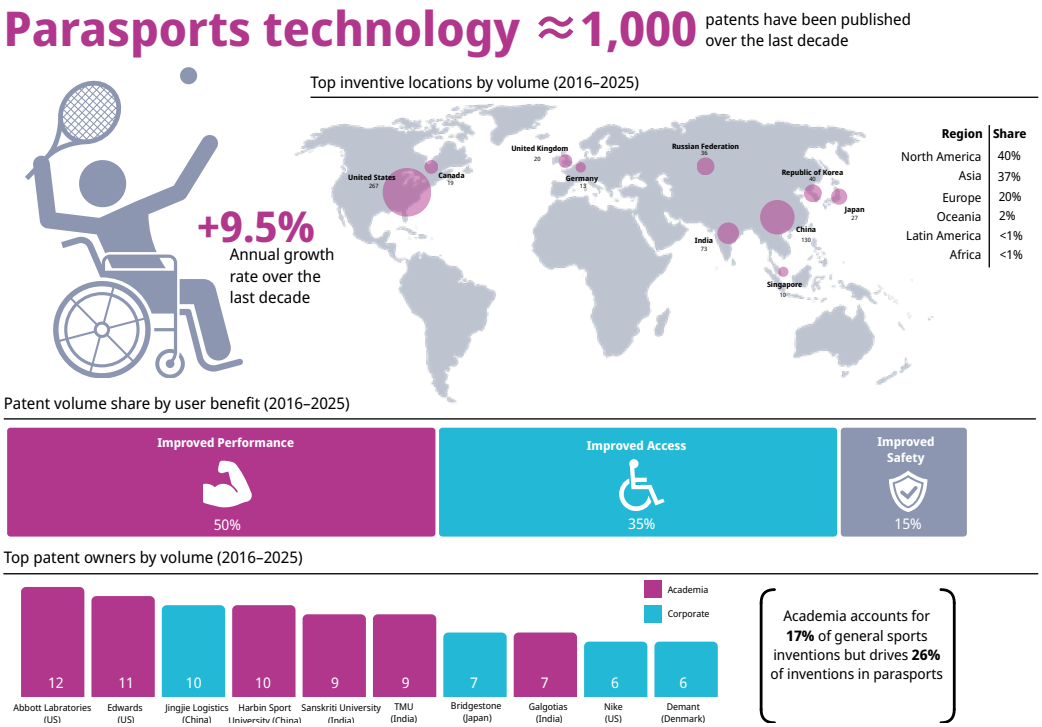
This dual-use dimension has been extensively documented in the 2021 WIPO Technology Trends report on Assistive Technology,[17] which highlighted rapid growth in patents relating to mobility devices, prosthetics, exoskeletons and adaptive human–machine interfaces. Many of the technological domains identified in that report – such as advanced prosthetic limbs, powered orthoses and sensor-integrated mobility platforms – directly underpin competitive parasports. The present analysis builds on that foundation, focusing specifically on innovations designed or adapted for sporting performance.

Beyond physical health, parasports are vital for fostering social inclusion, psychological empowerment and community integration. They challenge societal perceptions of disability by shifting the focus from limitations to athletic excellence. Furthermore, the specialized equipment and rules developed for these sports often drive broader technical innovations that improve general accessibility and quality of life for millions.

The analysis of worldwide patenting activity related to parasports focused on three primary areas: specialized adaptive hardware like "running blades," exoskeletons and racing wheelchairs; assistive technologies tailored for athletes with physical impairments; and terms specific to exclusive disciplines such as goalball and boccia. It captures the technical evolution of equipment designed to enhance accessibility and performance across dozens of sports, from archery to skiing. This methodology ensures a comprehensive view of how modern engineering is specifically adapted to meet the needs of para-athletes globally.

16 Durand, A.-A. (2025). Paralympics shifted perceptions, but not the living conditions of people with disabilities. *Le Monde*, July 28, 2025. Available at: https://www.lemonde.fr/en/france/article/2025/07/28/paralympics-shifted-perceptions-but-not-the-living-conditions-of-people-with-disabilities_6743792_7.html

17 https://www.wipo.int/en/web/technology-trends/assistive-technology/index



Note: All counts represent the number of inventions, measured in terms of the number of published patent families. One-to-many AI-based tagging was used to classify patents within specific categories. "Inventive location" is based on original patent applicant address. "Patent owners" is based on the current patent assignee's ultimate owner but simplified to show the related, and more well-known, sports brand instead of, for example, the holding company.

