G42

The Future of Sport and AI

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The Future Laboratory is one of the world's most renowned futures consultancies. We deliver foresight through a number of products and services, including our trends intelligence platform, LS:N Global, our Bespoke Foresight and commissioned content offering, and through our Strategic Advisory.

Our strategic foresight helps our clients to harness market trends, understand and adapt to emerging consumer needs, position their brands for success and keep them ahead of their competitors. Since 2000, we have worked with more than 1,000 businesses on over 5,000 projects in 50+ countries. In 2022, The Future Laboratory became part of the Together Group.

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Born in Abu Dhabi and operating internationally, G42 champions AI as a powerful force for good, with almost limitless potential to enhance people's abilities and lives.

G42 believes in the power of people, and unlocking human potential through the use of technology to help them achieve incredible things.

Sport will always be centred on the people who take part. Human performance is at the heart of sporting competition whilst fans are the lifeblood of spectator sports, and that will never change.

What if, though, AI and its exponential capabilities can enhance that to produce better athletic performance, increased opportunities for global talent scouting and more immersive experiences for fans?

This report explores this exciting new future, examining how AI-driven capabilities will augment expert teams and bring improved outcomes across the pillars of Strategy and Tactics, Talent, Engagement, Health and Performance, and Design.

To learn more about G42 and its portfolio companies you can visit www.g42.ai

Contents

Methodology

: At the heart of The Future Laboratory® is a proprietary foresight methodology. Our macrotrends and microtrends are rooted in an understanding of fundamental human needs and macro-environmental global drivers.

: The Future Laboratory also employs a mixed methodology approach to gather key cultural and consumer insights to inform our trend hypotheses. This includes our in-house Foresight Research System (FRS) – an internal central database updated daily by a cross-sector team of analysts, researchers and strategists.

: Our analysis in this report draws on extensive research, expert interviews and The Future Laboratory's trends database to provide a comprehensive overview of the emerging trends and drivers shaping the intersection of AI and sport.

Rapha's Spring Summer 2024, UK

Experts

Interviews with experts to consider the technological, sociological, psychological and commercial intersections of the topic – enabling us to validate, interrogate and identify the key themes and their impact on AI and sport pillars: Strategy and Tactics, Talent, Engagement, Health and Performance, and Design.

: ## Rory Smith

The New York Times global sports correspondent and author of Expected Goals: The Story of How Data Conquered Football and Changed the Game Forever

: ## Ilario Corna

chief information and technology officer, International Olympic Committee (IOC)

: ## Chris Brady

chief intelligence officer at Sportsology and author of AI for Sports: AI for Everything

: ## Jesse Davis

professor of Machine Learning Group and DTAI Sports Analytics Lab, KU Leuven

: ## Benn Achilleas

CEO and founder, Sport Buff

: ## Dr Fabio Richlan

senior scientist, University of Salzburg, Austria

: ## Alex Kipman

CEO and founder, Analog AI

: ## Farah Hillou

precision nutrition specialist and wellbeing counselor, M42

: ## Thomas Pramotedham

CEO, Presight

Part one

Introduction

Exploring how AI is supercharging the future of sport, augmenting teams and improving outcomes across Strategy and Tactics, Talent, Engagement, Health and Performance, and Design.

A shift in how we compete, consume and manage sports

Artificial intelligence (AI) is about to revolutionize conventional sports wisdom. In some cases it already has. 'In the world of professional sports, people are begging for AI-driven insights,' says Alex Kipman, CEO and founder of Analog. 'Everyone wants a competitor's advantage. If one team has AI but another one doesn't, or one's AI is better than another's, that's a disadvantage – the race is on.'

The growth of the global AI in sports market – projected to reach just under $30bn by 2032, growing at an annual rate of 30% per year between now and then – has set a paradigm shift in motion, affecting the way we compete, consume and manage sports.

This report explores this exciting new future, examining how AI-driven capabilities will augment expert teams and bring improved outcomes across the pillars of Strategy and Tactics, Talent, Engagement, Health and Performance, and Design.

Sport as an innovation hub and the ideal testing ground for AI

As the sports sector learns to work with AI and use its potential, the world will look on with interest. Many sports are already mining huge amounts of data, and the repetition and complexity of play makes it a veritable playground for AI engineers. The story of AI in sport will be one of how AI-driven innovation will one day influence broader society too.

'Sport always jumps head first into everything,' explains Rory Smith, The New York Times global sports correspondent. 'Because everyone is focused on gaining an edge, it's a natural environment to experiment with new technology and look for ways to improve.' With global audiences of over 3bn for the Olympics, 3.5bn for football, 2.5bn for cricket and 2bn for basketball and field hockey, many people are poised to learn more about the potential of AI to positively affect human ability, not just as fans but also as participants.

Health and wellbeing dominate culture – and sport is benefiting

Today, new audiences are attracted to sport as part of the broader growth of health and wellbeing culture. Armed with wearable devices, fitness content and dietary hacks, people can approach their own training as athletes do. They use digital coaches to set goals, tweak their routine and monitor performance data.

Scouting apps like aiScout are even connecting top performers to talent scouts. Using 3D capture technology via an individual's camera phone, users can see how their performance ranks against others globally. If they hit the mark, a scout will call.

Elite sport is still out of reach for most, but the rise of AI-fueled, digital products is giving wider audiences access to the tools and the dream of one day competing in professional sport. In that sense, sport provides the ideal vehicle to increase familiarity with this advancing technology.

Part two

Drivers

Identifying the key sociocultural and technological forces driving the future of AI innovation in sport – from evolving audience expectations to the rise of precision health.

LightSpray by On, Switzerland

The Human Narrative

Sport may be a hotbed of AI innovation, but it is also a showcase for what defies the algorithms – the power of the human spirit.

While sports are at the cutting edge of AI research and experimentation, performance in sports remains a sector uniquely resistant to automation. The chaos of the game, the unpredictability of play – these are elements that fans relish.

'There's a lot of complexity in sport. It's simply not possible to iron out all of that inconsistency with AI,' explains Jesse Davis, professor of Machine Learning Group and DTAI Sports Analytics Lab at KU Leuven. 'Moreover, it's not something you would want to get rid of.' In other words, there's a reason that robot wars have limited appeal: humans want to watch other humans achieve superhuman feats that defy the odds.

'Sport will always be human,' says Rory Smith. 'As such, it will always be subject to human failure and illuminated by human genius.' In this new era of AI

integration across sectors, athletes' ability to defy algorithms with human spirit will cement sport's place as integral to our need for entertainment.

Take Cristiano Ronaldo. With 635m followers on Instagram, he surpasses Kim Kardashian, Dwayne 'The Rock' Johnson, Ariana Grande and Kylie Jenner. Fans are not just impressed with how he plays; they idolize him as an icon of human capability. His hero status reflects the health of the broader global sports market. Even as video-on-demand streaming sites and highlight clips captivate younger viewers, 71% of sports fans say their favorite type of sports content to watch is live.

In this sense, sport and its showcase of human ability is more compelling than other forms of entertainment. The global sports market is expected to reach $680bn by 2028, growing at just under 10% each year. This is great news for AI innovation, says Presight CEO Thomas Pramotedham: 'It's not just about AI for sports performance excellence; the economics of sport entertainment will also drive the adoption of AI.'

$680bn

The global sports market is expected to reach $680bn by 2028, growing at just under 10% each year

Source: Statista

'Sport will always be human, as such, it will always be subject to human failure and illuminated by human genius'

Rory Smith, The New York Times global sports correspondent and author

New Audiences

Demographic and generational shifts are introducing new audience expectations around sports and engagement, giving rise to an expanding fan base with varied interests and preferences.

People are increasingly using sports to define their identity and connect with like-minded individuals. When watching live sporting events from home, 61% of Gen Z fans say they watch with other people – compared to 53% of Generation X and 48% of Boomer fans. Sports fandom is more vibrant than ever, partly as an antidote to years of lockdown, and partly due to the rise of new platforms on which to consume sports.

