Future Perspectives on Next Generation e-Sports Infrastructure and Exploring Their Benefits

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Abstract. e-Sports and cyber games are becoming popular among the young population and the effectiveness of gaming industry depends on the effective infrastructure. This paper contemplates some of the future developments required in the information and communications industry to suit the demands of online gamers and e-Sports industry. Some of the modern developments which can add greater facilities to the next generation e-Sports industry for enhancing the future players' demands are also discussed. The article explores some of the potential future benefits of e-Sports in the field of education, training, learning and physical activities.

Keywords: e-Sports, infrastructure, industry, communication, education, learning.

1. Introduction

The success of Internet and rapid developments in virtual world is responsible for development of number of video and online games worldwide. In many countries e-Sports are increasingly becoming popular. An explosive growth of online gaming in various forms and shapes has taken place in the last few years, and it will only continue to grow as connectivity and computer availability increases. e-Sports or cyber sports are sports played online and are in the processing of becoming professional games. e-Sports can be briefly described as competitive computer gaming. e-Sport contains both amateuristic and professional elements and has many similarities common sport [1]. Competitions are organized not only online, but also on mobile phones. A content-rich and multimedia channel dedicated to online games is available in many parts of the world. Increasingly the events are becoming commercial along with competitors are paying for play. More and more money is being invested to create and sustain games, and the amount of time invested by the players grows as well. An online player can actually make a living out of acquiring virtual objects in MMORPG (Massive Multiplayer Online Role-Playing Games) and selling them on auction sites.

The global movement of e-Sport depends on several technological factors, such as the World Wide Web (WWW), the online-function of computer games and the development and expansion of broadband. Moreover standardization of games and internationalizing the competition process still in the premature process. Few organizations as such as All-China Sports Federation, in 2004, through holding China E-Sports Games, aimed to standardize and guide the healthy development of the games, and to internationalize those games with Chinese characteristics [2]. However, there is a need to have global consensus on organizing international game contests, framing rules, regulations and developing ethical standards related to cyber games.

2. Technical Factors Influencing Next-generation e-Sports

2.1. Broadband, Online Gaming and TV-Shows

Online gaming is made possible by broadband access. High-speed games can be played against opponents on an adjacent computer at the local PC *Bang* (*Bang* is Korean word for local gaming centers or stations) or on the other side of the country [3]. Pro-gamers play on television channels devoted to computer games, and receive salaries and attract several fans. The increasing availability of broadband Internet connections has led to a rise in popularity of networked games. These range from large, complex, persistent

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online environments supporting a large number of simultaneous participants, e.g., Massively-Multiplayer Online Games (MMOGs), to more conventional, First Person Shooter (FPS) games supporting a relatively small number of players.

The basic infrastructure required for e-Sports are IT facilities and telecom Infrastructure. A good example in this category is China Interactive Sports. This is a broadband interactive multi sports service platform. It uses IT and telecommunications technologies as central point, gathering related systems, applications and resources as important ingredients, carrying many application systems, including sports websites, sports competition management, sports games online and online competition result broadcasting to service members of the online sports world [2].

There have been recent attempts to create Television shows that follow gamers [4]. In Korea, for example, they have their own TV channels for coverage of big games. Some star players are shining in the e-Sports industry that shows the e-Sports industry is very promising. e-Sports are developing with priority given to online game industry, based on advanced high-speed telecommunication industry globally and IT industry. Meanwhile, online gaming is appraised as the new invention in the 21st century [5]. There are some companies focusing on internet network for gamers. The *ingame Gmbh* is one such company, which is the leading German internet network for gamer. Now its popularity is over 600,000 registered users [6].

