

The Computational Society Case Study Challenge
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We would like to submit the attached Case Study titled **“Making Athletes out of Gamers and Gamers Out of Athletes- How Technology is Revolutionizing Fitness”** for consideration to 2018 The Computational Society Case Study Challenge. The case study addresses the following topic: **“Computational technologies and well-being: how technology is changing the way we play and entertain”**.

We understand that the submissions will be judged on the criterion mentioned on the computational society challenge page (<http://thecomssociety.com/pages/thecomputationalsocietycasestudychallenge>) and agree to the terms and conditions <http://thecomssociety.com/pages/termsfuse> .

Our work has not been plagiarized or is subject to any other ethical charges. Also, the case study is not being reviewed for publication at another outlet.

Sincerely,

Signature: Andrea Behler

Name: Andrea Behler Date: March 2, 2018

On behalf of :

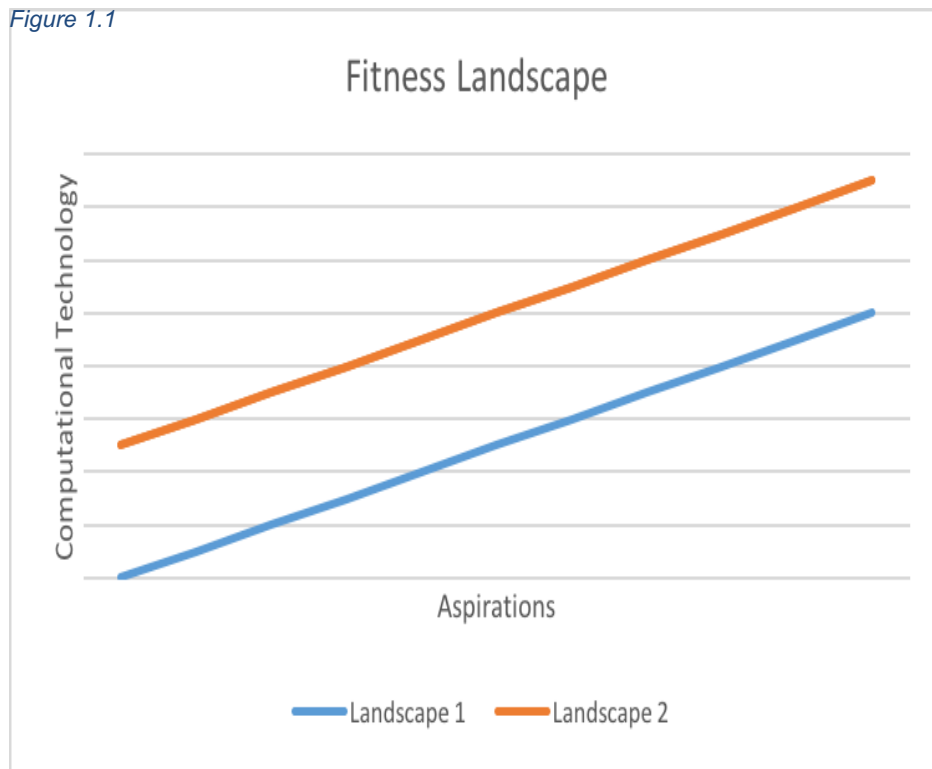
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Making Athletes out of Gamers and Gamers Out of Athletes- How Technology is Revolutionizing Fitness

Context

In the ongoing Digital Revolution and Information Age, computational technologies are promoting and increasing society's overall physical and social well-being. The book