'The next generation are used to social media and engaging in a two-way interaction, and this needs to be brought into sports broadcast more'

Benn Achilleas, founder, Sport Buff

F1's audience growth has been turbocharged by the Drive to Survive Netflix documentary. What used to be exclusive content is now available in shorter, digestible bites for an online community hungry for highlights, human stories and the lifestyle behind motorsport. Social media has been particularly impactful for F1, given the difficulty fans face in attending live races. Similarly, Tour de France: Unchained and Break Point are attracting new audiences to cycling and tennis.

'The next generation are used to social media and engaging in a two-way interaction, and this needs to be brought into sports broadcast more,' explains

Benn Achilleas, founder of Sport Buff, a leader in fan engagement collaborating with FIFA World Cups, UEFA Champions League, Rugby and Cricket World Cups. Among sports fans aged 18–24, 34% prefer highlights to full games.

Some sports are even responding by adapting live games to appeal to these shorter attention spans. Cricket has launched T20 and football has The King's League, with two 20-minute halves and surprises throughout. In baseball, the Savannah Bananas have introduced novelty with dance routines, batters on stilts, somersaulting fielders, pitchers throwing from trampolines, and occasionally flaming bats – all within a strict two-hour time limit. 'It is easy enough to dismiss the Bananas as an irreverent sideshow,' writes Jonathan Liew in The Guardian. 'But the Bananas model has real-world implications: a vision of sport that – for better or worse – may well be coming to an arena near you soon.' With 8.8m followers on TikTok, the Bananas followers outstrip other professional baseball teams in America in terms of reach.

Women's football also attracts a broader fan base than the men's game, with a younger audience that is more likely to include women and families. The average age of a women's football fan is 35, compared to 39 for men's football, and fans are more likely to be female (source: Two Circles). Women now make up 40% of F1 fans, according to F1 Academy, and the sport is responding. Charlotte Tilbury was recently named as an official partner for the F1 Academy 2024. According to Deloitte, women's sports are projected to become a $200bn global industry in the next decade, suggesting that sports leagues will need to continue to adapt as this demographic shift unfolds.

Precision Healthcare

The increasing availability and affordability of health-monitoring technologies has led to significant advances in precision healthcare, giving athletes broader access to personalized data and insights.

Society is at an inflection point – set to experience step-change advances in what healthcare can achieve. This will have ramifications for the professional sports world.

About 60% of US households own a wearable device and 87% of wearable owners surveyed use them to track health metrics such as heart rate, workout duration and sleep quality. Advances in technology and people's access to digital diagnostics are mobilizing a shift from curative to preventative medicine, and with that, an elevation in expectations of what good health means – including the methods to achieve it.

The global preventative healthcare market is projected to grow by 8.32% per year to reach over $5.5 trillion by 2027. Personalized recommendations based on an individual's unique genetic make-up are transforming tracking data into useful insights previously only available to the elite. In sport, this is used to tailor an athlete's training, diet, even his or her chosen sport to their unique genetics and microbiome.

'AI is being used to help people gain insights on what to do with that data,' explains precision nutrition specialist Farah Hillou, who describes how precision healthcare tools such as genomic and microbiome testing, proteomics and pharmacogenomics are being used today to deliver

personalized medicine. 'It's only getting more personalized, utilizing tech and then empowering individuals and athletes to make necessary changes.'

This provides huge benefits in sports training. 'Athletes consume supplements and ergogenic aids – and now we have data to identify their ability to benefit from these supplements and aids, and any risks that might be associated,' adds Hillou.

$5.5 trillion

Projected growth of the global preventative healthcare market by 2027

Source: Globe Newswire

AI coaching apps will soon augment professional coaching, appealing to non-professional sports audiences as well. Smart assistants and a network of home sensors will capture health data, detect potential threats and provide personalized advice. PainChek, for instance, uses facial analysis and AI to assess and score pain levels by recognizing facial muscle movements associated with pain, with potential applications in managing sports injuries and chronic conditions.

Mercedes-AMG PETRONAS F1 Team in partnership with G42

Part three

Trends

Here we look at the five pillars that will determine the implementation of AI in sport. Each pillar features three trends that highlight the new behaviors, opportunities and tech capabilities set to influence the growth of AI in sport over the next 3–5 years.

Apple Heart and Movement Study, US

AI + Strategy and Tactics

Collaborating for Competitive Edge

Human intuition and creativity are combining with AI-powered analysis and insight to produce a new form of sports intelligence.

The future of strategy and tactics in sport will harness a new form of intelligence, where a competitive edge is achieved only when human and machine capabilities are combined.

Sports serve as a crucible for the broader societal integration of AI. Progress will be achieved by humans and machines using their respective strengths. AI will analyze vast data sets, offering predictions, insights and new possibilities. Humans will then apply critical thinking, balancing these insights with intuition, imagination and creativity to make the best decisions.

At a Glance:

: **Intuition Meets Analysis:** Human intuition and creativity, combined with AI-powered analysis and insight, will produce a new form of sports intelligence. Future sports leaders must hone their critical thinking skills, working with data while navigating the discomfort of making decisions that go beyond blindly following AI recommendations.

: **Transforming Game Tactics:** Data analytics has completely transformed game tactics in baseball and basketball, and it is also transforming football. With the help of AI, every sport is poised for its great data transformation.

: **Citizen Data Analysts:** An online community of citizen data analysts are developing their own theories and strategies around game tactics, sharing these insights with others. This community is a hotbed of AI talent, contributing to the fast-changing future landscape of sport.

The Great Transformation

AI is set to change how games are played, bringing about revolutionary transformations. Basketball has been reshaped, football is changing, and soon every sport will be poised for its own data-driven evolution.

'A huge number of sports are awaiting their great data transformation,' says Rory Smith. For basketball, the higher statistical probability of scoring with three-point shots rather than two-point shots was hard to ignore. 'Today's game is completely different to what it was in the 1990s.'

Similarly, in football, algorithms indicate that long-range shots are not a reliable technique, leading to a decline in such attempts and an increase in goal-scoring efficiency.

Data-driven insight is making sport more rational and logical, but it also has the potential to transform a game into something more unexpected. New AI tools such as TacticAI from Google DeepMind use reinforced learning to teach a sport to simulated players. 'The machine keeps coming up with ways to win, myriad permutations, some of which have never been seen before,' explains Sportsology chief intelligence officer Chris Brady, who describes sharing these new ideas with the coaches, and if possible, recreating it with players on the field. 'That same day the team can be out on the pitch trying something new.'

Elsewhere, DeepMind's AlphaZero taught itself chess in a morning, reached superhuman levels by dinner and beat the world's best chess computer within a day. This is not just because it can play the game, it is also blind to learnt biases or tradition; it is free to simply reason out the best way, and at times this leads it to come up with bold new moves. While this will enable sports to become more efficient at reaching better outcomes, your favorite sport might also start to offer surprises to its audience.

Could cycling be next? UAE Team Emirates has partnered with Presight (a G42 company) –the region's leading big data analytics company powered by AI – to increase team performance and wins. The coaches are using AI-driven predictive models to simulate various race scenarios and consider variables such as weather conditions, competitor performance and course topography to predict the most likely outcomes of a range of strategic choices.

UAE Team Emirates coach Kevin Poulton explains the crucial role AI played in recent team decisions: 'During a recent stage race, the AI model suggested a counter-intuitive strategy of conserving energy during a seemingly critical segment, which ultimately allowed the team to outpace competitors in the finale.' This strategic insight, derived from complex AI simulations, was not only surprising but also significantly contributed to the team's success in that race. Such new approaches signal a shake-up in the future of the sport.

Trust and Transparency

AI judging is rapidly revolutionizing sports like gymnastics, tennis, F1 and football. Although current VAR technology attracts much criticism, in the next 3–5 years these challenges are likely to be eradicated. AI will support referees as a non-biased virtual assistant, guiding judges to make better decisions.