TV electronic-Sports (e-Sports) is computer and video games played as competitive sports over the Internet and a local area network (LAN), and are provided to users through a TV relay broadcasting system and the Internet due to tremendous popularity of the e-Sports recently [7]. Public user experiences with video entertainment and computer games, driven by the rapid evolution in digital technologies have led to on-demand home digital video services and extremely sophisticated computer games with multiplayer capabilities, high-quality three-dimensional video rendering, and special effects rely on high-end computational platforms equipped with power-intensive display engines and large amounts of memory[8].

These days the e-Sports no longer remained as common games played on computer rooms. No longer are computer game contests considered "virtual competitions." The action is real - live, pulse-pounding affairs held before wildly enthusiastic crowds, with glorious victory or humiliating defeat hanging in the balance on each player's every move. In many competitions such as in ESPORTS ARENA, in addition to the displays at the individual stations, ongoing competition between players can be displayed in real-time for both the audience as well as game players on the theater auditorium's giant screen using special split-screen technology [9].

2.2. Dynamic In-Game Advertising

Recently In-game advertising (IGA) is getting more popular in video gaming industry. In IGA, the advertisements are displayed along with video games. Unlike normal advertisements, the advertisements can be changed from remote locations. In-game advertising on next-generation gaming systems is expected to grow to $852 million by 2011, fueled largely by connectivity enhancements in the consoles. The projection is part of a forecast released by ABI Research [10]. "*The growth and interest in this generation [of game consoles] is in part because the numbers of connected consoles are much, much greater,*" says Michael Wolf, research director, digital home, at ABI Research. Connected consoles create more opportunities for dynamic in-game advertising, where ad-placements can be updated with new campaigns and advertisers. It also allows advertisers to commit to a particular title closer to release date, or even after a game is in stores.

3. Entertainment to Enterprise: Technical Developments

3.1. Next Generation Game Server Infrastructure

Many MNCs (Multi-National Corporations) are trying to develop good strategies to improve the games. For example, Sun Technologies for Network Games focus on enabling high-performance gaming across any network or device [11]. Engineers working on developing next-generation game server infrastructure that will drastically reduce the cost and complexity of delivering high-performance games across any network or devices. Future gaming industry will be of playing or connecting to game anytime, anywhere, from any device. Sun has been working closely with middleware developers, handset and console manufacturers, broadband service providers, and wireless carriers to deliver a next-generation solution that will enable high-performance gaming across any network or device.

3.2. e-Sports by cognitive UWB (Ultra Wideband) Radio

Future of e-Sports is bright in many directions. Especially e-Sports industry is looking for new type of games which are more or less physical than only mental. In one of the interesting online video, viewers can see kind of changes that will appear in the future e-games [12]. In addition, some technical experts will see the integration of e-Sports along with cognitive UWB (Ultra Wideband) radio and embedded systems. Cognitive Radio has been recently hailed to be the "Next Big Thing" in future wireless communications. Uniqueness of Cognitive Radio is its ability to make efficient use of resource-limited spectrum environments, based on automatically adapting to a wireless channel and network environment. Cognitive Radio is suitable for radio nodes collaboration to share spectrum and can be applied to realize autonomous, spectrum-agile radios with adaptive wireless networking [13].

3.3. WCG Networks

To provide the fast, secure and flexible network environment for ensuring the international players, there are many organizations trying to develop and implement networks especially designed for World Cyber Games (WCG). The World Cyber Games is regarded as the world's most prestigious e-Sports competition. These networks make the competitors to demonstrate their abilities to the maximum level of flexibility. In this direction, some companies also developing stable networks suitable for successful cyber game contests. For, example, the ProCurve Networking business unit of HP delivers enterprise networking solutions comprising wired and wireless LAN and WAN networking products, services and solutions [14]. WCG games are streams live into the Internet and TV in many countries with nearly 30 million audiences across the globe. To cope with this requirement the network needs to move data around in the right order, and with a minimum of jitter. In addition, the ProCurve network will provide the infrastructure that will deliver real-time event coverage that will reach between 20 and 40 million people across the globe. The WCG network is designed to create a flexible, stable and dependable competition environment, while providing a secure wireless overlay across the entire WCG venue during the event.

