MDST 4510 Capstone Topics: AI & Society

THE INTERNERT OF BODIES & AI

Redefining The Track: AI's Transformative Impact on The Future of Running

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Abstract

This paper aims to dig deep into how the multifaceted role of AI, within the realm of the Internet of Bodies (IoB), enhances running economy through wearable self-tracking technology and adds value to the study of running biomechanics through performance optimization evaluation. In other words, I want to convey how AI is redefining how athletes train and how they are increasingly delivering successful results due to data-driven performance indicators and algorithms that shape training. My research will communicate how society is shifting towards relying on machine learning for optimization and by narrowing my focus to running optimization I will exemplify the significant promise that AI continues to have on individuals, in this case athletes. The integration of technology and the human body envelops the physical and virtual realms together, forming what is known as IoB, through which I will assess the convenience of having the human body connected to technology as well as the potential harms that come with it. Negative consequences include security concerns and the availability of data that can damage the human body, as well as racial bias in wearable tech. In addition, I will explore how individuals increasingly rely on self-tracking through the lens of how machine learning algorithms and AI are employed in devices that record biometrics and transmit data to the IoB. This investigation will offer a thorough understanding of the growing dependence on technology for personal health and performance monitoring.

Background & Context

i. Defining the Internet of Bodies (IoB)

Imagine a reality where our physical world is an elaborate computer-generated illusion. This concept might ring a bell if you're familiar with 'The Matrix'. Interestingly, our current world is increasingly resembling this narrative. As time progresses, more people are interconnected through the internet, not just digitally, but physically. This has led to the emergence of the IoB, a network where human bodies, and the data derived from them, are digitally interconnected. In other words, the IoB represents a digital collection of bodily data, forming a vast network. This "platformization" of the body is leading to groundbreaking changes in how society develops as a collective, as it is directly transforming society's norms and values, and testing notions of self-governance and individual human agency.[1]

As the human body progressively blends with software, hardware, and algorithms, the line between the human body and the machine begins to blur. A surprising amount of people have become reliant on the Internet for their body's functionality. Given the fact that the IoB occupies a vast spectrum of areas, Andrea M. Matwyshyn, from William & Mary Law Review, has classified the Internet of Bodies into three generations of technologies—body external, body internal, and body melded.[2] For the purpose of this paper, I will focus on the first and second generation of IoB devices, which are those that have already become a familiar presence in our daily lives (Self-Trackers), and those in which a part of the device is implanted within the body or penetrates the skin for access (Digital Pills). Within the realm of the first generation, there are three defining categories - FDA-approved "medical devices," "general wellness" gadgets that are low-risk and encourage a healthy lifestyle (thus not regulated by the FDA), and a range of non-health-related

1 ANDREA M. MATWYSHYN* William & Mary Law Review

2 ANDREA M. MATWYSHYN* William & Mary Law Review

devices used in business, education, and recreation that connect to the internet, either directly or indirectly. [3] Fitness self-tracking devices fall under the second category of this generation of IoB, thus, for the intent of this research, the focus will be on “general wellness/lifestyle” devices specifically. Similarly, in the second generation of IoB devices, while the initial ones were often classified as medical devices by the FDA, later iterations may include devices regarded by their manufacturers as pertaining to a “healthy lifestyle” and nonmedical. This evolution mirrors the progression seen in the first generation, underscoring the expanding scope and impact of IoB technologies on various aspects of human life. The manner in which wellness-tracking devices receive and transmit data through the internet, tethering the body to dual realities, ushers in a new societal model – a hybrid society where computer code and human bodies merge, making the human body a novel platform for technology. This leads to an imperative question: how can society design AI and related technologies in a manner that is both socially responsible and sustainable? This question emphasizes the importance of adopting a considered and equitable strategy while we venture into this new phase of integration between humans and technology.

ii. Embracing and Fearing the IoB

Living with technology that promises to enhance our lives sounds promising, almost positively adding to the narrative of a utopian version of our world that boosts individuals to become the best versions of themselves – much like superheroes. Yet, it's crucial to consider the

3 ANDREA M. MATWYSHYN* William & Mary Law Review

entire narrative and scrutinize any underlying issues within the technology transforming our lives. AI and the IoB pose significant challenges, particularly regarding privacy and personal autonomy.