Figure 1.1

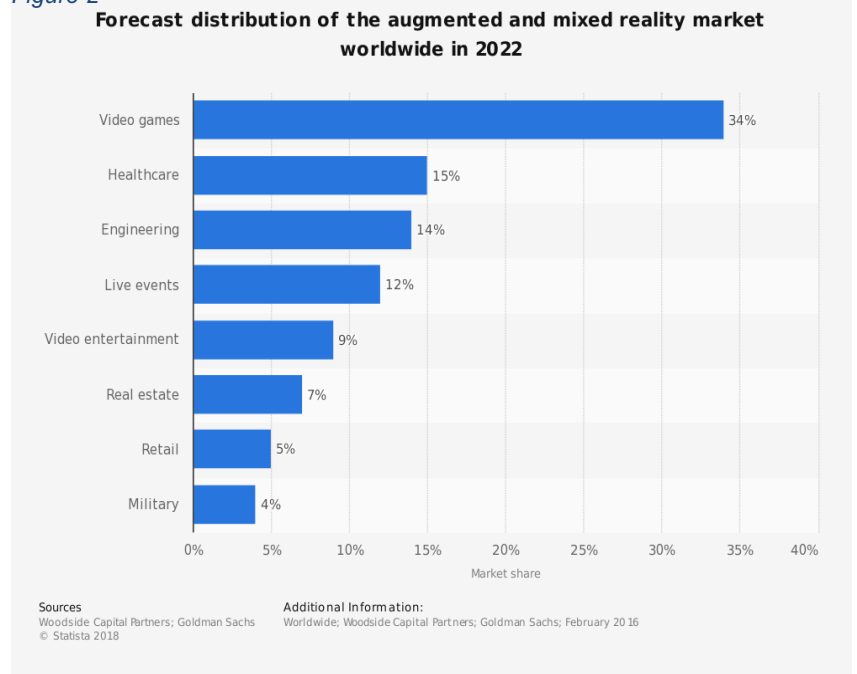


“Computational Technologies and Choices Drive Choice”, outlines a study which proposes a fitness landscape as a linear function of capabilities of computational intensity and an individual's aspirations (Setia, 2018). To move

along the fitness landscape, individuals can either utilize more advanced computational technologies or increase their fitness aspirations. In the following analysis, we propose a positive shift in the fitness landscape that could occur by the immense expansion of computational technology (See Figure 1.1). With the advanced capabilities of Virtual Reality, Augmented Reality, and wearable technologies in the near future, individuals can draw on these technologies, both in the sports industry and entertainment/ recreation arena, to create a positive shift in their personal fitness landscapes.

According to Goldman Sachs Global Investment Research (*Augmented Reality Market Report*, 2016), two of the most highly anticipated markets for VR/AR Applications are Video games and Healthcare (See Figure 2). Video games are forecast to constitute 34% of the mixed reality market, with healthcare forecast at 15% of the total market.

Figure 2



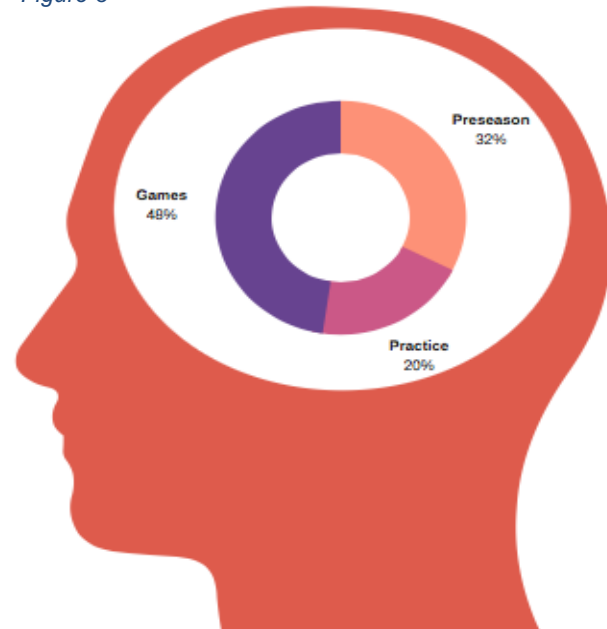
Thesis: New advances in augmented reality (AR), virtual reality (VR), and wearable technologies are helping professional athletes, fit individuals, and inactive individuals realize a superior well-being. When leveraging these technologies efficiently, all three demographics can transform their fitness aspirations.

Problems

Problem 1: Professional Athletes’ Undetected Injuries Lead to Long-term Repercussions

Athlete well-being is a top priority to themselves and their coaches. Concussions are a growing level of concern in all levels of athletes, specifically football players.

Figure 3



During the 2017 NFL season, there was a 15.6% increase in concussions league wide, compared back to the 2016 season (Nation, 2018). **Figure 3** shows NFL percentages of where concussions happened. Concussions are very hard to diagnose, and if they go undetected it could lead to future brain damage and long-term repercussions.