3.4. Pervasive Gaming

In the recent years games are becoming more pervasive in terms of user demands and flexibility. For example, many players like to play games during their free time while travelling in bus, subways or in restaurants. Instead of isolating game play to specific environments and limited sessions, as in the case with PC and console games, pervasive games allow greater degrees of freedom and new kinds of playing behavior often characterized as anytime, anywhere, gaming [15]. The focus is on pervasive games that are played with mobile phones. For instance, once GPS (General Position System) becomes more common in mobile phones, it is also probable that more mobile games and applications that use location features will be created [16].

The use of GSM (Global System for Mobile communications) short message service (SMS) and other cellular network services for gaming were examined in [17, 18, 19], but these studies consider relatively low-end games, rather than the state-of-the-art video-intensive games that are prevalent today. Devices such as the PSP (PlayStation Portable) support a rich choice of computer games, are well supported by numerous hardware and software companies, and are widely accepted in the market place. The intrinsic multiuser game support capability of the PSP eliminates the need for game servers, and, as a mobile hand-held gaming console, it is hardened and designed for travel. A cabin entertainment system built on the PSP architecture also makes use of a successful commercial off-the-shelf product design [8].

3.5. Integrated Physical and Virtual Gaming Facilities

Interactivity in gaming is very important to make the games more interesting. Almost most of the widely played games are virtual without much physical interaction. A common feature of pervasive games, not implemented in computer gaming previously, is the integration of the physical and virtual worlds when creating a game world. By placing virtual objects at physical locations or by enhancing physical locations with information presented in the virtual world, pervasive games expand the use of both the physical and the virtual in game design. Traditional computer games have a clear focus on the virtual world, as they build their game worlds almost exclusively on the virtual dimension [15]. In the future there is a demand for such games that makes the players physically concerned rather than psychologically connected. Some researchers view that, sport simulation integrates sport exercise and state-of-art science technologies to add interesting into scientific training [20, 21]. Definitely the development in robotics, embedded real-time systems, sensors and actuators may boost the development of integrated virtual and physical gaming facilities.

4. Exploring Benefits

4.1. e-Sports as Educational Training Tools

There is a greater to need to develop interactive games rather than just games to attract wider players around the world. For example, games such as virtual teacher/trainers could provide answers to different questions of students, may be of great benefit in the future. Few recent researchers demonstrate that videogames enhance literacy, attention, reaction time, and higher-level thinking. Several scholars have suggested that massively multiplayer online games (MMOs) such as *Everquest* and *Second Life* have educational potential. The paper [22] reports findings from two MMO-based courses in the context of situated learning theory. The first course, focused on the ethnography of online games, used the game *Everquest* as a vehicle for teaching research methods to 36 students in an undergraduate communication course. Recommending that potential virtual environments be selected on the basis of genre, accessibility, and extensibility, it is suggested that game-based assignments are most effective when they build bridges between the domain of the game world and an overlapping domain of professional practice. In addition to their social character, MMOs are uniquely engaging environments. In a recent study of 30,000 players, Yee [23] found that 70% had spent at least 10 continuous hours in a virtual world at one sitting.

4.2. Flow Experience

Many researchers have observed that players intensely involved with video-games display characteristics of the psychological state that Csikszentmihalyi [24] has termed the "flow experience." Hoffman and Novak [25] explain that the flow state is characterized by user confidence, exploratory behaviors, enjoyment, distorted time perception, and greater learning. Drawing on Heeter's [26] work on telepresence, Chou and Ting [27] argue that on-line games such as MMOs are uniquely likely to evoke all of these effects among users.