Having personal data online can be unsettling, but the idea of bodily data on the internet is even more daunting. The Internet of Bodies collects comprehensive aspects of our identity, almost creating a digital clone in the 'cloud'. With self-tracking devices, every recorded activity, or even each step counted towards our daily goal, feeds into an algorithm. We are continuously generating data that not only shapes our digital footprint but also compromises our privacy. Our human beings are often quantified for purposes unknown to us, typically without our direct knowledge or consent. Exploring the two primary outcomes, our data might either enhance AI's machine learning capabilities, creating robust, precise datasets that promote our well-being and encourage healthier lifestyles, thereby helping us become stronger versions of ourselves. Alternatively, it could expose the collective to technological risks and data exploitation.[4]

Consequently, computer code could potentially harm many people on a large scale, aligning with the dystopian narrative often associated with AI. This risk is particularly present if the software is vulnerable and compromises the confidentiality, integrity, and availability of human data.[5] In fact, there is an ongoing discourse about the legal framework for first and second-generation – body external and body internal– devices that are not regulated by the FDA. This raises concerns about the control corporations have over trackers that collect our data and pose a threat to our personal autonomy, particularly our ability to disconnect.

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4 Eleonore Pauwels and Sarah W. Denton - California Western Law Review

5 Eleonore Pauwels and Sarah W. Denton - California Western Law Review

Venturing into philosophical discourse, the concepts of Kantian autonomy and heautonomy are highly relevant. Autonomy is "acting freely according to one's form," but heautonomy goes further, embodying "being the source of the form according to which one acts... literally self-governing." This is especially pertinent in the context of AI data bodies. As an extension of my physical self and a key part of my collaborative future, my AI data body is inherently mine and should be under my control. This viewpoint highlights the need to address the excessive corporate influence on our data and autonomy, stressing our right to disconnect and self-govern. If corporate control diminishes through strict data protection laws and solid software systems, self-tracking technology stands to gain substantially from the idea of heautonomy. In an environment where individual data rights are robustly protected and software systems are secure, users of self-tracking devices can exercise true self-governance.

iii. **AI and Running**

What is the relationship between the Internet of Bodies and running, and where does Artificial Intelligence (AI) fit into this context? At its core, the IoB collects bodily data that is processed by algorithms within these devices. These algorithms analyze the data and, through AI and machine learning, create a feedback loop that enhances device functionality. Delving deeper, Generative AI plays a crucial role by simulating and generating new patterns of data that mimic real bodily responses. This allows for the creation of personalized training programs that adapt in real-time to the runner's performance and physical state. By doing so, it provides tailored feedback to help improve technique, endurance, and overall fitness, effectively bridging the gap between human capabilities and technological advancements. The rapid advances in technology and AI within this realm give rise to a multitude of questions. As we delve into this complex field, several key inquiries emerge:

i. How are the Internet of Bodies and self-tracking devices like smartwatches, which collect and analyze bodily data, reshaping our social norms and personal values, and what impact does this have on our perception of the 'ideal' human being and the daily lives of amateur athletes?
ii. How is AI transforming the assessment of running economy and biomechanics of proper running form, and in what ways is it pushing the boundaries of performance for athletes?
iii. What does the future hold for running coaches in the age of AI, and is it possible for artificial intelligence to replace the human element in coaching?

Methods

For this paper I have organized my research into four categories, each emphasizing a critical aspect of the sport of running. By reviewing literature from sociology of sports, athletic journals, and sports medicine journals, as well as examining specific technologies in the market, I aim to delve into the varied applications of Artificial Intelligence and its future impact on this sport. Through detailed analysis of how bodily data combined with AI can transform athletic practices, I will offer insights into how deeply these devices are integrated into individuals' daily routines and how such innovations are pioneering a new era in the sport. Starting with the First Generation of IoB devices, such as smartwatches and sensors, I will explore how amateur athletes use self-tracking technology to manage their training and daily lives, and examine its broader impact on society as a collective. Subsequently, I will examine the Second Generation of IoB devices, focusing on how digital pills are being utilized, to collect internal bodily data during running. This exploration will highlight how AI aids in digesting this data to enhance our understanding of the physiological processes involved. Lastly, I will move on to reviewing how AI is shifting coaching dynamics. This final segment will explore how coaches are using AI for biomechanical analysis during training sessions to elevate their understanding of the sport. Additionally, it will critically assess whether AI has the potential to replace human coaches.