Problem 2: Individuals Are Not Realizing Their Fitness Goals and Aspirations

Figure 5



Figure 5

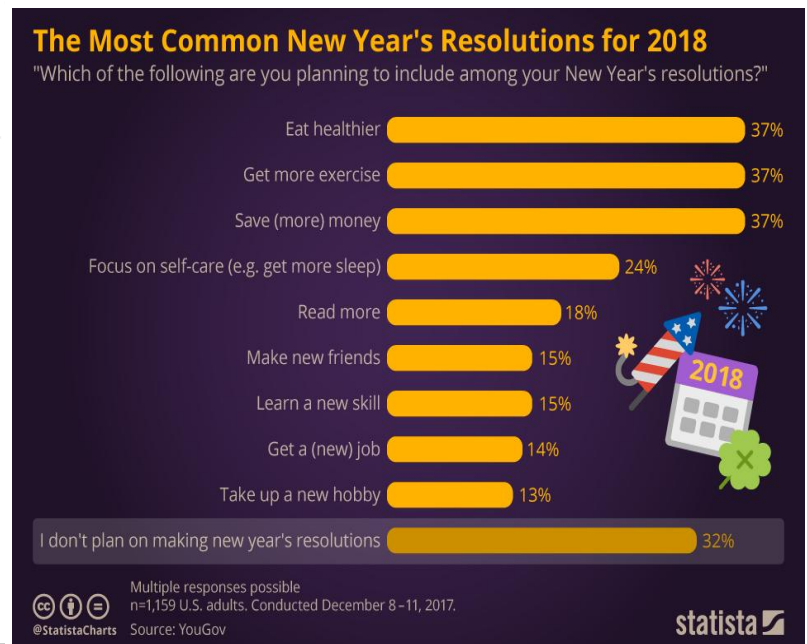


Figure 4 shows that currently, Americans are not utilizing their fitness landscape to achieve optimal well-being (Secretary & President’s Council, 2017). Both adults and adolescents are more inactive than ever before. Only 20% of people are meeting fitness guidelines in the U.S. Children spend a daily average of over 7 hours in front of a screen and 33% of high school students spend over 3 hours a day playing video games.

The top New Year’s Resolutions for 2018 are illustrated in **Figure 5** (Armstrong & Richter, 2018). The top two were to “Eat Healthier” and “Get More Exercise”. However, these

are two historically common New Year's resolutions, and according to a study published in the Huffington Post, only 8% of people actually achieve their New Year's resolutions (Gregoire, 2017). These resolutions express an individual's desire to attain a superior well-being, yet few continue to follow through or take action on this desire.

The future brings prospects of advances in an individual's physical and social well-being because the integration of more advanced computational technology in everyday life will increase his/her ability to transform his/her fitness aspirations. This case analyzes the use of Virtual Reality, Augmented Reality and wearable technologies and its future impact on two different user (demographics):

- Professional athletes are using Virtual Reality, such as goggles and headsets, and wearable technology integration, like GPS trackers sewn into athletic uniforms, to train, prevent injuries, help with recovery, and expand the overall fitness landscape.
- Inactive individuals are using Augmented Reality, such as Pokémon Go, to fulfill their previously unrealized fitness potentials with an increased activity level and fitness landscape.

Computational Technology

Three developing technologies are being utilized by athletes, fit individuals, and previously inactive individuals to achieve a superior well-being. These users are utilizing:

- Virtual Reality tools such as headsets used in sports to detect head traumas and limit further long-term brain damage.
- Augmented Reality apps available for download on smartphones and wearable technologies, such as Pokémon Go.
- Wearable technologies such as fitness trackers and Apple watches to monitor and detect risks an athlete's health during training.

Recently, virtual reality, using sports training and exercise evaluation models, has developed capabilities to track ocular-motor impairment and vestibular balance dysfunction. Ocular-motor impairment is the inability to synchronize visual information with cognitive and motor functions. Vestibular balance dysfunction is impairment to the balance center of the brain, affecting the ability to coordinate head and eye movements. EYE-SYNC is a virtual reality company using technology that is able to detect these impairments in 60 seconds. Wearing a pair of EYE-SYNC goggles, a patient watches a target move in a circular motion for 30 seconds. The device monitors the patient's ability to predict and detect a certain circular pattern within the motion. A clear pattern in the motion of a patient's eye means no ocular-motor impairment, while abnormal patterns could detect some form of ocular-motor impairment. The second test monitors the patient's ability to keep an object in sight with rapid head movements. These tests are constantly improving to detect concussions and head traumas in athletes (The All-In-One Platform, 2018).