Judging sport is a fraught with controversy, making it a prime candidate for the accuracy and traceability of AI. A recent Football Supporters Association (FSA) survey found that fewer than a quarter of fans (22.9%) felt the standard of refereeing at games they watch is acceptable. This presents a huge opportunity for AI.

From 2025, ELC Live (Electronic Line Calling) technology will replace line judges in Association of Tennis Professionals (ATP) tournaments. Similarly, the Judging Support System (JSS) was used for every apparatus in the World Gymnastics Championships

in 2023. These advances pave the way for future judging without guesswork and offer a potential new asset for engagement.

According to a recent FSA survey, 80% of fans feel they should be able to hear discussions between the VAR and the on-pitch referee. The details of these conversations are essential content for fans who analyze game intricacies in post-match discussions. AI's ability to provide automated simultaneous translation could make these conversations accessible to global audiences.

Alain Zobrist, CEO of Swiss Timing, has described the use of AI to assist the Olympic diving judges at Paris 2024: 'AI splits the dive in sequences and analyzes it in less than a 10th of a second. And it can be shared with fans in real time, so they better understand where someone gained and lost points.' Understanding the rationale behind the judging is key to increasing audience engagement.

AI imagery by The Future Laboratory

Citizen Statisticians

A vast online community of citizen data analysts are developing theories and strategies around game tactics, sharing their insights for others to learn and improve on.

The abundance of publicly available data and code across the full breadth of the sports sector is fuel for research. Data enthusiasts are tapping into this, and sharing their insights, building their expertise and advancing how AI is used to gain a competitive edge.

'Anyone who has basic knowledge of programming or Excel can work with the publicly available data sets and come up with their strategies,' says Jesse Davis, who describes this community as a hotbed of data analytical talent fresh out of their studies looking for their next role: 'It goes in cycles. There'll be lots of work in the public space; then these individuals all get hired by the clubs and that analysis gets taken in-house.'

Examples include Sarah Rudd, whose forward-thinking work led to her being hired by StatDNA, later acquired by Arsenal; and William Spearman, who presented pitch control concepts at the MIT Sloan Sports Analytics Conference and is now the director of research at Liverpool.

What differentiates these leading data analysts is their ability to harness imagination and vision. Asking the right questions of the data requires creativity and critical thinking. 'There is a human element to doing the right analysis,' explains Davis. 'There's a lot of creativity involved. Some questions are obvious, but many are harder. If you have a good question to ask, then your analysis improves.'

To access cutting-edge tactical AI work, look to this highly informed community and find ways to use it. They can be found on platforms like StatsBomb. com, which has a public repository releasing sports data and encouraging new research and analysis. Similarly, Kaggle, a data science and machine learning community, recently launched the National Football League (NFL's) Big Data Bowl, an open competition that helps contestants get noticed by league clubs.

What this means for:
Strategy and Tactics

: **Become a Master of Judgment:** Future sports leaders need to learn the art of critical thinking. They must use data, but also be comfortable making decisions that go beyond simply following AI recommendations. Academic institutions are increasingly teaching this skill. The Leadership in Sport Master's degree at The Institute for Sports Humanities includes a Management and Decision-Making module dedicated to honing this ability.

: **Hire Super-Communicators:** As data science and sports converge, effective communication between these fields is crucial to unlock the full potential of data. Professor Davis emphasizes the need for AI engineers to figure out their language. Davis believes using video has been key to getting football coaches, players and strategists on board.

'There is a human element to doing the right analysis, there's a lot of creativity involved. Some questions are obvious, but many are harder. If you have a good question to ask, then your analysis improves'

Jesse Davis, professor of Machine Learning Group and DTAI Sports Analytics Lab, KU Leuven

Big Data

Riccardo Musconi, head of trackside performance at Mercedes-AMG PETRONAS F1 Team, on the role of data in the future of sport

How do you collaborate with drivers, engineers, and other team members to interpret and leverage the data to get essentially ultimate performance?

We are all working incredibly hard. And the future of AI is fascinating because that could help take huge chunks and make it very thin so that we can keep getting faster and better and better. We'd start with, how do you collaborate with everyone? And then I'll tell you what, AI could make this a different world.

Formula One is a team sport. We have a lot of experts both at the track and back of the factory looking through a huge amount of data. Everybody tends to be an expert in their own field, so we need to collaborate between a few people to optimise the performance of the car. For example, when you're making a strategy decision, you need to have all the information of how the tyres are behaving and if these things happen separately, your outcome is not going to be favourable. I can see AI helping us in picking up from this huge amount of data, what the important bits are and making them visible to all the people that are involved in making the decision.

It's always going to be difficult. It's always going to be human error. If there was something in place potentially in the future to help streamline those processes or to help interpret that big data more quickly without any errors, then of course it would make for better results.

Formula One is essentially a team sport, with quite a big team. We have engineers both at the track and at the factory, and they tend to be experts in their own fields. So, it's important to have this collaborative working environment where the information is shared. Now humans can make errors, or they cannot pick up on specific events happening throughout a qualifying or the race. So, I can see AI streamlining a bit these processes and capturing important things that humans might miss and also avoiding errors.

How does the speed and accuracy of data analysis impact the team's ability to identify potential overtaking opportunities so planning optimal pit stops or just tire strategies during the race?

During the qualifying on Saturday and during the race on Sunday, it's important to make fast decisions. The data we are collecting is to come through quickly and interpreted in the fastest way possible. That allows you to make decisions that otherwise, if not made in a timely manner, are going to compromise the result.

When you're boxing someone, normally you're watching the window, and you stretch until it gets right there. Now, it's quite difficult to make the decision, if in the last sector somebody is losing time ahead, all of a sudden you can stop. Do it or don't do it. So those are the times where it's difficult to make a decision and having something that reacts a bit quicker than our models, maybe it could be something that would help us.

During the race, we are monitoring with the GPS, what the pitstop window is. So, for a few laps we look at when we're going to have the gap necessary to stop the car and stop ahead of another car. So, all the eyes are on is this little window, but having a very rapid and fast decision when there's a sudden drop of pace out of the car ahead of our car, is crucial to the outcome.

On Sunday, we are constantly monitoring the gaps for a pit stop. So, when we are approaching the end of our tyre life and we need to make this decision, we constantly look at this gap which is fed by GPS information.
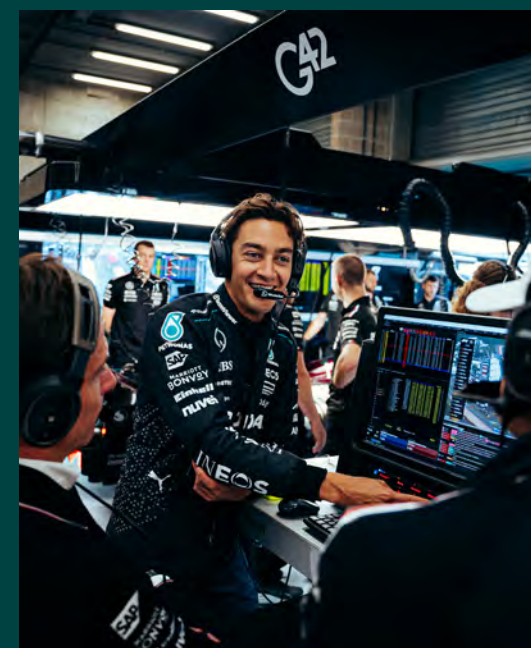
I can see how AI could help us in making the right decision at the right time. Monitoring this gap, but also knowing what the degradation for the two cars is and if there are any yellow flags or any other events happening around the track.

How data and AI has changed the approach…

Well, there's a lot more value, that if there is something not right with the car, if you dig into the data, you're going to find the reason, while before it was not a given. You could have spent hours looking at the little amount of data you had, but nothing was coming out of it. Now I can really identify any problem when it happens, that is going to be there somewhere. In my opinion, the area AI could help us with, is looking into the data. So, finding these trends that a human would take a long time to dig out in the data effectively or solving complex problems, multidimensional problems that as a human, it would take you a long time to identify. While artificial intelligence could really make two plus two in a much shorter time or understand something that is not very obvious to the naked eye.