Data Analysis

i. AI Shaping the Lives of Amateur Runners Through Self-Tracking

Through the systematic monitoring and analysis of real-time data by artificial intelligence in devices such as wearable fitness smartwatches, qualitative aspects of life are converted into quantifiable data. This transformation broadly positions sports technology as a valuable ally in enhancing athletic performance and physical condition, boosting motivation, and preventing injuries. [6] The data collected is then utilized to offer personalized health recommendations, providing individuals with insights into their physiological processes through objective data analysis. By translating daily activities into data points, individuals can directly observe the impact of their actions on their health. Fitness trackers process and analyze the data generated by the user through algorithms, returning it in a form that creates what experts describe as a digitally mediated feedback loop. Studies indicate that regardless of a runner's level of experience, they

6 Karahanoglu, Armagan & Gouveia, Rúben & Reenalda, Jasper & Ludden, Geke. (2021). How Are Sports-Trackers Used by Runners? Running-Related Data, Personal Goals, and Self-Tracking in Running. Sensors. 21. 3687. 10.3390/s21113687.

need this feedback to make well-informed decisions regarding their training and health routines as a strategy to improve their running technique and overall performance. Having guidance in a personalized way helps them reach personal goals and gives them agency over their fitness journey. Hence, the integration of these tracking tools into runners' daily routines is crucial, not only empowering them to succeed but also likely influencing their behavior, which can reshape habits and tendencies.

Anthropologist Josh Berson refers to the term "new intimacy of surveillance" which uncovers a growing set of ethnographic research into the social, narrative, and affective dimensions of actual data practices and experience.[7] Thus, the relationship between individuals and their data transcends mere numerical attributes, encompassing a range of emotional responses from pride to disappointment, and from enthusiasm to frustration, reflecting feelings of control as well as obsessiveness. In their quest for self-knowledge through quantification, amateur runners not only strive to improve their running form but also risk becoming dependent on and controlled by tracking technology to achieve or even exceed specific performance metrics. By quantifying efforts, specific expectations are set based on the metrics generated, dictating how a runner should perform. As such, the sense of agency is displayed by an urge to achieve goals. While fitness technology incrementally becomes a companion in runners' lives, a 2021 study proposed that technology developers should consider the psychological effects of running-related data on runners. [8]

7 Mina Ruckenstein & Natasha Dow Schüll - The Datafication of Health

8 Karahanoglu, Armagan & Gouveia, Rúben & Reenalda, Jasper & Ludden, Geke. (2021). How Are Sports-Trackers Used by Runners? Running-Related Data, Personal Goals, and Self-Tracking in Running. Sensors. 21. 3687. 10.3390/s21113687.

ii. Assessing Biomechanics of Running Form Through Inertial Motion Capture

Running economy (RE) can be described as the steady-state consumption of oxygen ($\dot{V}O_2$ Max) during submaximal exercise. [9] In other words, it is how much energy is required for an individual to run a certain speed for a certain distance, and the less energy wasted, the better an individual's running economy scores are. The amount of oxygen a runner can take in and push to the muscles, and how much of it is placed into good use is essential to become an efficient runner. While training sessions such as "interval runs", "threshold runs" and "fartlek" (Swedish term for "speed play") improve $\dot{V}O_2$ Max levels to score a higher RE, altering the biomechanics of running is crucial for improving energy optimization. Running biomechanics refers to how a person runs, including their posture, stride length, foot strike pattern, and cadence.[10] In the age of AI, wearable sensors have made it possible to acquire real-time biometric data measurements and allow the modification of foot strike patterns – key contributors to achieving a superior RE.

Didier Lopes, a software fusion engineer, has significantly advanced the technology for step detection in human running activities. He developed specialized foot-strike detection algorithms, which were highlighted at the International Conference on Machine Learning Applications in 2022. Pushing the boundaries of real-time bodily monitoring, Lopes pioneered the use of foot-worn inertial sensors that accurately detect the orientation of foot landing patterns. It's crucial to recognize three main types of foot strikes: rearfoot strikers, where the heel touches the ground first; midfoot strikers, where the heel and the ball of the foot land simultaneously; and forefoot

9 INTERNATIONAL FEDERATION OF SPORTS MEDICINE - Integration of Wearable Sensors Into the Evaluation of Running Economy and Foot Mechanics in Elite Runners

10 Dr. Eric Abramowitz, DPT, FDNS – Running Mechanics and Gait Analysis

strikers, where the ball of the foot lands before the heel. [11] The interaction between the foot and the ground plays a critical role in a runner's performance, with studies indicating that forefoot and midfoot strikers often experience fewer injuries and better energy optimization.