Source: WIPO, based on patent data from Patsnap, January 2026.

Approximately 1,000 patents have been identified in this field over the last decade, with a robust growth rate of nearly 10%. Although the absolute numbers remain small, this trajectory indicates that parasport innovation is currently outperforming the overall sports patent growth (7.6%) in terms of relative expansion over the same time period. The top locations for patent filings are led by the United States, which accounts for 38% of the total. China follows with 19%, and India ranks third with 11%. The Republic of Korea and the Russian Federation hold the fourth and fifth positions with 6% and 5% respectively. Together, these countries signify leading innovation hubs for parasport technology, highlighting a concentration of inventive activity primarily in Asia, North America and certain European countries.

The primary user benefit categories are "Improved Performance" (50%), "Improved Access" (35%) and "Improved Safety" (15%). The data demonstrate that innovation in parasport technologies is predominantly driven by the goal of enhancing athletic performance, while significant efforts are also dedicated to increasing accessibility and participation opportunities for users. Additionally, a notable portion of patents addresses safety and injury prevention, reflecting an ongoing commitment to protecting athletes. This distribution suggests a balanced approach to advancing competitive abilities, inclusivity and safety within the parasport sector.

The top patent owners in parasports over the past decade shows contribution from both academic and corporate entities. While academia accounts for only 17% of general sports inventions, it drives a substantial 26% of inventions within the parasports sector. Leading patent owners by volume include US-based Abbott Laboratories and Edwards Lifesciences.

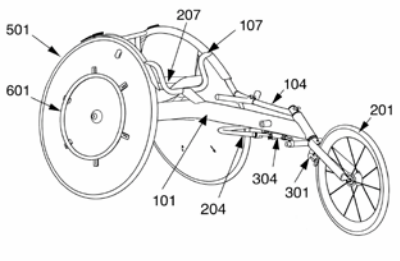
Other notable contributors include Jingjie Logistics and Harbin Sport University from China, as well as Sanskriti University and TMU from India, emphasizing the active role of international academic institutions in technical innovation.

Patent spotlight

University of Bergamo's invention of a sports wheelchair exemplifies the strong academic presence in this innovative field by providing a cost-effective, modulable design that adjusts to specific anthropometric and disability-related needs. This wheelchair eliminates the financial and physical barriers to entry in parasports, fostering greater athletic performance and social integration.

- Patent number: **WO 2017/037648**
- Applicant: **University of Bergamo**
- Title: **Modulable sports wheelchair**
- First publication date: **March 9, 2017**

Patent drawing



Source: PATENTSCOPE.[18]

18 https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2017037648 AI-assisted redrawing for improved clarity.

Problem: Current sports wheelchairs are often customized and expensive, limiting accessibility for athletes with disabilities, as they do not adequately accommodate individual anthropometric dimensions and disability-specific needs, hindering the development and popularity of the sport.

Solution: A modulable sports wheelchair with a structural seating cage and adjustable frame that allows for continuous width adjustment and customizable rear wheel positioning, enabling optimal athlete positioning and flexibility for various disabilities, reducing costs and increasing accessibility.

Benefit: The modulable wheelchair provides a cost-effective, customizable solution that meets the diverse needs of athletes with different disabilities, enhancing their ability to participate in sports and promoting social integration by allowing a single device to accommodate multiple users, comparable to high-end customized solutions.[19]

19 Problem, solution and benefit summaries are AI-generated by Patsnap and do not represent WIPO interpretations.

Emerging technologies, emerging fields

Innovation not only transforms existing sports; it also gives rise to entirely new sectors. Digital platforms, immersive environments, advanced analytics and new forms of competition are expanding who can play and who can be a fan. From esports to hybrid physical–digital experiences, this chapter looks ahead to emerging technologies and emerging sectors, using signs of early innovation to explore how the future is already taking shape.

Smart equipment and intelligent materials

Innovation in sport is increasingly embodied not only in data platforms and digital services, but in the equipment itself. Across a wide range of sports, balls, rackets, bats, footwear and protective gear are being enhanced with sensors, connectivity and intelligent materials, transforming passive equipment into active systems that generate data, respond to conditions and adapt to the athlete using them.