So, the bigger amount of data we are producing these days on the car, it means that we have certainty on the problems affecting any parts of the car. We know that if there is a problem it is going to be there in the data, we are going to find it.

I can see artificial intelligence being quite useful in identifying trends that would be otherwise quite difficult to pick out to the naked eye of the engineer, for example, delving into huge amounts of data and finding trends that it would take us months probably to discover. And AI could really do two plus two, put the things together and offer us the information straight away without wasting our time.

Mercedes-AMG PETRONAS F1 Team in partnership with G42

AI + Talent

Revolutionizing Team Dynamics

AI is bringing teams together in virtual spaces, enhancing collective performance by predicting team dynamics and discouraging selfish play. The power of the team will be bolstered through AI.

The next generation of AI offers richer insights by considering context, helping coaches and scouts better quantify a player's contribution to the team and discouraging selfish play.

Data analytics in sports dates back to the 1950s, so players have long been aware that their every move is monitored. Unsurprisingly, players sometimes find ways to game the analytics. Manchester City's Pablo Zabaleta was known for boosting his statistics by running sprints during injury breaks.

Today's AI tools go beyond simple data-tracking. The England women's cricket team, for example, uses AI from PSi Technology to inform team selection. Head coach Jon Lewis emphasized the importance of this technology in the 2023 Ashes series draw. 'We can run simulated teams against simulated opposition to understand how those teams may match up,' Lewis told ESPN. 'I can send multiple different line-ups and run about 250,000 simulations per team, considering all the different permutations that could happen during the game. It's not how we select the side, but it's one part of the selection process.'

At a Glance:

: **Global Scouting:** Coaching platforms assisted by AI enable players from across the globe that may not be in professional training, or might not normally be noticed, to be brought to the attention of scouts such as aiScout and Homecourt.ai.

: **Tech-enabled Team-Building:** The market value of metaverse activity is growing exponentially, potentially reaching $4–5 trillion by 2030, according to McKinsey & Co. Geographically dispersed teams will meet in digital spaces to build bonds, conduct training and deepen team solidarity.

: **Mental Health Support:** AI chatbots such as mental health app Wysa will become more prevalent in wider society over the coming years, and are likely to be part of an athlete's high-performance toolkit to manage anxiety.

New AI apps level the playing field

Billy Beane revolutionized baseball talent recruitment in the 2000s by re-evaluating player statistics and filling his Oakland Athletics team with undervalued but brilliant players. This approach, highlighted in Michael Lewis's 2003 book Moneyball: The Art of Winning an Unfair Game, marked a shift toward data-driven talent recruitment. New AI scouting apps promise to enhance this potential.

AI-assisted coaching platforms enable scouts to discover players from around the globe, including those not in professional training or typically noticed. Apps like Strava could engage global audiences to compete against each other in activities like running marathons, even if they are geographically dispersed.

'AI is going to help lift the game,' explains Thomas Pramotedham. 'To find more good athletes, you need to give more opportunities to the wider community. You could have the world competing in running, cycling or rowing, using analytics and AI to filter out the noise and find the talent.'

: **AiScout:** Lets athletes record themselves performing a carefully designed set of drills, compare themselves to others globally and get a call if their numbers hit the mark.

: **Homecourt.ai:** A personal skills trainer that captures performance, provides guided feedback and features a virtual scouting tool sharing workout history and shooting data with scouts.

: **ScoutGPT:** SentientSports has designed ScoutGPT, a ChatGPT bot for football scouts, which crunches live data and provides insights based on complex analytics, speeding up decisions on a player or team.

Homecourt.ai, USA
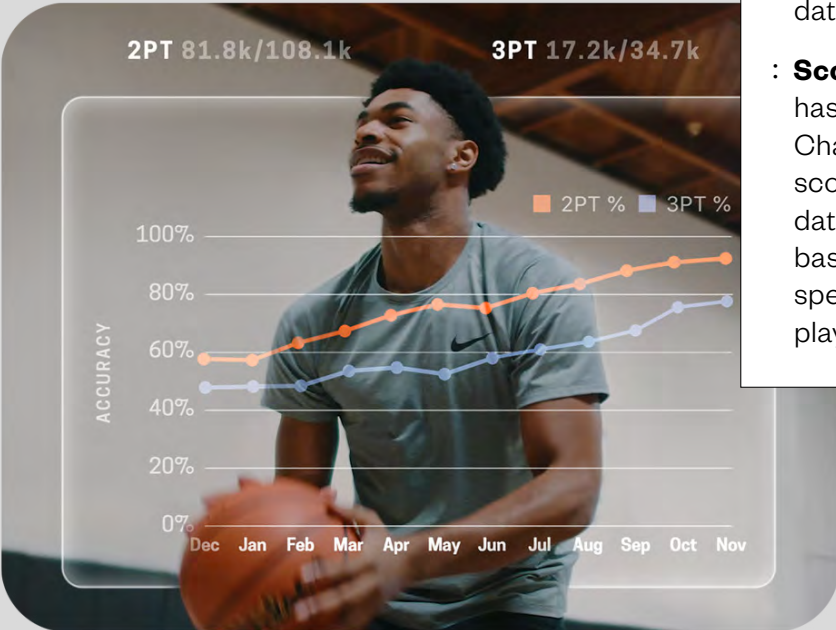
Augmented Analysis

Advances in AR and VR technology, coupled with AI, are ushering in a new era of spatial computing that is enhancing how athletes perform on and off the course – enriching the power of the team.

The next digital era will be more collaborative and human-centric, using immersive technologies to bring people together rather than isolating them on their personal devices.

For Analog, this future will be experienced through holographic images and real-time data visualizations. The new technology can be used in multiple ways for professional teams and fan engagement. It captures performance data in real time and projects it as a holographic image, either live or after an event, to assist team analysis or enhance the fan experience. As CEO and founder Alex Kipman explains: 'Analog can be used in post-action review. We want to be able to go back to the performance as a team, sit around a holographic table, analyze what happened and discuss what went well or didn't.'

AR glasses are also being combined with AI to provide enriched information during play. Psychologist Dr Fabio Richlan explains: 'You can imagine being in the stadium, so you'll have the real perception but with additional information overlaid on top via smart glasses. You could see a virtual arrow or zones where you have to make your move; if you do this during practice, athletes can retain that insight when in competition.'

Chinese firm Oppo recently launched its Oppo Air Glass 3, equipped with a voice assistant powered by Oppo's LLM, AndesGPT. Similarly, Stanford University researchers have created a prototype augmented reality headset that uses holographic imaging to overlay full-color, 3D moving images on regular glasses. As easy as popping on a pair of glasses, the headset provides an enriched world overlaid with full-color 3D computer imagery.

The Olympic Metaverse

The future of remote sports training will be turbocharged through the convergence of complementary technologies: the metaverse, virtual reality and AI translation.

Geographically dispersed teams will meet digitally to build bonds and strengthen team solidarity as innovation in immersive virtual spaces brings emerging technologies into widespread commercial use over the next 3–5 years.

Despite risks associated with cryptocurrencies and non-fungible tokens (NFTs), the market value of metaverse activity is growing exponentially, according to McKinsey & Co, potentially reaching $4–5 trillion by 2030 – roughly the size of Japan's economy. McKinsey & Co attributes this to the metaverse being a 'combinatorial technology' blending elements of AI, immersive reality, advanced connectivity and other fast-growing technologies.

'If I get asked to do a coaching masterclass in Indonesia, I can say: 'I'll run a training group and I can talk to you in 10 languages and share what I've learnt and we won't have to even get on a plane to attend',' says Peter Keen, director of sport advancement at Loughborough University.

Advances in AI-powered dubbing software are already allowing actors and podcasters to speak to foreign audiences instantly and in their own voice. According to The Economist: 'It will soon be standard for video to be edited so that their lips match the new language too.' With this technology becoming more accessible, it will enhance communication in sports: between coaches and their teams, between players of different nationalities, and between athletes and their fans.