Building on these insights, Lopes introduced NURVV Run—smart insoles that utilize AI to identify foot strike patterns and imbalances, offering instant feedback on foot-specific metrics. These insoles employ machine learning models to predict future trends and provide actionable advice.[12] The integration of artificial intelligence with Inertial Measurement Units in these insoles brings unprecedented precision and detail to data collection. Inertial Measurement Units (IMUs) are a type of wearable technology that meticulously measures the motion and orientation of a runner's foot. Utilized to analyze running biomechanics, IMUs incorporate accelerometers, gyroscopes, and sometimes magnetometers to capture detailed movement data.[13] This detailed data is analyzed by AI algorithms, furnishing runners with real-time feedback and insights that help them fine-tune their stride, balance, and overall technique. This not only enhances performance but also aids in injury prevention, revolutionizing how runners evaluate and improve their technique in the field.

iii. Ingestible Telemetric Temperature Pill - Digital Pill

11 INTERNATIONAL FEDERATION OF SPORTS MEDICINE - Integration of Wearable Sensors Into the Evaluation of Running Economy and Foot Mechanics in Elite Runners

12 Didier Lopes - Step Detection using SVM on NURVV Trackers

13 Benson, Lauren C et al. "Is This the Real Life, or Is This Just Laboratory? A Scoping Review of IMU-Based Running Gait Analysis." Sensors (Basel, Switzerland) vol. 22,5 1722. 23 Feb. 2022, doi:10.3390/s22051722

The human body typically maintains a core temperature of around 98.6°F (37°C), but it can significantly increase during physical exertion. This exertion may cause body temperatures to rise as high as 104°F (40°C), leading to overheating. When the body overheats, the oxygen available in the muscles decreases, consequently reducing physical performance as the body compensates for the stress. [14] Thus, the accurate measurement of a runner's core temperature is vital to safeguarding their health and supporting performance optimization.

Second-generation IoB data-tracking pill technology completely reimagines how bodily data is collected. French MedTech company BodyCap developed eCelsius: an electronic pill, approved by the Food and Drug Administration for clinical and research purposes. [15] It continuously communicates real-time core temperature data while preserving comfort and mobility for athletes, transmitting this data to an app via linked smartwatches. By providing continuous and accurate data for an average transmit time of 24-48 hours, the data collected supports smart wearables' alert risk of heat injury. These technologies have been put to the test in environments like marathons and are being studied at institutions such as the Heat Resilience and Performance Centre at the National University of Singapore's Yong Loo Lin School of Medicine to further understand and improve heat strain estimation through wearables. [16]

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14 J. D. Périard, S. Racinais (eds.), Heat Stress in Sport and Exercise, https://doi.org/10.1007/978-3-319-93515-7_3

15 Martin, Valentine. "French MedTech BodyCAP Launches Its 'eCelsius Medical System', a Connected Ingestible Thermometer for Medical Applications in the United States." PR Newswire: Press Release Distribution, Targeting, Monitoring and Marketing, 4 Oct. 2023, mma.prnewswire.com/media/2238451/Full_Press_Release.pdf.

16 Chia, Osmond. "Why Runners Are Swallowing Electronic Pills to Help Build Next-Generation Wearables." The Straits Times, 19 Nov. 2023, www.straitstimes.com/tech/why-runners-are-swallowing-electronic-pills-to-help-build-next-generation-wearables.

Furthermore, the integration of artificial intelligence with this digital pill technology marks a leap forward in personalized sports science. Data collected from digital pills is fed into machine learning algorithms, which analyze the accumulated temperature data to identify patterns and predict optimal conditions for athletic performance. This enables runners to train in environments that maximize their potential. Essentially, BodyCap's eCelsius digital pills are creating a database of runners' temperatures and allowing AI algorithms to efficiently offer real-time insights that prevent overexertion and optimize training. [17]

iv. AI Coaching Mechanisms

One significant question in the athletic community is whether AI can replace human coaches. As the sport of running grows in popularity, emerging platforms are creating online spaces where runners can receive coaching from AI. This trend is particularly notable among amateur runners who are new to the sport and may even turn to tools like ChatGPT for running plans and advice. Moreover, with the continuous advancement of wearable technology, AI has the capability to create personalized training plans based on collected bodily metrics.