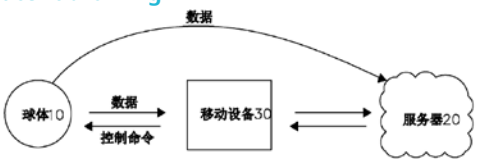
This shift is visible across many sporting disciplines. In ball-based sports such as football, basketball, rugby and cricket, equipment embedded with inertial and motion sensors is used to measure speed, spin, trajectory and impact characteristics, supporting performance analysis as well as officiating and rule enforcement.

Patent spotlight

One of the early smart ball patents includes Gengee's published application for a smart ball that integrates inertial sensors and wireless communication to capture precise motion and positioning data, supporting data-driven athlete training and performance analysis.

- Patent number: **WO 2016/206413 A1**
- Applicant: **Gengee Technology Co., Ltd**
- Title: **Smart ball and system thereof**
- First publication date: **December 29, 2016**

Patent drawing



Source: PATENTSCOPE.[1]

1 https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2016206413

End-user application

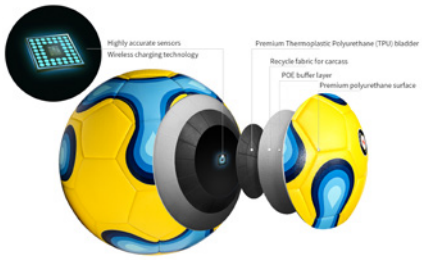


Image courtesy of Gengee Technology Co., Ltd.

Problem: Existing smart devices fail to effectively utilize sensor data in sports scenarios. Especially in high-intensity sports, it is difficult to highly integrate athletes' special skills and training loads, and there is a lack of systems which are able to provide athletes with data on a consistent basis.

Solution: A smart ball that integrates a micro control unit, inertial sensing device, clock device, wireless charging receiving device, storage device and wireless communication device. It collects motion-related data through a six-axis inertial sensor and adds a time stamp. It combines mobile devices so that the server performs data processing and storage, and uses a wireless communications positioning base station to achieve precise positioning and motion trajectory calculation.

Benefit: It achieves high-precision, low-power consumption sports data collection and transmission, provides a data basis for athletes' special abilities, and improves the efficiency of athletes' training.[2]

In racket and bat sports, integrated wireless connections in rackets, clubs and bats capture swing mechanics, impact location and timing, enabling more precise feedback on technique and consistency. Similar developments are evident in athletics and team sports, where smart footwear integrates pressure sensing and motion tracking to monitor gait, load distribution and injury risk.

Beyond performance measurement, intelligent equipment is also playing an expanding role in player safety and protection. Helmets, mouthguards and protective pads with connective

2 Problem, solution and benefit summaries are AI-generated from Patsnap patent data and do not represent WIPO interpretations.

functionality are increasingly designed to detect and record impact forces, providing objective data to support injury assessment and return-to-play decisions.

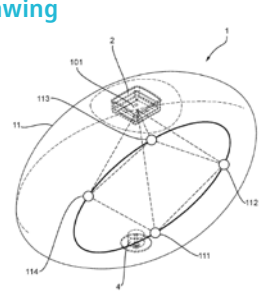
Although these applications are often presented in sport-specific terms, the underlying technologies are highly transferable across disciplines. Miniaturized sensors, wireless communication modules, power management solutions and embedded analytics recur across many types of equipment, enabling innovations developed in one sport to more easily diffuse into others.

Patent spotlight

A recently published patent application from Sportable Technologies relates to a rotationally balanced smart ball integrating embedded electronics while preserving natural spin and on-field behavior through a distributed counterbalancing mass system.

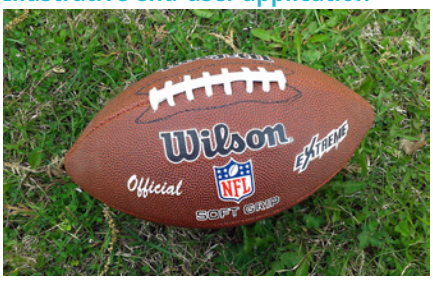
- Patent number: **WO 2025/051398 A1**
- Owner: **Sportable Technologies Ltd.**
- Title: **Rotationally balanced smart ball**
- First publication date: **March 13, 2025**

Patent drawing



Source: PATENTSCOPE.[3]

Illustrative end-user application



Source: Photo by Petey21 via Wikimedia Commons, licensed under CC Zero.