In July 2016, Niantic, Inc. released a new smartphone gaming app that transformed the way we play and interact: Pokémon Go. As of November 2017, Pokémon Go remains in the top 10 most popular games by monthly usership, 6th on the list at 8.36 million users per month (Verto Analytics, 2017).

AR Mode: 5% capability

Non-AR mode: 0%



Figure 6

The app uses AR based concepts, allowing users to catch Pokémon in the real-world environment around them. Incorporating location services, live camera functions, and real-world weather that impacts gameplay, the app requires users to get off the couch to play this video game. **Figure 3.1** depicts the AR mode of the game, utilizing location and camera functions, compared to the non-AR setting. The game currently utilizes only 5% of AR capabilities, giving it significant room for future expansion (Tassi, 2017). CEO John Hanke foresees incorporating developing AR functionalities into the game with the promise of Apple’s coming update to the ARKit and new technologies, such as mixed reality glasses and headsets.

Fitness trackers and Apple Watch make up almost 60% of wearable technology today (Kevin, 2015), as illustrated in **Figure 3.2**. These devices are transforming the way both fit and unfit individuals play and interact.

In the professional field, wearable devices allow coaches to monitor each player’s biometrics in real time to detect anomalies and signs of exhaustion during training and games. The opportunities for the applications of wearable technology are also expanding to average people who can use these devices to monitor physical activities and their health holistically.



Case Dynamics

Physically Fit Individuals and Professional Athletes

Virtual reality is increasingly becoming more involved in the sports world, helping athletes achieve the highest degree of performance. In particular, it addresses the issue of medical professionals not being able to diagnose a concussion.

When an athlete experiences a concussion, multiple symptoms occur: headaches, dizziness, nausea, sleep problems, and cognitive problems. EYE-SYNC technology tests can detect ocular-motor impairment and vestibular balance dysfunction more accurately in athletes. Although neither of these tests are definitive indications of a concussion, they recommend to athletes when not to resume game action for risk of further damage. It was reported that 75% of athletes could detect symptoms of a concussion and 92% of them knew there was a serious risk associated with the idea of them returning to the field. Despite those statistics, only 54% of the athletes responding said they would report such symptoms to their coach/trainer (Hoffman 2013). The immediate results generated by the EYE-SYNC technology will stop athletes from returning to game actions and preventing further damage to the brain.

Wearable technology also plays a significant role in helping professional athletes achieve and maintain well-being (Clapp, 2016). It enables real-time tracking of their key health indicators by monitoring various aspects of an athlete's physical health, such as pulse rate, hydration, and temperature (Kevin, 2015). The integration of wearable technologies into sports will improve overall well-being of professional athletes as they can leverage the knowledge gained from these health metrics to proactively identify potential health issues. The following are some examples of the impact of wearables in professional sports ("How Wearable Tech is Transforming a Coach's Decision-Making", n.d.):

- The Toronto Raptors had the highest rate of player injury in the 2012 season. However, in 2014, after using athletic wearable technology that monitored players for early signs of soft tissue injury in practices and games, they had the least injuries of any team in the league.
- The Florida State Seminoles started wearing wearable analytic devices made by Australian industry giant, Catapult in 2013. In that year, the team had an 88 percent reduction of injuries to soft tissues.
- NFL players use GPS trackers sewn into their athletic uniforms to obtain real-time feedback on their balance, speed, acceleration, and motion. Coaches can readily detect early signs of injury to soft tissues, thus preventing more severe injuries.

Previously Inactive Individuals

The power of computational technology to impact society's overall well-being is most influenced by the demographic of previously unfit individuals. The release of the Augmented Reality based App Pokémon Go in July 2016 demonstrates the potential power and impact of these technologies on overall well-being.