Matt Fitzgerald, the creator and head coach of Dream Run Camp [18], a year-round training retreat for runners, questions the reliability and effectiveness of AI tools compared to a human coach. He concludes that the answer is nuanced, being both yes and no. [19] For many individuals,

17 Milne, Keeley. "Runners Are Swallowing Data-Tracking Pills to Create Better Watches." Canadian Running Magazine, 29 Nov. 2023, runningmagazine.ca/the-scene/runners-are-swallowing-data-tracking-pills-to-create-better-watches/.

18 Dream Run Camp, dreamruncamp.com/dream-run-club/.

19 Fitzgerald, Matt. "Should You Allow AI to Coach You?" Strava, 10 Mar. 2024, stories.strava.com/articles/should-you-allow-ai-to-coach-you.

AI coaching has opened a gateway to becoming a runner, especially for those who are unable to access a human coach, it is an affordable alternative. However, Fitzgerald points out that although AI training apps can replicate and sometimes enhance the analytical tasks of human coaches, such as generating and refining performance predictions, they cannot replace the human relational aspect of coaching, which he deems irreplaceable. [20]

While acquiring and understanding a runner's metrics is important, Fitzgerald asserts that running involves much more than just data. If running were solely about planning workouts based on metrics, then indeed, human coaches would face significant challenges competing with AI. However, like many other sports, running requires human connection and interpersonal skills in training for true success. The United States Sports Academy has found that "communicating with athletes" and "motivating athletes" are among the top characteristics contributing to a coach's success, ranking well above "knowledge of the sport" in importance. [21] Thus, AI will never be able to replace the relationship between the coach and the athlete.

Subsequently, it is crucial to note that the effectiveness of an AI training app depends heavily on the expertise of the humans who design it. Not all AI training platforms are reliable and may negatively impact a runner’s performance. Inadequate guidance may cause the athlete to encounter problems that range from ineffective training to the development of injuries. Fitzgerald emphasizes the importance of runners being selective when choosing from AI-powered coaching

20 Fitzgerald, Matt. “Should You Allow AI to Coach You?” Strava, 10 Mar. 2024, stories.strava.com/articles/should-you-allow-ai-to-coach-you.

21 Frost, Jefrey L. “Characteristics Contributing to the Success of a Sports Coach.” The Sport Journal, 7 Jan. 2009.

platforms. [22] He advises that the key is to find a service that offers both AI data analysis and access to real-life human support.

Discussion & Findings

"No human is limited," as demonstrated by Eliud Kipchoge, the fastest marathon runner, who famously completed a marathon in under 2 hours. However, Kipchoge's groundbreaking sub-2-hour marathon would not have been possible without insights provided from his bodily data. The datafication of the human body is pushing the boundaries of human potential, and the different generations of the Internet of Bodies are enabling the era of Artificial Intelligence to expand what is achievable in sports.

Having metrics available at all times fosters a deep reliance on technology among users. Research underscores the health benefits of being connected to a smartwatch that provides real-time bodily data, enhancing decision-making and promoting well-being. Yet, this accessibility has led to a new era where individuals are increasingly dependent on their metrics. In the running community, common phrases like 'If it's not on Strava, it didn't happen' or 'pain is temporary, Strava is forever,' humorously highlight this trend, showing how Strava, a fitness tracking app, doubles as a social media platform for athletes. This dependency on data not only influences personal achievements and community interactions but also raises questions about the ideal qualities valued in athletes today. Such technology was intended to enhance health and performance, but it can sometimes lead to a negative rebound effect, creating an overdependence

22 Fitzgerald, Matt. "Should You Allow AI to Coach You?" Strava, 10 Mar. 2024, stories.strava.com/articles/should-you-allow-ai-to-coach-you.

that may skew our perception of success and ideal standards. This overreliance also sparks a critical debate about agency—whether it is humans or the AI analyzing the data that truly holds control, potentially leading to a dystopian scenario where AI overshadows human intentions. While some view this as empowering, believing they control their data and make autonomous decisions, others see it as a diminishing of human autonomy, with AI guiding choices. As smart devices increasingly dictate training regimes and performance metrics, runners might begin to question whether their achievements are truly their own or largely the result of algorithmic recommendations. These dynamics call to a deeper examination of how IoB is reshaping social norms, expectations, and the conception of the 'ideal' human by challenging what is known to humankind as the limitations of the human body.

Running is a natural human ability, and the sport itself embodies the potential to reach one's peak performance through the perfection of the ideal running form. By examining the evolution of running across generations and the records that surpass previously perceived human limitations, it is clear that technological advancements have played a crucial role in shaping the progressive history of the sport. Research into how elite athletes exceed what was once considered unattainable provides concrete data on biomechanical physiology's crucial role in determining performance outcomes. Evidently, proper running form leads to optimized energy use and a high running economy.