3 https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2025051398

Problem: Existing methods for incorporating electronic devices into sports balls, such as mounting them near the center or on the periphery, face challenges in maintaining rotational balance, particularly when using peripheral mounting (which tends to unbalance the ball).

Solution: An inflatable ball design with a distributed balancing mass system. This system includes at least one electronic device mounted on or over the bladder wall, with a center of mass away from the ball's center. A distributed balancing mass, comprising multiple balancing mass elements, is arranged around a second point opposite the device's center of mass – closer to that point than the first point – to achieve rotational balance without introducing a preferred rotation axis.

Benefit: This design effectively balances the mass of electronic devices in sports balls, ensuring the ball rotates uniformly and behaves similarly to a conventional ball, without altering its natural rotation characteristics.[4]

4 Problem, solution and benefit summaries are AI-generated from Patsnap patent data and do not represent WIPO interpretations.

A similar pattern can be observed in the use of intelligent and adaptive materials, including smart textiles, flexible electronics and materials engineered to respond dynamically to pressure, impact or environmental conditions. These materials increasingly appear across footwear, apparel and protective gear, regardless of the sport in which they are first introduced.

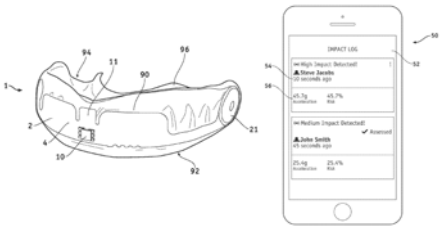
This convergence highlights a defining feature of emerging sports technologies: advances are driven less by individual sports than by shared technological building blocks. Once an innovation proves its value – whether in improving performance, enhancing safety or enriching feedback – it is readily adapted to new sporting contexts. From an IP perspective, patents in this area can reveal how incremental advances in sensors, materials and system integration combine to reshape sports equipment, often offering early insight into how intelligent gear is redefining training, competition and participation across sport.

Patent spotlight

Force Impact Technologies' recently granted patent is a sensor-equipped smart mouth guard that accurately detects and communicates impact forces in real time, improving concussion monitoring without bulky or uncomfortable equipment.

- Patent number: **US 12232889 B2**
- Owner: **Force Impact Technologies, Inc.**
- Title: **Mouth guard having internal components for sensing impact forces**
- First publication date: **March 16, 2023**
- Grant date: **February 25, 2025**

Patent drawing



Source: PATENTSCOPE.[5]

5 https://patentscope.wipo.int/search/en/detail.jsf?docId=US393707160

Problem: Existing solutions for detecting injurious concussive forces in sports and athletic activities are not sufficiently flexible or precise, often requiring bulky equipment like helmets or multiple part pieces that are cumbersome and uncomfortable to wear.

Solution: A customizable, single-piece mouth guard with embedded sensors and on-board electronics that detect impact forces, provide local and remote notifications, and adjust impact thresholds based on user biometric data and activity type.

Benefit: The mouth guard effectively identifies and communicates impact forces to the user and remote devices, enhancing safety by providing accurate and timely notifications while maintaining comfort and usability across various sports and activities.[6]

6 Problem, solution and benefit summaries are AI-generated from Patsnap patent data and do not represent WIPO interpretations.

Esports

Organized, professional competitive video gaming – known as esports – has evolved from recreational play into a global industry with tournaments, teams, sponsorships and audiences comparable with many traditional sports. While the competition takes place in digital environments rather than on physical fields, the technological demands are equally intense. Fairness, precision and performance depend on highly advanced hardware, ultra-fast networks and sophisticated software systems. For this reason, esports are an important part of the broader technology landscape examined in this report. They demonstrate how new forms of competition are increasingly shaped not only by physical equipment and materials, but also by digital infrastructure, data systems and immersive spectator technologies.

Did you know?