Sports such as American football, where teams undergo extensive classroom training before the season, will find this particularly transformative. As Chris Brady notes: 'American footballers spend 4–5 weeks in a classroom before the season starts, learning all the plays because they must know these by rote. AI has the potential to speed up this process. Why can't you have an app which you give them showing the 28 plays they're going to use?'

Athlete Anxiety

AI tools and AR and VR will be used to support athletes to relax, talk through their mental blockers and escape the pressure pre- or post-performance.

Maintaining the mental health and focus of athletes is crucial for coaches to maximize their talent. Panic attacks, burnout and depression can significantly derail a career.

Olympic gymnast and gold medalist Suni Lee recently spoke openly about the performance anxiety she suffered. She told Texas TV station KPRC 2 in an interview about her stellar performance in which she beat the likes of Simone Biles to emerge as the unexpected winner at the Tokyo Olympics 2021: 'I woke up that morning with an anxiety attack.' Gymnastics, known for being one of the most mentally demanding sports, could be a prime candidate for AI-assisted therapy. This is a rapidly advancing area in AI research, with the AI in mental health market expected to grow to $10.3bn by 2032, increasing at just over 30% each year from now to then.

In a new research project from Stockholm University, researchers are developing an AI system that can read emotions. The main purpose of this research is to develop an AI tool that will serve as an advisory aid to psychotherapists. The tool can track a client's emotional development over time, making its application in sports psychology an obvious choice to improve athletes' psychological wellbeing.

'One of the key applications for AI in sports is the wellbeing and performance of athletes – in particular supporting mental health,' says Ilario Corna, chief information and technology officer at the International Olympic Committee (IOC). Already this formed a key part of the IOC's duty of care to its accredited athletes for Paris 2024, who were shielded from online abuse on public social media accounts by a monitoring system that used AI to identify and mitigate abusive messages and flag them for removal, in many cases before the athlete was confronted with the harm, thereby avoiding any negative impact on their performance.

While an AI therapist might sound superficial, a recent study by psychologists from Stony Brook University, New York, the National Institute of Mental Health and Neurosciences, India, and chatbot Wysa, found that some patients are more comfortable opening up to a chatbot than confiding in a human being. The research also showed how patients developed a bond with their bot even though they were fully aware of it being an AI. User transcripts included phrases like 'Thanks for being here' and 'I appreciate talking to you'. AI chatbots will become more prevalent in wider society over the coming years and are likely to have a place in an athlete's broader suite of high-performance tools.

What This Means for: Talent

: **Own Your Data Footprint:** All athletes will amass valuable data traces that are crucial for their careers and insightful for their agents and managers. But who owns that data? 'People need to feel in control of their data and, ultimately, athletes should always own their own data,' says Analog's Alex Kipman, who suggests always following GDPR standards even in currently unregulated fields.

: **Be Ready to Capitalize on the Long View:** Recruiters and team strategists will experience a significant enhancement in their tactical abilities as their access to longitudinal data increases. 'You don't have a longitudinal data set yet, but once you start to get that you will be able to really get more out of the data and use it for long-term decision-making,' says professor Jesse Davis.

'One of the key applications for AI in sports is the wellbeing and performance of athletes – in particular supporting mental health'

Ilario Corna, chief information and technology officer, International Olympic Committee (IOC)

AI + Engagement

Enhancing Fan Experiences

As AI becomes more emotionally intelligent, it will transform the audience experience across categories, particularly sport.

With immersive content, emotionally attuned messaging and hyper-personalized experiences, the future of sports entertainment will deepen engagement and leave fans eager for more.

The advance of technology, especially AI, deep learning algorithms, cloud and edge computing, and natural language processing, will provide fans with a sense of individual attention and intimacy, breaking the fourth wall to make them part of the action.

'AI allows us to create a new asset and a new level of engagement with the audience, which would never have been possible before,' explains Benn Achilleas. 'From the generative side, we're able to produce a vast amount of content, hyper-personalized for each specific audience – something positive for the fans.'

Audience consumption patterns are changing, with 77% of Gen Z and 75% of Millennials saying they prefer to watch sports outside of venues, compared to 53% of Baby Boomers and 32% among the over-70s. With the cost of tickets to live events being cited as one of the barriers to attendance, organizers are looking for new ways to deepen the in-stadium experience and exceed fans' expectations. The ability for AI to assimilate data across a fan's history and tune into their individual likes and needs will transform the fan experience in unimaginable ways.

At a Glance:

: **Breaking the Fourth Wall:** The advance of technology, especially AI, deep learning algorithms, cloud and edge computing, and natural language processing, will provide fans with a sense of individual attention and intimacy, breaking the fourth wall to make them part of the action.

: **Interaction with AI Clones:** British athlete Hannah England recently had her voice cloned by AI to create Hannah-bot. This technology will also one day be able to deliver personalized updates, tailored to an individual's preference, using AI-generated content to bring favorite players or commentators to life for every fan.

: **Real-time Updates and Personalized Content:** When it comes to how generative AI can improve engagement, real-time updates (40%) and personalized content (36%) are top priorities for sports fans aged 18–29, according to a study by Morning Consult for IBM. Mindfly, for example, has created AI-enabled vests with cameras attached to enable fans to experience a game from the point of view of any player.

Interactive Fan Communities

With new expectations for sports engagement, younger audiences increasingly want their favorite sports teams to provide interactions and community involvement comparable to those in other sectors.

SailGP, the international sailing competition, announced the launch of its first ever fan-owned team for Bermuda and the Caribbean in 2023, run as a decentralized autonomous organization (DAO). Fans have the opportunity to become founding investors in the team, collaborate with fellow fans and owners on proposals and vote on key team operation decisions.

The goal for SailGP's senior vice-president of strategy and commercial Ben Johnson is to deepen the connection between the community and the sport. 'When we look at something that's new for our fans, we really want it to be genuinely additive,' he explains, 'whether that's the experience on-site or whether that's the access they get to the organization across the athletes and reflected at the events.'

Sport Buff, which works with leading sports broadcasters to increase interactivity throughout a match, describes how important it is for today's fans to feel part of the experience. Younger viewers don't want to sit passively consuming the game. This is where AI is stepping in to tailor content right down to an audience of one.

'Using AI, we can create polls in real time based on the live sports data,' says Sport Buff's Benn Achilleas. 'The AI can optimize and personalize that content for you, based on your personal interests: perhaps you like predictions or you prefer a quiz. Or it can focus on your favorite player. AI allows a personalized experience that you wouldn't be able to achieve at a human level.'

'Using AI, we can create polls in real time based on the live sports data. The AI can optimize and personalize that content for you, based on your personal interests'

Benn Achilleas, CEO and founder, Sport Buff

Sorare, France

Re-inventing Live

Today, sensors on players and cameras around pitches and arenas provide up-close footage and real-time data capture. But advances in drone technology will elevate this experience to new heights in the future.

Not all fans have the same interests, and this is where AI will be utilized to provide a personal viewing experience, attuned to each individual fan's preferences. As the IOC's Ilario Corna explains: 'AI will customize the viewing experience by offering unique camera angles, personalized highlight reels and tailored commentary.'

When it comes to how generative AI can improve engagement, real-time updates (40%) and personalized content (36%) are top priorities for sports fans aged 18–29. It's a level of personalization that would require a staggering human workforce, and even then would be impossible without a delay. With AI, personalization can occur in real time across markets, instantly translated into the relevant language.

Content platforms such as Netflix currently provide recommendations based on preferences and past interactions. Generative AI is augmenting this format by analyzing individual fan preferences and audience viewing to create highly personalized content. Mindfly has created AI-enabled vests with cameras attached to enable fans to experience a game from the point of view of any player. Fans will be unified watching the action, but each will have their own preferred lens on the play.