The IoB underscores the importance of biomechanics. As research tells, the rising popularity of technology like smartwatches and body-external sensors, devices like NURVV Smart Insoles are pioneering the efficiency that can be achieved through analyzing and predicting foot strike patterns. The significance of a correct foot strike is often underestimated, yet many running injuries stem from poor foot striking. Thus, the integration of AI in analyzing how our bodies interact with the ground in real-time, and providing precise feedback from sensor tracking data, is groundbreaking. Imagine a run where AI analyzes each foot strike, and immediate feedback is given—this is truly revolutionary. Not to mention the role of digital pills, a body-internal data tracker. Almost seems out of this world and yet we are living in what we thought was a future way ahead of our time. The vast set of databases generated by collected data points is shaping the future of AI technologies by enhancing machine learning algorithms. Having our bodily data accessible in the cloud benefits the sport by allowing for continuous improvement and assessment of running biomechanics. This availability of data not only transforms individual performance but also makes advanced technology accessible to a wider public, encouraging positive changes in athletic performance.

It is clear that AI is unable to replace the human affect we possess. Coaching involves more than just metrics; while they are important for performance outcomes, the true essence of coaching lies in the ability to connect with athletes, instilling strength, confidence, assurance, and motivation. A successful coach is not merely one who crafts the most effective training plans to optimize performance, but one who tailors these plans to fit both the physical and mental states of the athlete, integrating a deep understanding of how performance unfolds beyond metrics. A coach serves as an anchor for the athlete, providing support that an AI coach cannot replicate, particularly in terms of relational attributes. Therefore, the broader discussion should focus on how coaches can integrate AI into their methods and utilize it to enhance their training strategies. By doing so, coaches can concentrate more on the relational aspects, combining critical and analytical thinking to comprehensively address what the athlete needs to succeed.

While the Internet of Bodies has revolutionized running performance with innovations in both body-external and body-internal devices it introduces significant challenges that call for further research. Specifically, rising concerns around data privacy, the psychological impact on mental health due to continuous tracking, and the potential for a technology division among groups highlight the need for future work. These challenges highlight the urgent need for frameworks that establish clear guidelines and regulations on the utilization and ownership of data collected from sports tracking technologies. Questions such as whether the data is considered intellectual property or if it remains under the ownership of the device manufacturers must be addressed. Ethical considerations are particularly critical since bodily data is both intimate and personal, and the implications of these technologies are not yet fully understood. Moreover, the accuracy and reliability of data from IoB devices are significant concerns; it is crucial that these devices provide precise and clinically validated information to prevent misinterpretations that could negatively impact an athlete's performance or health. Regarding mental health, there exists an unexplored gap concerning the potential negative effects these devices could have on well-being in the future. Additionally, further research is necessary to understand how the IoB is contributing to the emergence of a new layer of society, creating a distinct segmentation that categorizes individuals based on their usage of these technologies.

Conclusion

AI continues to demonstrate that our existence increasingly depends on technology, with the world rapidly embracing this era by integrating machine learning into the realm of the Internet of Bodies (IoB). The adoption of devices across the three generations of the IoB has not only enhanced the quality of life but also built a global database of bodily metrics, suggesting a future enriched by accurate predictions that could expand human capacities significantly. However, this optimistic view of human interaction with AI and IoB devices brings with it concerns about human autonomy and the potential for technology to dominate, positioning individuals in secondary roles to AI's control. Simultaneously, while the IoB has introduced significant advancements in running by incorporating both body-external and body-internal devices, it also presents complex challenges that necessitate further research and scrutiny. These include serious concerns about data privacy, the mental health impacts of continuous monitoring, and the risk of a technology divide that could segment certain groups and lead to marginalization. These issues highlight the urgent need for robust frameworks and regulations to manage data utilization, ownership, and the ethical implications of pervasive tracking technologies. This research is critical as we evaluate how deeply AI is integrated into intimate realms. Ultimately my study leads me to conclude that Artificial Intelligence, while demonstrating immense potential to transcend the limitations of the human body—as eloquently put by Kipchoge—also underscores the essential balance we must maintain between technological advancement and the preservation of fundamental human values and autonomy. This balance is crucial as we strive to ensure that the evolution of IoB serves to augment human abilities without diminishing our essence.

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