In a joint study of Pokémon Go's influence on physical activity, Stanford researcher Tim Althoff and Microsoft researchers Ryen White and Eric Horvitz discovered the significant impact of augmented reality on well-being (2016). Within the first 30 days of the app's release, Pokémon Go added 144 billion steps to US physical activity. 31.7% of engaged users now maintained the average daily step count of 8000 since beginning gameplay, a 160% increase from before. In addition, the study predicts that the health benefits from improved physical activity using this app along could increase life expectancy by 41.4 days per user.

The study found significant evidence that the attracted users Pokémon Go were not only in the younger demographic, but also had below average activity levels. This should not come as a surprise; logically, typical video game users could be expected to spend more hours sitting on the couch “gaming” than engaging in physical activity. These “lazy gamers” are a target user of Pokémon Go. Since using the app, they have developed a more physically fit persona.



Age: 33

Daily Steps: 6,258

Male: 96.2%

BMI:

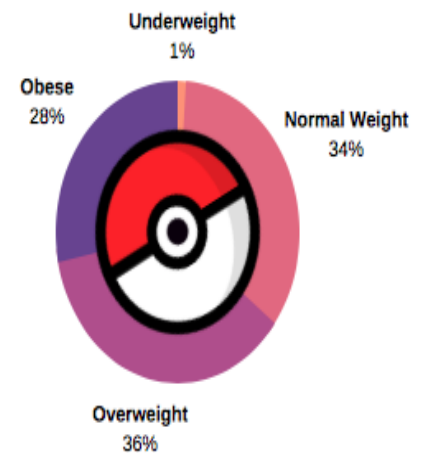


Figure 7- Persona of Pokémon Go User

According to the study, Pokémon Go users initially had 178 less steps per day than the Control group. After starting play, Pokémon Go users increased their average step count by an average 192 steps per day, about 3% higher than before, while the control group decreased activity by 50 steps per day during the same time period. However, when segregating out app

users with a higher interest in the game (10+ more queries), average daily step count increased by 1,473 steps, a 26% increase. **Figure 8** shows the greater impact on highly engaged users of the app. A benefit of AR based video games is the ability to increase user’s motivation to exercise. **Figure 9** depicts user’s motivation and reasons for playing Pokémon Go, with the most significant reason being “to exercise while playing” (YouGov, 2016).

Figure 8

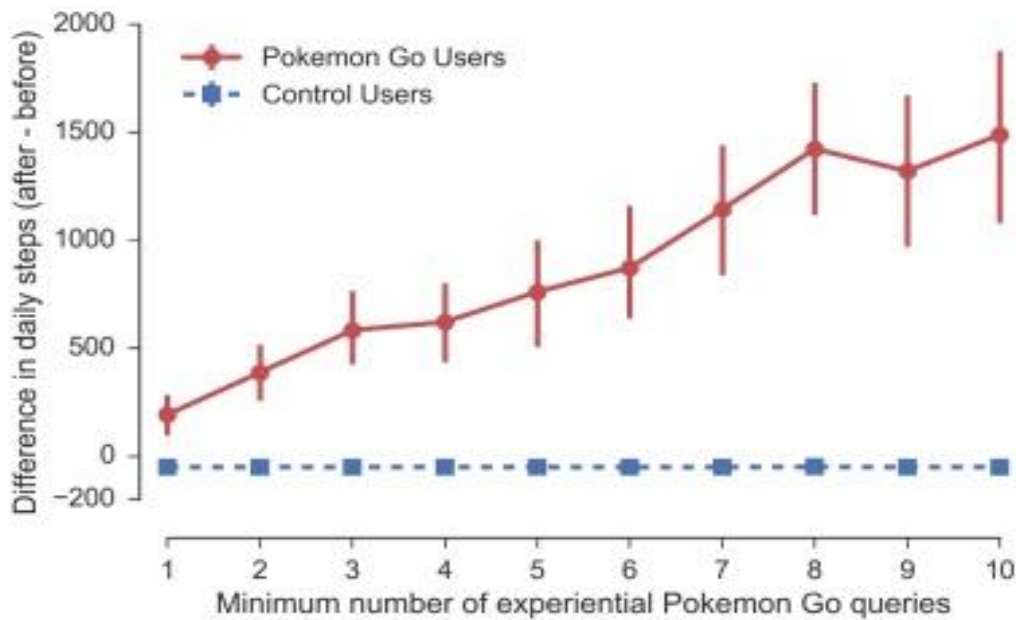
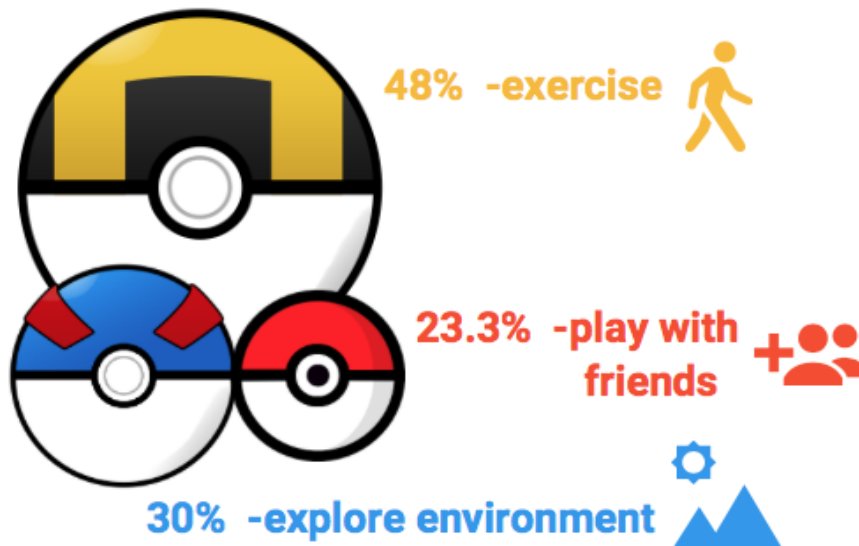