Drone technology is also advancing at pace to deliver eye-catching camera footage and keep fans on the edge of their seats. A team of researchers at Delft University of Technology have developed a drone that is based on the lower data and energy requirements of animal brains rather than the need for greater battery and hardware for current drones whose deep neural networks run on graphic chips. The researchers suggest further developments of this technology could enable the leap for drones to become as small, agile and smart as flying insects, capturing the minutiae of an athlete's facial expressions or their technique.

The US Government Accountability Office recently reported on its use of swarms of drones. Borrowing from swarm intelligence, inspired by the collective behaviors of insect colonies and flocks of birds, they used AI techniques to respond to new situations without the need for human involvement. This would make viewing a fast-moving game or race a thrilling experience for fans with few of the health and safety concerns associated with the size and weight of today's autonomous flying devices.

Red Bull is already working in this area. It captured spectacular footage of Max Verstappen during its recent Silverstone filming day from an overhead drone that tracked the car over an entire lap. The Red Bull Drone 1, developed by Red Bull's Advanced Technologies division, might reach F1 speeds of 220mph and there are hopes to live-stream an entire race one day.
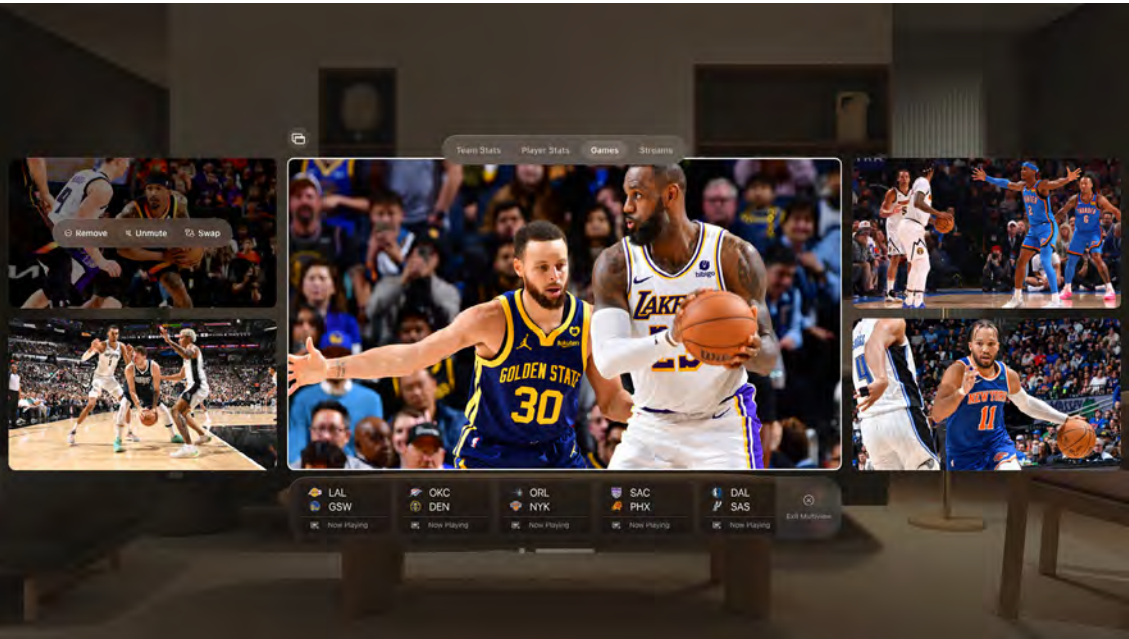
The National Basketball Association (NBA) and Major League Baseball (MLB) in partnership with Apple Vision Pro, US

Virtual VIPs

AI voice impersonation and video generation tools, when used with legal permission and clear labeling, can delight fans with personal video footage or holographic projections. This technology is likely to transform live sporting events and sports broadcasts, offering unique and immersive experiences.

Personalized, AI-generated content will be used to bring favorite players or commentators to life and deepen fan engagement – talking directly to the fans, and making them feel like a hero for the day.

'We can create personalized video messages based on just 30 minutes of audio from an athlete,' says Benn Achilleas about a collaboration between Sport Buff and AI company Elevenlabs.io. 'These stars are time-poor and can only commit to so many sponsor activations or activities for their club, but with AI we can build this package for them and deliver more sponsor activations without taking up the athlete's time.' While this technology has been used to develop deepfakes, in the right hands it has the potential to give fans an unforgettable, immersive and unique experience.

Former British athlete Hannah England recently had her voice cloned by AI. Hannah-bot was used to deliver updates from the European Team Athletics Championships in Poland in 2023. Similarly, IBM's watsonx AI platform has been trained in specific tennis language to offer AI-generated audio commentary and captions in its online highlights videos made available through the Wimbledon tennis app.

The next level of this will be emerging formats similar to the Abba avatars that have been a sell-out success in recent years. Or they might be like Meta's celebrity chatbots, whose artificially rendered avatars of Snoop Dog and Kendall Jenner are already delighting their fans and giving a taste of the future of sports entertainment. This presents huge opportunities for this personalized immersive content to elevate the arena experience too, particularly in marketing, inviting attendees to purchase some merchandise they or a loved one was previously viewing online, or responding personally to fan requests via social media accounts for AI-generated influencers such as @its.ariadne.silver.

What this means for: Engagement

: **Use Premium Offers to Deepen Fan Engagement:** Today, fans of Tottenham Hotspur pay a premium for a thrilling view through Perspex glass, watching their favorite players travel from the locker room to the pitch. In cricket, fans pay extra for an earpiece to listen to conversations between the referee and players. AI will assist in creating future assets that fans will be willing to pay premium prices to experience. Imagine a holographic welcome from Jude Bellingham when you arrive at the stadium to watch a Real Madrid game.

: **AI-generated Content Rights:** AI-generated video or voiceover content will become ubiquitous, making it a key component of future rights agreements and meaning the ethical sourcing of that content will be key to retaining talent trust. Fans will also need to be fully aware if they are interacting with an AI bot. As Hannah England recently told the BBC in relation to her Hannah-bot: 'We're not trying to trick people. The authenticity is important, and we want to protect that.'

AI + Health and Performance

Unlocking Athletic Excellence

At a Glance:

: **Real-time Biomarker-Tracking:** AI tools that track biomarkers in real time pre- and post-competition, or use digital twin technology to simulate performance, will enable leaps in an athlete's performance and recovery, and crucially, minimize injury.

: **Digital Athletes:** The Digital Athlete is a joint effort between the NFL and Amazon Web Services (AWS) that uses AI and machine learning to build a complete view of a player's experience, so coaches can accurately measure what individual players need to stay healthy, recover quickly and perform at their best.

: **Digital Twin Diagnostics:** Tata recently announced a partnership with French tech developer Dassault Systèmes to produce a digital twin heart, mimicking the flesh-and-blood heart of Olympic marathon runner Des Linden. Using AI-analyzed data from CT and MRI scans, the avatar organ can simulate her heart rate, blood flow and oxygen levels, providing instant feedback to adjust training and competition.

Innovation from the world of longevity and sports science provides a new suite of tools for coaches and athletes to aim for new peaks in human performance.

AI is transforming medicine and the biosciences, offering insights that will enhance our understanding of the human body and its capabilities.

Sport has always represented the best of human capability, advancing in tandem with human progress. Sporting excellence has now reached new heights using insights across nutrition, physiology, psychology and strategy, and an athlete's training program is managed to the finest detail to gain an advantage.

The Digital Athlete – a joint effort between the NFL and Amazon Web Services (AWS) – uses AI and machine learning to build a complete view of a player's experience, meaning coaches can accurately measure what individual players need to stay healthy, recover quickly and perform at their best. The tool gathers data from real-time location, speed and acceleration data for every player, each time they play and on every inch of the field. It also draws from video filmed during games and practice sessions along with sensors around the stadium that record performance metrics from tracking devices embedded in players' equipment.

AI and machine learning algorithms use these inputs to run millions of simulations of NFL games and specific in-game scenarios to spot which players are at the highest risk of injury. The findings will allow NFL teams to develop individualized training and recovery regimens and help prevent player injuries.