The global esports industry is growing into a major spectacle, with hundreds of millions of viewers and expectations that the market could reach tens of billions of US dollars over the next decade.[7]

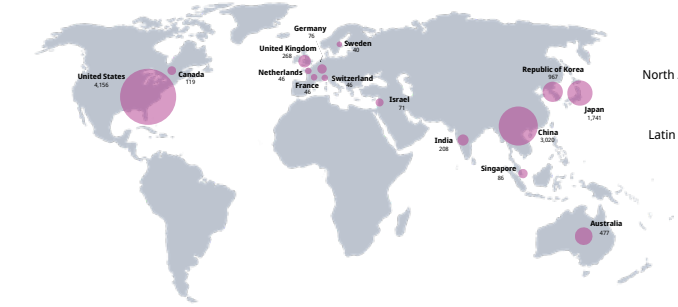
Esports technologies encompass the high-performance hardware, low-latency networks and sophisticated software engines that facilitate professional competitive gaming. These include specialized peripherals, AI-driven performance analytics and cloud infrastructure designed to eliminate “ping” or lag.

Their importance lies in ensuring competitive integrity by creating a fair, skill-based digital environment. Beyond gameplay, these technologies drive massive economic value through immersive broadcasting tools like augmented reality (AR) or virtual reality (VR) overlays and global streaming platforms. Ultimately, they transform video gaming into a legitimate professional industry, fostering a new ecosystem for STEM (science, technology, engineering and mathematics) innovation, global community-building and digital literacy.

7 Esports Stats (2025). *eSports Statistics 2025 (Market Size, Viewership & Trends)*. Available at: https://esportstats.co/

Esports technology >11,800 patents have been published over the last decade

Top inventive locations by volume (2016–2025)



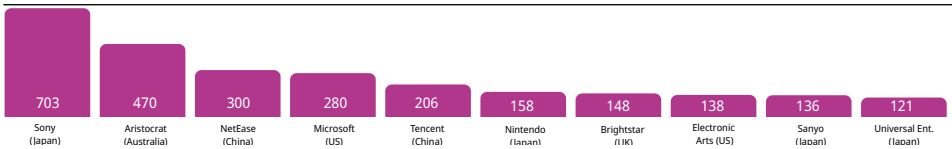
Region	Share
Asia	52%
North America	36%
Europe	7%
Oceania	4%
Latin America	<1%
Africa	<1%

+9.3%

Annual growth rate over the last decade

Patent volume share by user benefit (2016–2025)

Top patent owners by volume (2016–2025)



Note: All counts represent the number of inventions, measured in terms of the number of published patent families. One-to-many AI-based tagging was used to classify patents within specific categories. "Inventive location" is based on original patent applicant address. "Patent owners" is based on the current patent assignee's ultimate owner.

Source: WIPO, based on patent data from Patsnap, January 2026.

Approximately 12,000 patents have been identified in esports over the last decade, reflecting a strong growth rate of over 9%. This trajectory shows that esports innovation is currently outperforming the overall sports patent growth (7.6%).

The United States leads significantly in esport patenting, with 4,155 patents accounting for 36% of the total. China follows as the second largest contributor with 26%, followed by Japan with 15%. The Republic of Korea and Australia have 8% and 4% of esports patents respectively. Collectively, these five locations represent the primary centers of patenting activity, accounting for over 90% of the total number of esports patents.

Patenting activity in the esports sector is concentrated across three strategic pillars. "Improved Play" (comprising the platform, network and spectator experience) leads with 45% share, focusing on immersive broadcasting and low-latency streaming infrastructure. This is closely followed by "Improved Watching" (comprising competitive play and training) with 42%, which emphasizes performance-enhancing hardware and AI analytics. Meanwhile, "Improved Competition" (comprising tournament operations and monetization) with 13% secures the professional ecosystem through technologies such as anti-cheat systems. Viewed holistically, these patent statistics highlight the importance of optimizing the technical precision of high-stakes play while scaling the digital infrastructure required for a global audience.