4.3. Enhanced Learning Process through e-Sports

Once students are highly engaged in the process of role-playing and information seeking, it is relatively easy to convince them to role-play as apprentice participants within a higher-level theoretical community. The students can also be encouraged to make the critical leap into meta-reflection about the similar learning processes embedded in both domains. Some theorists speculate that excessive involvement in virtual worlds negatively impacts interpersonal relationships, scholarship and family life [28]. Yet, similar charges were made against such media as film, comic books, and television when they first arrived, and each of these communication technologies has demonstrated its instructional effectiveness. In the absence of solid data supporting negative claims about MMOs, we should cautiously proceed with efforts to incorporate virtual environments into the classroom [22]. In Korea, the PC *Bangs* are in that process of creating community online but also partaking in physical community. Especially in Korea, many students would like to play games because of ability to do something "extremely well," in the areas of school or games, is very much taken seriously and admired. Who are good at playing digital games are quite highly regarded. Players involved in e-Sports are often celebrities supported by major corporate sponsorship and a loyal fan base.

4.4. In Physical Education Activities

There are other areas of applications where e-Sports could be more applicable. For example, author in [29] explores the benefits of e-Sports beyond normal academic training. They argue that, the e-Sports system's main application area not only in distance sport coaching and education, but it can also be used as virtual classroom and discussion platform with support of some tools from GlobalMMCS system. The Global-MMCS Project tries to build a collaboration system, which integrates various services including videoconference, instant messaging and streaming, support multiple videoconferencing technologies and heterogeneous collaboration environments [30]. As described in paper [29], when the game begins, the coach and students all go to the e-Sports portal website, they log-in using their usernames and passwords, then, the coach select and play the real-time live game transmitted from TV through Global-MMCS, both the coaches and students can then watch the game. During the game watching, the coach takes snapshots of valuable video frames for coaching and discussion, those snapshots are loaded to the collaborative whiteboards, coaches and students can then add graphic and text annotations collaboratively and synchronously using the whiteboard tool. During annotation, the coach creates and saves a new composite annotation stream by binding the annotation snapshots with the original game stream using timestamp information. This procedure is repeated till the whole game stream is over.

Usually, e-Sports put a higher demand on the players' abilities than common computer games, not only superb coordination capacity between hands and eyes, rapid response capacity and skilful handling capacity

of mouse and keyboard, but also complex strategic and tactical thinking ability [31]. However, e-Sports have some critical concerns, including unsuitable content of the games, social isolation of the players and lack of physical activities [32]. So, new e-Sports projects should overcome such limitations. Through local area network (LAN) or Internet, users in e-Sports play together with more communication and feedback. Apart from typical input devices which bind people staying long statically, such as keyboard, mouse and joystick, an exertion interface is an alternation which requires more users' physical activities [33]. Inspired by the above considerations, fitness-oriented e-Sport is one of the best options [34]. This will clearly show that future developments in e-Sports may cope with physically played sports as well.

5. Conclusion

e-Sports are continued to grow in rapid speed along with growing technological breakthroughs. But, there is a growing need to develop standards, rules and regulations to make the progress of development smoother. We believe that, e-Sports need to shift form limited countries to global level, to bring awareness among many players around the world. The challenges faced by the e-Sports industries and sponsors need to be addressed to strive for creating healthy and internationally recognized gaming environment. This paper examines the future perspectives on e-Sports infrastructure and the potential future benefits. There is several technical factors influence the next generation e-Sports such as broadband, online gaming and exclusive TV shows etc. The paper also presents some of the modern technical envelopments in next generation game servers, e-Sports by cognitive UWB, WCG networks and pervasive gaming facilities.

There are potential possibilities that e-Sports can be tools to bridge the gap between different countries and can be used in various training and educational purposes to improve the quality of teaching. Especially, the e-Sports facilities can enhance the learning abilities, flow experience through integrated educational and training tools. The game industries have great scope for development for ultra-modern games using advancements of ubiquitous computing to complex robots. As embedded software, wireless technologies and robotics arena is increasingly become popular, many game designers, academicians and researchers need to look forward technology savvy games for the next generation of e-Sports.

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