Figure 9

Reasons to play Pokémon Go



Conclusions

Athletes and non-athletes alike are exploiting the power of Virtual Reality, Augmented Reality, and wearable technologies to improve their fitness capabilities and overall physical well-being. Advancements in these technologies are revolutionizing the world of fitness. Virtual reality headsets can limit an athlete's risk of concussions and injuries for the betterment of athlete well-being. The technology allows for athletes to increase performance without compromising their overall physical health. Pokémon Go and other future gaming apps can make a significant impact on society's overall standard of living, with the potential to increase life by 41.4 days per person, adding 2.825 million years to US users.

Furthermore, the incorporation of VR/AR technologies in everyday life is increasing society's acceptance and adaptation of these technologies. Pokémon Go illustrates a straightforward, accessible app gradually introducing AR functionalities into everyday life. In a poll, 87% agreed that their experience using Pokémon Go increased their probability of using AR technologies in the future (Pokemon Go, 2016).

This case study analyzes just the beginning of the fitness revolution. Computational technologies will soon bridge the gap between the digital and physical world, creating communities of athletes and gamers in one "reality." New and exclusive beta forms of Augmented Reality Gyms and Virtual Reality Gyms are already emerging in modern society. Augmented Reality Exercise, or ARX, is developing technology that enhances personal fitness sessions at real gyms, transforming the fitness atmosphere from a monotonous, repetitive chore into a "fun and engaging video game." (ARX - Augmented Reality Exercise). This technology will enhance the real world landscape of the gym to make exercise more exciting and engaging. ARX also includes a social aspect by building a community of users on social media.

Performance data will be stored in cloud based architectures, that will enable users to share their progress and challenge their friends. This competitive community dares others to test their aspirations and achieve a superior well-being.

In 2016, Black Box VR founders embarked on a venture with the mission of disrupting and redefining the fitness industry (Black Box). The technology pairs resistance training with gaming principles to create the ultimate scenario for achieving one's fitness goals. Artificial Intelligence will soon be incorporated into these technologies to customize optimal workouts that maximize fitness results. The technology allows users to immerse themselves in dangerous scenarios to remove one's perceived limitations and tap into physical capabilities that are not easily accessible. As computational technology continues to advance at an accelerated rate, so does an individual's ability to move up his fitness landscape. The ability to reach hidden potentials will enable a positive shift in the fitness landscape, leading to new levels of physical well-being.

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