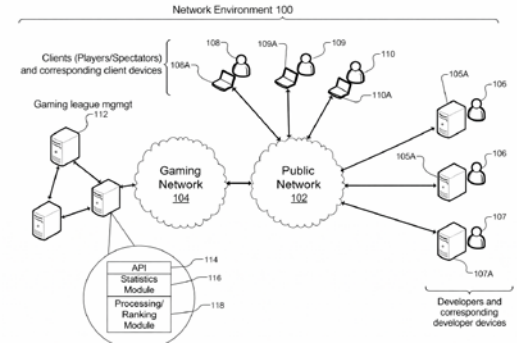
Over the last decade, the esports patent landscape has been dominated by major technology and gaming corporations, primarily from Japan and the United States. Sony (Japan) leads by a substantial margin with 703 patents, followed by the Australian gaming giant Aristocrat (470). Other significant players include NetEase (300) and Microsoft (280), alongside prominent industry names like Tencent, Nintendo and Electronic Arts. This distribution suggests a competitive field where both hardware manufacturers and software developers are innovating to define the next generation of digital competition and spectator experiences.

Patent spotlight

Sony's recently patented system enables spectators to influence esports matches in real time – through actions like cheering or jeering – making audiences visible participants in the game environment.

- Patent number: **US 12330070 B2**
- Owner: **Sony Interactive Entertainment Inc**
- Title: **Spectator participation in esports events**
- First publication date: **January 25, 2024**
- Grant date: **June 17, 2025**

Patent drawing



Source: PATENTSCOPE.[8]

8 https://patentscope.wipo.int/search/en/detail.jsf?docId=US420414295 AI-assisted redrawing for improved clarity.

Problem: Current esports event systems lack effective mechanisms for spectator participation, resulting in a lack of immediacy, community and engagement for both players and spectators, as spectators are typically silent and invisible to both each other and the players.

Solution: The system modifies the virtual environment of esports events in real-time based on spectator actions, such as cheering or jeering, by associating these actions with specific players and adjusting game parameters or generating audiovisual effects accordingly.

Benefit: This solution enhances spectator participation and engagement by creating a sense of community and immediacy, allowing spectators to influence the game environment and interact with players and other spectators in meaningful ways.[9]

9 Problem, solution and benefit summaries are AI-generated from Patsnap patent data and do not represent WIPO interpretations.

Appendix

Patent search strategy

All patent searches were conducted using the Patsnap database in January 2026. The datasets were reviewed manually to eliminate any irrelevant patents.

Sports-related patents

(((TAC:(FOOTBALL* OR SOCCER* OR HOCKEY* OR “ICE HOCKEY” OR “FIELD HOCKEY” OR TENNIS* OR BADMINTON* OR “TABLE TENNIS” OR “PING PONG” OR PICKLEBALL OR VOLLEYBALL* OR BASKETBALL* OR BASEBALL* OR RUGBY* OR “AMERICAN FOOTBALL” OR GOLF OR SWIMMING OR GYMNASTICS)) OR (TAC:(CRICKET* OR SQUASH* OR RACQUET* OR RACKET* OR PADEL OR SWIM* OR ATHLET* OR SKIING OR “SNOW SPORT*” OR “WINTER SPORT*” OR HANDBALL OR WRESTLING) AND (IPC:A63B* OR CPC:A63B*)) OR (TAC:((SPORT* OR ATHLETIC* OR CRICKET* OR SQUASH* OR RACQUET* OR RACKET* OR SWIM* OR ATHLET* OR SKIING OR HANDBALL OR WRESTLING) $W4 (EQUIPMENT* OR SYSTEM* OR DEVICE* OR APPARATUS* OR MEASUR* OR SENS* OR METHOD* OR SHOE OR SHOES OR FOOTWEAR OR BOOT OR CLOTHING OR CLOTHES OR APPAREL)))) AND F_PBD:[2016 TO 2025])

Parasports patents

(TAC:((WHEELCHAIR* OR PROSTHE* OR ORTHOTIC* OR EXOSKELETON* OR “RUNNING BLADE*” OR “ARTIFICIAL LIMB*”) AND (SPORT* OR RACE* OR ATHLET* OR ARCHERY OR ATHLETICS OR BADMINTON OR FOOTBALL OR BASKETBALL OR CANOE OR EQUESTRIAN OR JUDO OR POWERLIFTING OR SHOOTING OR SWIMMING OR RUGBY OR TENNIS OR SKIING OR BIATHLON OR SNOWBOARD OR CURLING)) OR TAC:((DISAB* OR IMPAIR* OR AMPUT* OR “LIMB LOSS” OR “LIMB DEFICIENCY” OR PARALYS* OR PARAPLEG* OR QUADRIPLEG* OR TETRAPLEG* OR ASSISTIV*) AND (ATHLET* OR SPORT* OR RACING* OR RACE* OR CYCLING* OR SWIM*)) OR (“SITTING VOLLEYBALL” OR GOALBALL* OR BOCCIA*)) AND (IPC:A63B* OR CPC:A63B* OR IPC:A63C* OR CPC:A63C* OR IPC:A61F2* OR CPC:A61F2* OR IPC:A61F5* OR CPC:A61F5* OR IPC:A61G5* OR CPC:A61G5* OR IPC:G01* OR CPC:G01* OR IPC:G09B* OR CPC:G09B*) AND F_PBD:[2016 TO 2025]