Digital Athletes

AI tools that track biomarkers in real time pre- and post-competition, or use digital twin technology to simulate performance, are improving athletes' abilities, enhancing recovery, and crucially, minimizing injuries.

'AI is already across all areas of sport assisting with injury predictions, recovery regimes, looking at historical data and how to maximize the athlete. You can model everything, right down to the tiniest details,' says Chris Brady. Digital twin technology is one example revolutionizing how to model performance and training by creating a virtual replica of the athlete to simulate, predict and improve real-world outcomes.

Tata recently announced a partnership with French tech developer Dassault Systèmes to produce a digital twin heart, mimicking the flesh-and-blood heart of Des Linden, an Olympic marathon runner and winner of the 2018 Boston Marathon. Linden's avatar organ, created using AI-analyzed data from CT and MRI scans, can simulate her heart rate, blood flow and oxygen levels, providing instant feedback that can be interpreted to adjust training and competition, with obvious benefits to performance.

Dr Srinivasan Jayaraman, the principal scientist on the project, explains: 'We want to understand what a safe zone is for Des's trainer to put her through,' so instead of having her run on a treadmill or outdoors, 'we can run simulations using her digital twin heart to vary different cardiovascular parameters and fine-tune her training'. For Linden, it's win-win. 'Being able to map out [my training] and see the gains and drawbacks ahead of time will allow me to work smarter, not harder,' she says.

New research on the microbiome promises to provide additional insights for coaches and athletes to gain an edge through tweaking the unique make-up of the bacteria in their gut.

'Research is looking at how the microbiome varies depending on the sport the athlete plays. We're investigating if this can help us identify species to see whether these could be promoted in the future to help performance, and would obviously be different for rowers, footballers or cyclists, for example,' says Farah Hillou.

While in its infancy, precision microbiotics offers huge potential to athletes, particularly given the negative effect extreme exercise can have on an athlete's microbiome. 'A lot of athletes struggle with digestive issues, in training or during competition,' says Hillou. 'Precision microbiotics could be used to support the gut for better performance outcomes.'

AI Opponents

If a player feels intimidated by their opponent, it can adversely affect their performance. AI tools are stepping in to augment training by recreating the pressure and aggression of a live game.

Advances in motion sensors, robotics, geospatial positioning and reinforced learning will usher in a new era of robo-opponents. Abu Dhabi recently hosted an event pitting a self-driving car against Formula 1 driver Daniil Kvyat. Although Kvyat easily finished first, future advances in AI-powered vehicles could lead to the Abu Dhabi Autonomous Racing League becoming a practice ground for future F1 stars, who might compete against simulations of their opponents.

'We believe that there is an opportunity for leveraging the technology that has been developed in autonomous robotics and AI to develop the co-piloting capability that we can put into road cars that will prevent accidents occurring'

Tom McCarthy, executive director, ASPIRE

For now, the Autonomous Racing League is all about road safety, as Tom McCarthy, executive director of ASPIRE, part of the Abu Dhabi government's Advanced Technology Research Council, says: 'We believe that there is an opportunity for leveraging the technology that has been developed in autonomous robotics and AI to develop the co-piloting capability that we can put into road cars that will prevent accidents occurring.'

While the technology is in its infancy, it represents a critical step in the integration of autonomous vehicles into the everyday by training the autonomous cars to perform reliably at extreme speeds with a built-in contingency for normal day-to-day traffic.

For Matthew Gombolay, associate professor of robotics at the School of Interactive Computing at the Georgian Institute of Technology, Georgia Tech human-scale robots have a future performing the role of opponent in sports and athletic training. 'Training against an opponent is psychologically more stressful,' says Gombolay, who developed the ESTHER bot, a wheelchair tennis robot with a tennis racket connected to a single arm that can rapidly cover both sides of the court.

Gombolay and his team arranged a network of high-resolution cameras around a tennis court and used computer vision algorithms, a field of AI, to help ESTHER recognize an incoming tennis ball. ESTHER stands for Experimental Sport Tennis Wheelchair Robot, the name is homage to renowned wheelchair tennis player Esther Vergeer and gives an indication of future training equipment. As Gombolay predicts: 'I could have it pretend to be the one guy I always lose to because he can exploit this weakness in my game.'

As the quality of opponents increases, so too will the chance of breaking world records. DriverBot, a Google Cloud-developed generative AI recently helped Formula E driver Jake Hughes smash the indoor land speed world record. DriverBot harnessed real-time data from the car, alongside historic race data, to help Hughes and his engineers beat the existing world record by more than 50km per hour, offering a taste of future sporting feats.

'AI is already across all areas of sport assisting with injury predictions, recovery regimes, looking at historical data and how to maximize the athlete. You can model everything, right down to the tiniest details'

Chris Brady, chief intelligence officer at Sportsology and author of AI for Sports: AI for Everything

AI Imagery by The Future Laboratory, UK

The Athletic Brain

AR and VR technology, powered by AI algorithms, are being used in training to enhance an athlete's natural mental ability to visualize, focus and train.

Sporting achievement requires a combination of physical strength and ability, plus the cognitive skills to memorize, focus and visualize. These are inherent capabilities of the human brain. Now advances in emerging technologies such as AR, VR and AI are augmenting how an athlete can access these skills and build that capability.

'VR or AR in practice enhances the brain's natural ability to learn, imagine and commit to memory. It provides assistance and then the athlete's brain does the rest,' says the University of Salzburg's Dr Fabio Richlan, who is keen to stress that the new tech tools are simply enhancing a human's natural ability rather than replacing it.

A huge part of an athlete's performance is down to mental preparation before a competition. This might involve visualizing their walk from locker room to pitch or imagining the intricate details of their successful performance. While this has always been a part of the routine, advances in VR are boosting an athlete's imagination skills, allowing them to turbocharge their natural ability to find their flow and prepare for a win.

Likewise, insights on the role of visualization to enhance performance have led NFL and National Collegiate Athletics Association (NCAA) athletes to use immersive learning technology from Strivr to undertake thousands of repetitions in virtual environments, to prepare and train without having to incur any physical load. AI is a crucial component in these virtual simulations, working with the data to continually offer new scenarios, some of which players will never have seen before.

According to Strivr, players training with the tool have logged thousands of hours in virtual reality and reviewed more than 50,000 plays and scenarios. Strivr claims its software has helped to improve reaction time, pattern recognition and the decision-making process of athletes when performing in high-stress situations.

'VR affords the end user a learn-by-doing experience that is scientifically proven to be more effective than traditional 2D methods,' explains Derek Belcher, CEO and founder of Strivr. Immersive approaches will increasingly be part of a professional sport's team's training toolkit.

What this means for:
Engagement

: **Focus on Enhancing Real Humans, not Super-Humans:** Sportsmanship will continue to revolve around the natural abilities of humans. While emerging concepts like the Enhanced Games attract media buzz, it's likely that people will find the competition boring if the playing field no longer feels fair or within the bounds of human capability.

: **Sharing Metrics and Analytics is Key to Align Expertise:** AI is providing dashboards and connected health records, assisting with a holistic, integrated approach. This allows performance coaches, mental health practitioners, fitness coaches, nutritionists and other team members to work together for the athlete's benefit.

AI Coach

UAE Team Emirates coach Kevin Poulton on new strategies to gain an edge

Cycling generates a vast amount of data captured via power meters, heart rate monitors, GPS devices and other sensors. It's a perfect match for AI and machine learning capabilities. This allows UAE Team Emirates coaches to observe patterns that were not immediately apparent through traditional analysis. In the future, AI will become an indispensable part of the training by coaching teams, offering new strategies that lead to optimal performance.

Automated Data Analysis: AI automates data analysis so coaches can focus more on strategic planning, athlete interaction and other critical areas. AI systems can analyze training data overnight and provide the team with practical insights by the morning, saving hours of manual data-crunching.