Esports patents

((TAC:(ESPORT* OR “E-SPORT*” OR “ELECTRONIC SPORT*” OR “COMPETITIVE GAMING” OR “ONLINE GAME” OR “MOBILE GAME” OR “COMPUTER GAME” OR “CONSOLE GAME”) OR (TAC:((GAME* OR GAMING) $SEN (MATCHMAKING* OR BROADCAST* OR STREAMING* OR LATENCY* OR CHAIR* OR KEYBOARD* OR MOUSE* OR CONTROLLER* OR JOYSTICK* OR HEADSET* OR HEADPHONE* OR EARPHONE*)))) AND (CLASS:A63F* OR CLASS:G06* OR CLASS:H04* OR CLASS:A47C* OR CLASS:H01H*)) AND F_PBD:[2016 TO 2025]

Trademark search strategy

Trademark searches were conducted using the WIPO Global Brand Database in January 2026.

“STATUS: REGISTERED” AND “GOODS AND SERVICES: CONTAINS THE WORD (SPORTS OR SOCCER OR FOOTBALL OR SWIMMING OR TENNIS OR BADMINTON OR GOLF OR PADEL OR PICKLEBALL OR ATHLETE OR RUGBY OR CRICKET OR SKIING OR SNOWBOARDING OR HOCKEY OR “PING PONG” OR VOLLEYBALL OR BASKETBALL OR HANDBALL OR BASEBALL OR SQUASH OR WRESTLING OR RUNNING OR SNOWSPORTS OR SPORTING OR ATHLETICS OR ATHLETIC)”

Designs search strategy

Design searches were conducted using the Patsnap database in January 2026.

LOC:(02-01-100069 OR 02-04-100167 OR 02-99-100284 OR 06-11-100741 OR 21-02 OR 32-02-105303 OR 02-02-105164) AND PBD:[20160101 TO 20251231]

Methodological considerations and limitations

IP analysis in the field of sports technologies presents structural challenges that differ from those encountered in more clearly delineated technical or product domains. International IP classification systems – whether the International Patent Classification (IPC) and Cooperative Patent Classification (CPC) for patents, the Nice Classification for trademarks, or the Locarno Classification for designs – are organized primarily by technical function, goods and services categories, or product type. They are not systematically structured around individual sporting disciplines. As a result, there are no dedicated and exhaustive classification categories for most specific sports.

Many enabling technologies and products – such as motion-tracking systems, ball trajectory analysis, textile materials, wearable sensors, footwear construction or protective equipment – are inherently cross-disciplinary and may apply across multiple sports. A single invention, brand specification or design registration may reference several sporting contexts simultaneously. Conversely, relevant IP filings may be drafted in general technical or commercial terms without explicit reference to sport, even where the ultimate market application is sporting.

These structural features introduce complexity into the identification of sports-related IP. Classification codes alone cannot fully isolate sport-specific activity. Accordingly, the search methodology combined classification-based filtering with targeted keyword strategies across patent, trademark and design datasets. Keyword-based searching, while necessary, does introduce some limitations – the IP rights may reference multiple sports even where the primary commercial focus is one discipline; terminology may vary across jurisdictions (for example, “football” and “American football”), creating ambiguity; applicants frequently draft broad technical descriptions or goods and services specifications to maximize protection, which can expand the apparent scope of relevance; and, conversely, relevant filings may not explicitly reference sport, leading to potential under-capture. To mitigate these effects, iterative query refinement, manual validation and structured sampling were undertaken across datasets. Sampling results indicate that the substantial majority of retrieved records are substantively relevant to sports-related activity. Nevertheless, the dataset should be understood as indicative rather than exhaustive.

Accordingly, the analysis presented in this publication should be interpreted as follows:

- Absolute IP filing counts should not be interpreted as precise measures of total innovation or branding activity in sport.
- Small numerical differences between sports, jurisdictions or years should be treated with caution.
- Broader directional trends over time, geographic distributions[1] and relative patterns across technology or product clusters are considered more robust than exact totals.

Despite these inherent structural constraints, the resulting dataset is sufficiently consistent and internally coherent to support meaningful conclusions regarding the scale, evolution and distribution of sports-related innovation and brand activity globally.

Taxonomy of sports categories

American football and rugby
American football and rugby are physical, territory-based team sports centered on advancing an oval ball toward a scoring zone. American football and rugby are grouped together because patent filings frequently address shared equipment, protective gear and ball technologies that apply across both codes, making separation analytically artificial.

Baseball
Baseball is a bat-and-ball sport in which teams alternate between hitting and fielding to score runs by circling a diamond-shaped field. It encompasses professional and amateur leagues, as well as closely-related formats such as softball.

Basketball
Basketball is a fast-paced team sport focused on scoring by shooting a ball through an elevated hoop. It encompasses traditional five-on-five indoor play, as well as variations such as three-on-three and street basketball.

Cricket
Cricket is a bat-and-ball sport played between two teams that alternate batting and fielding on an oval field.

Football (soccer)
Football (soccer) features two teams competing to score by moving the ball into the opponent's goal primarily using their feet. The category includes outdoor eleven-a-side matches, small-sided formats like futsal and five-a-side, and beach soccer.

Golf
Golf centers on precision-based play in which individuals or small groups aim to complete a course in the fewest strokes. It includes traditional outdoor golf on 18- or 9-hole courses, as well as formats such as match play and stroke play. The category also covers driving ranges, miniature golf and technology-assisted variants like simulator golf.

1 For regional analysis within this report, "North America" should be interpreted as comprising Canada, Mexico and the United States of America.

Gym and fitness
Gym and fitness focuses on physical conditioning, strength building and overall health. This category covers weight training, functional fitness, aerobics, group exercises and high-intensity interval training as well as all gymnastic types combining artistic (apparatus and floor), rhythmic (dance and props) and trampoline events.

Hockey
Hockey refers to stick-and-ball (or puck) team sports played on various surfaces. Major forms include field hockey on turf and ice hockey played on rinks, along with inline and street hockey variations. Ice hockey and field hockey are grouped together because of substantial overlap in stick, puck or ball control and protective equipment technologies, and because the keyword "hockey" in patent data is often indistinguishable between ice and field contexts.

Racket sports
Racket sports involve striking a ball or shuttlecock with a handheld racket across a net or against a wall. This category includes tennis, badminton, padel, pickleball, squash and table tennis, spanning both singles and doubles play. Racket sports have been grouped together because core racket, stringing, impact-surface and court-interaction technologies are commonly patented across multiple racket disciplines rather than for a single sport only.

Swimming
Swimming includes pool racing (freestyle, backstroke, breaststroke and butterfly), water polo (a tactical team sport), and artistic swimming (choreographed routines). It also features diving from boards and open-water marathons in lakes or oceans.

Volleyball
Volleyball involves teams rallying a ball over a net with the aim of grounding it on the opponent's side. The category includes indoor volleyball, beach volleyball played on sand and emerging formats such as snow volleyball.

Winter sports
Winter sports take place primarily on snow or ice and often require specialized equipment. They include alpine and cross-country skiing, snowboarding, figure skating, curling and biathlon.

Other sports
The "Other" category captures sports that fall outside the major global disciplines yet maintain strong regional or emerging appeal. These may include combat sports, cycling, athletics, surfing, skateboarding, climbing, and hybrid or newly professionalized activities.

This WIPO Technology SPARK report examines sports technology through the lens of IP analytics. By analyzing sports-related patents, trademarks and designs, the report reveals patterns of inventive activity, commercialization and design-led differentiation.

The analysis reveals how advances in equipment, materials, data analytics, wearables and digital platforms are reshaping sport, while showing that sports-related innovation is expanding rapidly, reflecting the growing technological intensity of modern sport and its surrounding innovation ecosystem.

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