Improved Recovery Times: AI analyses have shown that targeted, high-intensity training sessions can be more beneficial than prolonged, lower-intensity sessions. AI has identified that certain riders perform optimally with reduced training volume but increased intensity. This has led to better race results and quicker recovery times. It's an insight that has completely changed our training approach, so we focus more on quality not quantity.

Ask It Anything: AI enables dynamic and interactive analysis rather than static charts and graphs. Coaches can now ask specific questions and receive tailored insights. If a coach wants to know why a cyclist's performance dipped during a specific segment of a race, for instance, AI can quickly analyze multiple variables and provide a comprehensive explanation.

AI + Design

Boosting Design and Development

AI's ability to fast forward the iterative design process makes it a natural tool for innovation.

The real value that AI brings is how it accelerates innovation in the design phase, speeding up the process that would be heavy going for humans, but takes no time for computers. Some 45% of global organizations agree, and they plan to re-invest the savings from generative AI back into innovation.

The final decisions and expertise will always come from the domain experts working with this new technology. AI will not only advance design innovation in unimaginable ways, but it will also improve the job of design teams, giving them more time to focus on creativity.

'We can design it at super-speed,' says Chris Brady. 'What we are doing now is supercharging analytics, taking it out of human hands because the machine can do it a lot quicker, so the human talent can focus more on the design. Using data points to create the best tennis racket is something the computer can do in seconds, then the designers and engineers can get on with testing it.'

At a Glance:

: **Improving Experience Design:** AI is augmenting experience design. Venue Twin from event design platform OnePlan, for example, provides a fully interactive, centimeter-accurate 3D digital twin of any venue. Operationally, AI will assist with efficient crowd management, reduced waiting times and a smoother in-stadium experience.

: **Personalized Equipment:** Xonic Golf app assesses a golfer's swings using computer vision AI algorithms to offer personalized PGA Pro tips based on biomechanics, akin to having an expert caddie by one's side. The next step will be to offer a personalized golf club design finely attuned to that individual's specific style of play.

: **Revolutionizing Product Development:** AI-assisted material development will revolutionize product design from automotive to sports equipment and will affect how sport is played. Microsoft recently worked with scientists at Pacific Northwest National Laboratory (PNNL) in Richland, Washington, and has identified a material that could replace 70% of the lithium used in batteries with the abundantly available sodium – as easy to come by as table salt.

Dramatic Design

AI is transforming experience design, using data analytics to enhance the spectacle of play and the stadium experience. Advanced insights deliver surprise, enjoyment and drama in the moment.

The Ultimate Fight Championship (UFC) has partnered with Presight to use its Insights Engine, which measures strikes, kicks and slams in real time. This technology not only enables historical reviews, but also predicts fight outcomes. It has been specifically used to ensure fighters are well matched.

'You use the data to find the middle ground,' says Presight's Thomas Pramotedham on how UFC used its technology to improve the spectacle of play. 'The tool ingested tens of thousands of athlete and fight outcomes to create prediction models. If one was going to win by a 70% to 30% chance, that was not going to be a good fight for the audience. So, we created matches where it was more like 45% versus 55% odds of winning.'

The less glamorous details that go into experience design are also rich in data and ripe for improvement with the help of AI, answering questions like how many burgers are needed in the stadium, how traffic is managed or monitoring water usage and predicting potential leaks.

In response, AI-powered algorithms will help to create deepfake versions of stadiums that replicate physical locations accurately in real time so that experience designers can test new ideas and model the response.

Venue Twin from event design platform OnePlan provides a fully interactive, centimeter-accurate 3D digital twin of any venue offering huge operational and commercial benefits. As the IOC's Ilario Corna explains: 'Operationally, AI can also lead to efficient crowd management and transportation, streamlined ticketing and reduced waiting times, providing a smoother experience for fans attending the event.'

Nike in collaboration with Hyperice, US

Generative Gear

Advances in sensor technology, alongside the ability of LLMs to process data, will usher in a new era of bespoke sports equipment tailored to the individual.

AI will deliver items finely tuned to the need of each athlete – not just their conscious preferences, but also to the inner workings of their bodies. Such details were impossible to detect without the help of AI and an ability to continually iterate at speed.

'Generative design can be applied to any sport that requires an object where the sensors can detect how that individual makes contact and how the object should be altered to suit. This can go all the way to putting the athlete in a wind tunnel to track the data and 3D print a bike for them because they are one of a kind and deserve equipment to match,' says Analog's Alex Kipman.

Today, the Xonic Golf app assesses a golfer's swings using computer vision AI algorithms to offer personalized PGA Pro tips based on biomechanics, akin to having an expert caddie by one's side. The next step will be to offer a personalized golf club design finely attuned to that individual's specific style of play.

Already, professional sports players have their own personalized items. AI will allow this to become personalized further. With the help of AI, consumer brands will be offering personalized precision equipment to sports enthusiasts too.

Nike is developing its own generative AI model to design products using its vast bank of data on athlete performance, one of which is AIR – Athlete Imagined Revolution – which involved creating prototype shoes for 13 of Nike's top athletes such as sprinter Sha'Carri Richardson and French footballer Kylian Mbappé based on their requests and personalities.

As Thomas Pramotedham notes: 'Today you fit golf clubs by hitting 10 balls, but you can extrapolate that with AI so it can take in more data and combine this with insight on what the coach is looking for too. In the end, you get a piece of equipment that is more suited to that individual athlete. Then they play better, hit the ball harder or faster, and overall, the level of the game is improved to become even more competitive.'

Imagine an athlete feeling so in tune with their equipment that it can even interpret their inner thoughts. GrapheneX-UTS Human-centric Artificial Intelligence Center at the University of Technology Sydney (UTS) has developed a portable, non-invasive system that might one day do just that. It can decode silent thoughts and turn them into text. The potential for this type of technology within elite sports such as F1 or motorsports opens up the potential to one day augment the sport in unimaginable ways.

Nike AI model, US

The New Alchemy

Advances in materials research, accelerated by AI, have massive implications for the evolution of sportswear design.

The high demand for rare minerals and sustainability concerns around global resource shortages have put the emphasis on scientists to develop new materials. AI is now being deployed across sectors to accelerate this search.

Microsoft recently worked with scientists at Pacific Northwest National Laboratory (PNNL) in Richland, Washington, and has identified a material that could replace 70% of the lithium used in batteries with the abundantly available sodium. 'Something that could have taken years, we did in two weeks,' Jason Zander, an executive vice-president at Microsoft, told Reuters. The new technology could one day have applications in cars, energy grids and other areas that require batteries.

Using a combination of AI models trained on molecular science data and traditional scientific supercomputers, the tool was able to narrow down more than 32m possibilities to 18 candidates that the PNNL scientists examined to decide which ones to synthesize and test in a lab. Similar processes will take place in R&D labs across the globe over the next 3–5 years, making breakthroughs in materials research.

Innovators are already using AI to run fabric simulations on sports clothing textiles to determine whether new material compositions might provide athletes with a competitive advantage. UAE Team Emirates has recently trialed a competition jersey with an added ounce of silver in the weave, which is said to reduce body temperature.

In tennis, the Hïtëkw tennis racket was designed using text-to-image models like DALL·E and Midjourney. The result is a racket with a lighter and stronger construction that also looks like something out of a sci-fi movie.

AI-assisted material development will revolutionize product design from automotive to sports equipment and will affect how sports are played. This evolution may require games to adapt; for instance, advances in golf clubs are enabling golfers to hit balls farther than ever, making courses feel shorter. Regulatory bodies will also need to adapt to these new material capabilities to ensure a fair playing field is maintained.

What this means for:
Design

: **Identify the Right Problems:** As Chris Brady explains: 'The best results come from having an open genuine conversation about your problem, what you'd like and if the technology is there yet; it might take 10 minutes or it might take three years.'

: **Stay Ahead of Changing Regulations:** With advances in material science, governing bodies need to keep abreast of innovation to avoid technological doping. Staying proactive with changing regulations will ensure that new materials and designs comply with industry standards and maintain fair competition.

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